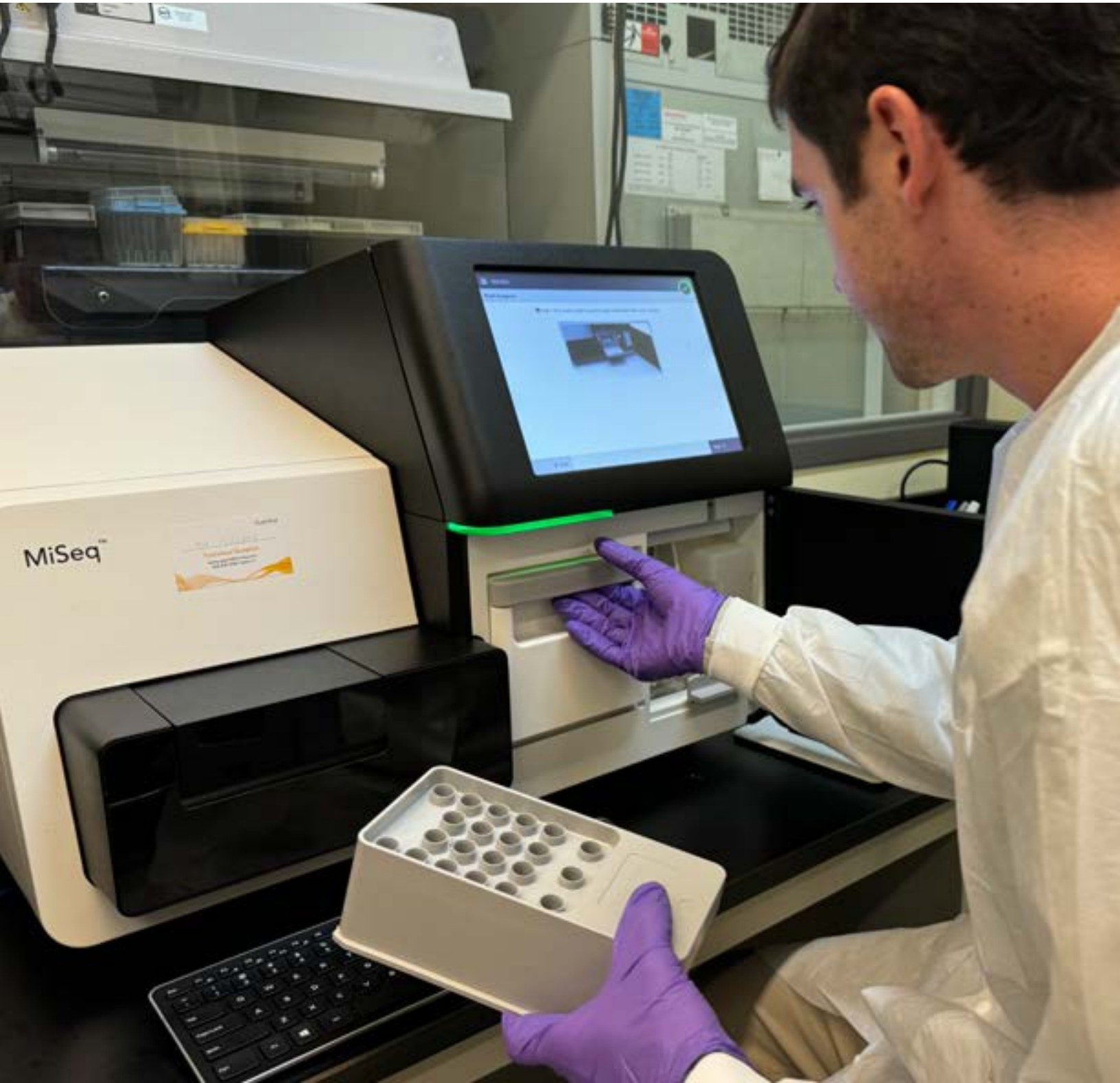
THE UNIVERSITY OF TENNESSEE HEALTH SCIENCE CENTER

RESEARCH

Institutional Research Core Facilities

FY23 Core Activity and Analysis Reports



THE UNIVERSITY OF TENNESSEE
HEALTH SCIENCE CENTER

Research Core Facilities Activities and Core Analysis Reports

Eighth Analysis, FY23 (July 2022-June 2023)

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Introduction

The purpose of the annual Institutional Core Facilities core activities and core analysis reports is to cultivate the research enterprise at the UT Health Science Center by reporting on core financial stability, key core accomplishments and the tangible and intangible return on investment in institutional core facilities by the state of Tennessee and the institution. The ultimate goal of reporting core activities and summarizing the financial overview of each core is to optimize operations of the institutional core facilities.

The procedure for performing this analysis for fiscal year 2023 (FY23) (July 2022-June 2023) was as follows:

- The core directors and business managers submitted initial drafts of the annual core activity and core analysis reports in early October 2023 (after closeout of FY23 ledgers).
- The financial tables in the Executive Summary were approved by the assistant director and director of Office of Research (Natalie Smith and Jacqueline Toney) on November 11, 2023.
- During October-December 2023, the associate vice chancellor for Research—Core Labs reviewed the reports with core directors and business managers and requested updates or corrections.
- In January 2024, Dr. Seagroves created the final versions of the reports.
- After revisions based on comments received, the director of communications for the Office of Research (Lee Ferguson) collated the final copies of the reports for publication.
- The final report drafts were presented to the interim vice chancellor for Research (Wesley Byerly, PharmD) in April of 2024.

As noted in the body of the reports, there were several operational and financial achievements accomplished in FY23; highlights are as follows:

- All cores were recommended to continue as institutional cores for FY24. However, the MPMS unit of the Proteomics & Metabolomics Core (PMC) was sunsetted effective June 30, 2023.
- Recoveries generated by service fees increased by $438,588 in FY23 ($4,607,963) over FY22 levels ($4,169,375). [Table 1]
- Across all cores, a year-end surplus of $74,013 was generated despite a reduction in institutional subsidy by $319,099. However, it should be cautioned that this surplus primarily reflected cost savings from unfilled personnel positions that have since been filled in FY24. [Table 1]
- Four institutional cores, the Molecular Resource Center (MRC), the Lab Animal Care Unit (LACU), the Molecular Bioinformatics (mBIO) Core and the Proteomics and Untargeted Metabolomics Unit of the Proteomics and Metabolomics Core (PMC) ended FY23 with *net income* after accounting for subsidies from the Tennessee Higher Education Commission (THEC; MRC) and the institution, respectively. The other cores/units ended in a net deficit, including: the Regional

Biocontainment Lab (RBL), Flow Cytometry and Cell Sorting (FCCS), Research Histology Core (RHC), Medicinal Chemistry (MedChem) Core, the Metabolic Phenotyping Mass Spectrometry Unit (MPMS) of the PMC, and the Advanced Imaging Core (AIC). It should be noted that FCCS, RHC, MedChem and AIC have been historically underfunded for their operating budgets.

- Overall, the year-end net subsidy required to operate the institutional cores, excluding MRC THEC funds, which rollover to the MRC THEC budget each year, *decreased* from a surplus of $179,679 in FY23 to a surplus of $74,013 in FY23 (**Table 1**). The primary drivers of the surplus were unfilled personnel positions in the LACU and RBL, and the increased usage and revenues for LACU.
- Three cores were allocated a net negative budget in FY23, accounting for unrealistic expectations of external income, FCCS (-$10,045), Research Histology Core (-$21,091) and the MPMS unit of PMC (-$8,875) (**Appendix H**). Total funds to support institutional cores should be more carefully allocated going forward to prevent cores from beginning the FY in deficit.
- The Regional Biocontainment Lab (RBL) continued to respond to the COVID-19 pandemic by supporting new research projects on behalf of a variety of organizations, including several commercial entities and external academic users. However, revenues at the RBL decreased from $567,520 in FY22 to $453,322 in FY23, leading to a net deficit in FY23 of $28,202.
- The LACU generated a record $3,842,691 in total revenues in FY23, $597,583 more than in FY22, primarily due to the increase in mouse care days (per diems) from $2,102,674 in FY22 to $2,308,858 in FY23, as well as increased use of vet tech services. External income also increased from $14,725 in FY22 to $92,955 in FY23.
- The FCCS core director re-submitted a shared instrumentation (S10) grant proposal to acquire a new Cytek Aurora cell sorter (spectral and conventional laser instrument) in the FCCS core to replace the aging BD Biosciences Aria IIu cell sorter. The proposal was awarded in Q1 of FY24, and the instrument is currently undergoing technical validation.
- The RBL received a second federal award to support operations and infrastructure.
- Overall, individual core budgets required rebalancing within the constraints of the total operating budget, in order to reallocate budgets across cores so that they were aligned with projected operating expenses and revenues based upon several years of historical data. The budgets were revised in March of 2024 to accomplish this goal.
- For the second time since these reports have been generated in FY16, the institutional cores operating budget was sufficient in FY23 to operate all institutional shared resource facilities. However, it should be noted that unfilled personnel positions contributed the most significantly to this surplus; as the job market stabilizes, savings from unfilled positions cannot be relied upon to balance the operating budget. The cores are also operating as lean as possible, by ordering just-in-time; however, inflation post-pandemic for operating supplies is also a concern, since core operating expenses increased in FY23 over FY22 levels.

-**Table 1** overviews FY over FY comparisons of the aggregated cores' operating budgets.

-The institution reduced the allocated funding for core operations in FY23 relative to FY22. The net total operating budget for the cores decreased by $319,099 in FY23 ($3,257,204) over FY22 levels ($3,576,303) **(Appendix H)**. As previously noted, in FY23, the reduction in aggregated operating expenses was primarily due to unfilled personnel positions, a primary driver of the net surplus in FY23. As expected, due to high inflation in FY23, total operating expenses also increased from $7,557,027 in FY22 to $7,786,108 in FY23. In FY23, these operating expense increases were offset by increased total revenues ($4,607,963), an increase of ~10.5% over FY22 revenues ($4,169,375).

As indicated in **Table 1**, multiple sources of funding (subsidy) are necessary to supplement core revenues/external income from service fee recoveries. Since the vice chancellor for Research startup funds were expended by the close of FY18, the only funds available in the FY19-FY20 budgets to invest in new core equipment were dollars from the indirect cost return to the Office of Research. Sponsored programs/research expenditures experienced record growth from FY19-FY22. The FY20 indirect cost return to the Office of Research (based on FY19 research expenditures) was used to purchase the Zeiss Elyra 7 super resolution microscope system for the Advanced Imaging Core (AIC), which began offering super resolution microscopy services to the research community in January of 2021. Although grants and contracts awards increased between FY20-FY22, the onset of the COVID-19 pandemic in Q4 of FY20 led to budgetary concerns for FY21-FY23 that, to date, has resulted in the halt of indirect cost return to the Office of Research. There is currently no dedicated budget set aside for investments in new core equipment, or for the replacement of old/outdated equipment for the institutional core facilities.

We hope that these reports are helpful to the UT Health Science Center community.

TABLE 1

INSTITUTIONAL CORE LAB BUDGET BALANCES
VICE CHANCELLOR FOR RESEARCH
COMPARISON FY2016, FY2017, FY2018, FY2019, FY2020, FY2021, FY2022, FY2023

	EXPENSE BUDGET	INCOME BUDGET	NET STATE FUNDED BUDGET	Cumulative Actual Expenses	Cumulative Internal Recovery & External Income	BUDGET BALANCE *Income / (Subsidy) without MRC, if THEC rollover*	EXPENDITURES FUNDED BY OTHER SOURCES	TOTAL Income/(Subsidy)
FY2016 TOTAL ALL ACCOUNTS:	2,255,575	(275,000)	1,980,575	5,498,507	(3,444,744)	(73,188)	1,276,817	(1,350,005)
FY2017 TOTAL ALL ACCOUNTS:	2,141,183	(161,528)	1,979,655	5,615,825	(3,516,189)	(119,981)	387,243	(507,224)
FY2018 TOTAL ALL ACCOUNTS:	2,553,788	(306,393)	2,247,395	6,539,617	(2,876,389)	(1,447,171)	715,703	(2,162,874)
FY2019 TOTAL ALL ACCOUNTS:	2,678,048	(327,538)	2,350,510	6,272,412	(3,140,272)	(831,034)	-	(831,034)
FY2020 TOTAL ALL ACCOUNTS:	2,543,266	(61,373)	2,481,893	6,389,938	(3,396,176)	(560,140)	-	(560,140)
FY2021 TOTAL ALL ACCOUNTS:	$ 2,572,123	(95,850)	3,219,610	7,772,001	(4,231,048)	(172,357)	-	(172,357)
FY2022 TOTAL ALL ACCOUNTS:	$ 3,709,901	(142,570)	3,576,303	7,557,027	(4,169,375)	179,679	-	179,679
FY2023 TOTAL ALL ACCOUNTS:	$ 3,472,344	(215,140)	3,257,204	7,786,108	(4,607,963)	79,059	-	79,059

Increase (Decrease) Comparison FY2016 through FY2023

	EXPENSE BUDGET	INCOME BUDGET	NET STATE FUNDED BUDGET	Cumulative Actual Expenses	Cumulative Internal Recovery & External Income	BUDGET BALANCE *Income / (Subsidy) without MRC, if THEC rollover*	EXPENDITURES FUNDED BY OTHER SOURCES	FY over FY TOTAL NET SUBSIDY Increase/(Decrease)
Increase (Decrease) from FY2016 to FY2017	**(114,392)**	**(113,472)**	**(920)**	**117,318**	**71,445**	**46,793**	**(889,574)**	**(842,781)**
Increase (Decrease) from FY2017 to FY2018	**412,605**	**144,865**	**267,740**	**923,792**	**(639,800)**	**1,327,190**	**328,460**	**1,655,650**
Increase (Decrease) from FY2018 to FY2019	**124,260**	**21,145**	**103,115**	**(267,205)**	**263,883**	**(616,137)**	**(715,703)**	**(1,331,840)**
Increase (Decrease) from FY2019 to FY2020	**(134,782)**	**(266,165)**	**131,383**	**117,526**	**255,904**	**(270,894)**	**-**	**(270,894)**
Increase (Decrease) from FY2020 to FY2021	**28,867**	**28,551**	**737,717**	**1,382,063**	**834,872**	**(387,783)**	**-**	**(387,783)**
Increase (Decrease) from FY2021 to FY2022	**1,137,768**	**(1,551)**	**356,693**	**(214,974)**	**(61,673)**	**352,036**	**-**	**352,036**
Increase (Decrease) from FY2022 to FY2023	**(237,557)**	**72,570**	**(319,099)**	**229,081**	**438,588**	**(105,666)**	**-**	**(105,666)**

APPENDIX A

INSTITUTIONAL CORE LAB BUDGET BALANCES
VICE CHANCELLOR FOR RESEARCH
FISCAL YEAR END 2016

Unrestricted

ACCT NO.	ACCOUNT NAME	FY16 EXPENSE BUDGET (includes PO carryover)	FY16 INCOME BUDGET	FY16 NET STATE FUNDED BUDGET	Cumulative Actual Expenses	Cumulative Internal Recovery & External Income	BUDGET BALANCE *income / (subsidy)*	EXPENDITURES FUNDED BY OTHER SOURCES *(a)*	TOTAL income/(subsidy)
E070160	LABORATORY ANIMAL CARE UNIT (LACU)	791,397	(150,000)	641,397	3,442,706	(2,795,576)	(5,733)		(5,733)
E070161	FLOW CYTOMETRY and CELL SORTING (FCCS)	5,000	(5,000)	0	4,714	(12,832)	8,118		8,118
E070165	REGIONAL BIOCONTAINMENT LAB (RBL)	738,532	(120,000)	618,532	779,033	(195,120)	34,619		34,619
	PROTEOMICS AND METABOLOMICS CORE (PMC)	0	0	0	0	0	0	1,074,817	(1,074,817)
E070167001	MOLECULAR BIOINFORMATICS	71,531	0	71,531	101,967	(39,478)	9,042		9,042
	SUBTOTAL UNRESTRICTED ACCOUNTS	***1,606,460***	***(275,000)***	***1,331,460***	***4,328,420***	***(3,043,006)***	***46,046***	***1,074,817***	***(1,028,771)***

Restricted

ACCT NO.	ACCOUNT NAME	FY16 EXPENSE BUDGET		FY16 THEC FUNDED & ADJUSTED BUDGET	Cumulative Actual Expenses	Cumulative Internal Recovery & External Income	THEC BUDGET BALANCE *Rollover / (Subsidy)*	EXPENDITURES FUNDED BY OTHER SOURCES *(a)*	TOTAL MRC THEC Rollover/(Subsidy)
R070167013	MOLECULR RESOURCE CENTER (MRC) of Excellence FY16	649,115		649,115	1,170,087	(401,738)	(119,234)	202,000	(321,234)
	SUBTOTAL RESTRICTED ACCOUNT	***649,115***	***-***	***649,115***	***1,170,087***	***(401,738)***	***(119,234)***	***202,000***	***(321,234)***
	TOTAL ALL ACCOUNTS:	**$ 2,255,575**	**$ (275,000)**	**$ 1,980,575**	**$ 5,498,507**	**$ (3,444,744)**	**$ (73,188)**	**$ 1,276,817**	**$ (1,350,005)**

(a) Funded by VC Research start-up

Orbitrap Lumos Mass Spectrometer for PMC	**1,027,150**
D. Kakhniashvili, PMC Director, salary 12/15/15 - 6/30/16	**47,667**
Total PMC:	**$1,074,817**
NexGen500 Sequencing System/Illumina, for MRC	202,000
Total MRC:	**$202,000**

APPENDIX B

INSTITUTIONAL CORE LAB BUDGET BALANCES

VICE CHANCELLOR FOR RESEARCH
FISCAL YEAR END 2017

Unrestricted	ACCOUNT NAME	FY17 EXPENSE BUDGET	FY17 INCOME BUDGET	FY17 NET STATE FUNDED BUDGET	Cumulative Actual Expenses	Cumulative Internal Recovery & External Income	BUDGET BALANCE *income / (subsidy)*	EXPENDITURES FUNDED BY OTHER SOURCES *(a)*	TOTAL income/(subsidy)
ACCT NO.	LABORATORY ANIMAL CARE (LACU)	610,729	(20,300)	590,429	3,401,781	(2,805,431)	(5,921)	0	(5,921)
E070160	FLOW CYTOMETRY and CELL SORTING (FCCS)	15,000	(15,000)	0	75,998	(24,320)	(51,678)	286,592	(338,270)
E070161	REGIONAL BIOCONTAINMENT LAB (RBL)	697,204	(70,000)	627,204	784,798	(221,535)	63,941	0	63,941
E070165	PROTEOMICS AND METABOLOMICS CORE (PMC)	90,640	0	90,640	149,277	(26,470)	(32,167)	0	(32,167)
E070170	MOLECULAR BIOINFORMATICS (mBIO)	73,495	(5,000)	68,495	134,902	(30,006)	(36,401)	0	(36,401)
E070174	RESEARCH HISTOLOGY CORE (RHC)	5,000	(5,000)	0	35,290	0	(35,290)	0	(35,290)
E070175									
	SUBTOTAL UNRESTRICTED ACCOUNTS	***1,492,068***	***(115,300)***	***1,376,768***	***4,582,046***	***(3,107,762)***	***(97,516)***	***286,592***	***(384,108)***

Restricted	ACCOUNT NAME	FY17 EXPENSE BUDGET (includes FY16 PO carryover)	FY16 PO carryover	FY17 THEC FUNDED BUDGET	Cumulative Actual Expenses	Cumulative Internal Recovery & External Income	THEC BUDGET BALANCE *Rollover / (Subsidy)*	EXPENDITURES FUNDED BY OTHER SOURCES *(a)*	TOTAL MRC THEC Rollover/(Subsidy)
ACCT NO.	MOLECULAR RESOURCE CENTER (MRC) of Excellence, FY17	649,115	(46,228)	602,887	1,033,779	(408,427)	(22,465)	100,651	(123,116)
R070167014	***SUBTOTAL RESTRICTED ACCOUNT***	***649,115***	***(46,228)***	***602,887***	***1,033,779***	***(408,427)***	***(22,465)***	***100,651***	***(123,116)***
	TOTAL ALL ACCOUNTS:	**$ 2,141,183**	**$ (161,528)**	**$ 1,979,655**	**$ 5,615,825**	**$ (3,516,189)**	**$ (119,981)**	**$ 387,243**	**$ (507,224)**

(a) **Funded by VC Research start-up**

	286,592
YETI Flow Cytometry Analyzer	**$286,592**
Total FCCS:	
	100,651
STARlet NexGen Sequencing System/Hamilton	**$100,651**
Total MRC:	

APPENDIX C

INSTITUTIONAL CORE LAB BUDGET BALANCES

VICE CHANCELLOR FOR RESEARCH
FISCAL YEAR END 2018

Unrestricted	ACCOUNT NAME	FY18 EXPENSE BUDGET	FY18 INCOME BUDGET	FY18 NET STATE FUNDED BUDGET	Cumulative Actual Expenses	Cumulative Internal Recovery & External Income	BUDGET BALANCE *income / (subsidy)*	EXPENDITURES FUNDED BY OTHER SOURCES *(a)*		TOTAL income/(subsidy)
ACCT NO.	LABORATORY ANIMAL CARE (LACU)	865,209	(150,000)	715,209	3,946,369	(2,351,047)	(880,113)	550,952	*	(1,431,065)
E070160	FLOW CYTOMETRY and CELL SORTING (FCCS)	16,890	(16,890)	0	166,094	(28,892)	(137,202)	0		(137,202)
E070161	REGIONAL BIOCONTAINMENT LAB (RBL)	807,969	(70,000)	737,969	1,170,295	(130,680)	(301,646)	0		(301,646)
E070165	PROTEOMICS AND METABOLOMICS CORE (PMC)	93,360	0	93,360	163,712	(37,827)	(32,525)	0		(32,525)
E070170	MOLECULAR BIOINFORMATICS (mBIO)	67,302	(5,000)	62,302	132,520	(30,046)	(40,172)	0		(40,172)
E070174	RESEARCH HISTOLOGY CORE (RHC)	77,937	(59,503)	18,434	94,718	(19,663)	(56,621)	0		(56,621)
E070175	MEDICINAL CHEMISTRY CORE (MedChem)	5,000	(5,000)	0	12,725	(13,833)	1,108	164,751	*	(163,643)
E070176										
	SUBTOTAL UNRESTRICTED ACCOUNTS	***1,933,667***	***(306,393)***	***1,627,274***	***5,686,433***	***(2,611,988)***	***(1,447,171)***	***715,703***		***(2,162,874)***

Restricted	ACCOUNT NAME	FY18 EXPENSE BUDGET	FY17 PO carryover	FY18 THEC FUNDED BUDGET	Cumulative Actual Expenses	Cumulative Internal Recovery & External Income	THEC BUDGET BALANCE *Rollover / (Subsidy)*	EXPENDITURES FUNDED BY OTHER SOURCES *(a)*		TOTAL MRC THEC Rollover/(Subsidy)
ACCT NO.	MOLECULAR RESOURCE CENTER (MRC) of Excellence, FY18	620,121	-	620,121	853,184	(264,401)	31,338			31,338
R079700143	***SUBTOTAL RESTRICTED ACCOUNT***	***620,121***	***-***	***620,121***	***853,184***	***(264,401)***	***31,338***	***-***		***31,338***
	TOTAL ALL ACCOUNTS:	**$ 2,553,788**	**$ (306,393)**	**$ 2,247,395**	**$ 6,539,617**	**$ (2,876,389)**	**$ (1,415,833)**	**$ 715,703**	*	**$ (2,131,536)**
	OVERALL NET DEFICIT, EXCLUDING THEC ROLLOVER									**$ (2,162,874)**

*** Additional Institutional Support**

Funded by VC Research Start-up and UTHSC	550,952
New and replacement Animal Caging	**$550,952**
Total LACU:	
Funded by VC Research-MedChem Core Setup	80,000
Salary Support-MedChem	3,808
Dell Desktop and Laptop	19,967
Discover SP Microwave System	53,123
Reveleris Prep System	7,854
Digital Melting Pot, Thermosci, Stirrer Mantle	**164,751**
Total MedChem:	
	715,703
TOTAL:	

APPENDIX D

INSTITUTIONAL CORE LAB BUDGET BALANCES
VICE CHANCELLOR FOR RESEARCH
FISCAL YEAR END 2019

Unrestricted	ACCOUNT NAME	FY19 EXPENSE BUDGET	FY19 INCOME BUDGET	FY19 NET STATE FUNDED BUDGET	Cumulative Actual Expenses	Cumulative Internal Recovery & External Income	BUDGET BALANCE *income / (subsidy)*	EXPENDITURES FUNDED BY OTHER SOURCES *(a)*		TOTAL income/(subsidy)
ACCT NO.	LABORATORY ANIMAL CARE (LACU)	894,864	(150,000)	744,864	3,791,590	(2,640,045)	(406,681)			(406,681)
E070160	FLOW CYTOMETRY and CELL SORTING (FCCS)	18,513	(18,513)	0	126,532	(25,745)	(100,787)			(100,787)
E070161	REGIONAL BIOCONTAINMENT LAB (RBL)	825,465	(70,000)	755,465	951,231	(108,047)	(87,719)			(87,719)
E070165	PROTEOMICS AND METABOLOMICS CORE (PMC)	95,694	0	95,694	139,814	(40,930)	(3,190)			(3,190)
E070170	MOLECULAR BIOINFORMATICS (mBIO)	126,971	(5,000)	121,971	163,119	(16,661)	(24,487)			(24,487)
E070174	RESEARCH HISTOLOGY CORE (RHC)	79,025	(79,025)	0	129,931	(11,018)	(118,913)			(118,913)
E070175	MEDICINAL CHEMISTRY CORE (MedChem)	5,000	(5,000)	0	119,438	(30,181)	(89,257)			(89,257)
E070176										
	SUBTOTAL UNRESTRICTED ACCOUNTS	***2,045,532***	***(327,538)***	***1,717,994***	***5,421,655***	***(2,872,627)***	***(831,034)***	***0***		***(831,034)***

Restricted	ACCOUNT NAME	FY19 EXPENSE BUDGET	FY18 PO carryover	FY19 THEC FUNDED BUDGET	Cumulative Actual Expenses	Cumulative Internal Recovery & External Income	THEC BUDGET BALANCE *Rollover / (Subsidy)*	EXPENDITURES FUNDED BY OTHER SOURCES		TOTAL MRC THEC Rollover/(Subsidy)
ACCT NO.	MOLECULAR RESOURCE CENTER (MRC) of Excellence, FY19	632,516	-	632,516	850,757	(267,645)	49,404	0		49,404
R079700143	***SUBTOTAL RESTRICTED ACCOUNT***	***632,516***	***-***	***632,516***	***850,757***	***(267,645)***	***49,404***	***-***		***49,404***
	TOTAL ALL ACCOUNTS:	**$ 2,678,048**	**$ (327,538)**	**$ 2,350,510**	**$ 6,272,412**	**$ (3,140,272)**	**$ (781,630)**	***0***	*	**$ (781,630)**
	OVERALL NET DEFICIT, EXCLUDING THEC ROLLOVER									**$ (831,034)**

APPENDIX E

INSTITUTIONAL CORE LAB BUDGET BALANCES
VICE CHANCELLOR FOR RESEARCH
FISCAL YEAR END 2020

Unrestricted	ACCOUNT NAME	FY20 EXPENSE BUDGET	FY20 INCOME BUDGET	FY20 NET STATE FUNDED BUDGET	Cumulative Actual Expenses	Cumulative Internal Recovery & External Income	BUDGET BALANCE *income / (subsidy)*	EXPENDITURES FUNDED BY OTHER SOURCES (*a*)		TOTAL income/(subsidy)
ACCT NO.	LABORATORY ANIMAL CARE (LACU)	858,840	(30,000)	828,840	3,952,325	(2,891,915)	(231,570)			(231,570)
E070160002	FLOW CYTOMETRY and CELL SORTING (FCCS)	19,844	(19,844)	0	199,646	(30,499)	(169,147)	0		(169,147)
E070161	REGIONAL BIOCONTAINMENT LAB (RBL)	755,371	(20,000)	735,371	888,434	(195,215)	42,152			42,152
E070165	PROTEOMICS AND METABOLOMICS CORE (PMC)/MPMS UNIT	97,608	0	97,608	230,744	(70,947)	(62,189)			(62,189)
E070179	MOLECULAR BIOINFORMATICS (mBIO)	128,980	(5,000)	123,980	156,125	(15,784)	(16,361)			(16,361)
E070182	RESEARCH HISTOLOGY CORE (RHC)	34,414	(34,414)	0	75,345	(24,136)	(51,209)			(51,209)
E070184	MEDICINAL CHEMISTRY CORE (MedChem)	6,312	(6,312)	0	85,546	(13,730)	(71,816)			(71,816)
E070185						0				
	SUBTOTAL UNRESTRICTED ACCOUNTS	***1,901,369***	***(115,570)***	***1,785,799***	***5,588,165***	***(3,242,226)***	***(560,140)***	***0***		***(560,140)***

Restricted	ACCOUNT NAME	FY20 EXPENSE BUDGET	FY19 PO carryover	FY20 THEC FUNDED BUDGET	Cumulative Actual Expenses	Cumulative Internal Recovery & External Income	THEC BUDGET BALANCE *Rollover / (Subsidy)*	EXPENDITURES FUNDED BY OTHER SOURCES		TOTAL MRC THEC Rollover/(Subsidy)
ACCT NO.	MOLECULAR RESOURCE CENTER (MRC) of Excellence, FY20	641,897	54,197	696,094	801,773	(153,950)	48,271	0		48,271
R079700143	***SUBTOTAL RESTRICTED ACCOUNT***	***641,897***	***54,197***	***696,094***	***801,773***	***(153,950)***	***48,271***	***-***		***48,271***
	TOTAL ACROSS ALL ACCOUNTS:	**$ 2,543,266**	**$ (61,373)**	**$ 2,481,893**	**$ 6,389,938**	**$ (3,396,176)**		***0***		
	OVERALL NET DEFICIT, EXCLUDING THEC ROLLOVER									**$ (560,140)**

APPENDIX F

INSTITUTIONAL CORE LAB BUDGET BALANCES
VICE CHANCELLOR FOR RESEARCH
FISCAL YEAR END 2021

Unrestricted	ACCOUNT NAME	FY21 EXPENSE BUDGET	FY21 INCOME BUDGET	FY21 NET STATE FUNDED BUDGET	Cumulative Actual Expenses	Cumulative Internal Recovery & External Income	BUDGET BALANCE *income / (subsidy)*	EXPENDITURES FUNDED BY OTHER SOURCES (*a*)	TOTAL income/(subsidy)
ACCT NO.	LABORATORY ANIMAL CARE (LACU)	858,840	(30,000)	1,075,284	3,900,980	(3,064,422)	238,726	-	238,726
E070160002	FLOW CYTOMETRY and CELL SORTING (FCCS)	19,844	(20,570)	64,760	217,136	(32,824)	(119,552)	-	(119,552)
E070161	REGIONAL BIOCONTAINMENT LAB (RBL)	755,371	(20,000)	1,029,459	1,838,975	(827,598)	18,082	-	18,082
E070165	PROTEOMICS AND METABOLOMICS CORE (PMC)-PROTEOMICS UNIT	98,535	0	138,942	110,341	(15,326)	43,927	-	43,927
E070179	MOLECULAR BIOINFORMATICS (mBIO)	128,980	(5,000)	150,538	111,321	(17,241)	56,458	-	56,458
E070182	RESEARCH HISTOLOGY CORE (RHC)	34,414	(34,414)	12,045	79,927	(23,568)	(44,314)	-	(44,314)
E070184	MEDICINAL CHEMISTRY CORE (MedChem)	6,312	(6,312)	26,070	96,384	(36,370)	(33,944)	-	(33,944)
E070185	METABOLIC PHENOTYPING MASS SPECTROMETRY (MPMS) UNIT OF PMC	22,000	(22,175)	7,828	80,841	(41,216)	(31,797)	-	(31,797)
E070186	ADVANCED IMAGING CORE (AIC)	0	(5,650)	18,586	481,567	(5,080)	(457,901)	-	(457,901)
E070187						0			
	SUBTOTAL UNRESTRICTED ACCOUNTS	***1,924,296***	***(144,121)***	***2,523,512***	***6,917,472***	***(4,063,645)***	***(330,315)***	***0***	***(330,315)***
	ADDITIONAL OPERATIONAL FUNDS			157,958					157,958
E070183	***NET SUBTOTAL UNRESTRICTED ACCOUNTS***	**1,924,296**	**(144,121)**	**2,681,470**	**6,917,472**	**(4,063,645)**	**(330,315)**	**0**	**$ (172,357)**

Restricted	ACCOUNT NAME	FY21 EXPENSE BUDGET	FY20 THEC CARRYOVER	FY21 THEC FUNDED BUDGET	Cumulative Actual Expenses	Cumulative Internal Recovery & External Income	THEC BUDGET BALANCE *income / (subsidy)*	EXPENDITURES FUNDED BY OTHER SOURCES	TOTAL MRC THEC Rollover/(Subsidy)
ACCT NO.	MOLECULAR RESOURCE CENTER (MRC) of Excellence, FY21, THEC appropriation	647,827	48,271	696,098	854,529	(167,403)	8,971	-	8,971
R079700143	***SUBTOTAL RESTRICTED ACCOUNT***	***647,827***	***48,271***	***696,098***	***854,529***	***(167,403)***	***8,971***	***-***	***8,971***
	TOTAL ACROSS ALL ACCOUNTS:	**$ 2,572,123**	**$ (95,850)**	**$ 3,219,610**	**$ 7,772,001**	**$ (4,231,048)**	**$ 8,971**	***0***	**$ 8,971**
	OVERALL NET DEFICIT, EXCLUDING THEC ROLLOVER								**$ (172,357)**

APPENDIX G

INSTITUTIONAL CORE LAB BUDGET BALANCES
VICE CHANCELLOR FOR RESEARCH
FISCAL YEAR END 2022

Unrestricted	ACCOUNT NAME	FY22 EXPENSE BUDGET	FY22 INCOME BUDGET	FY22 NET STATE FUNDED BUDGET	Cumulative Actual Expenses	Cumulative Internal Recovery & External Income	BUDGET BALANCE *income / (subsidy)*	EXPENDITURES FUNDED BY OTHER SOURCES (*a*)	TOTAL income/(subsidy)
ACCT NO.	LABORATORY ANIMAL CARE (LACU)	1,385,501	(30,000)	1,355,501	4,303,550	(3,245,108)	297,059	-	297,059
E070160002	FLOW CYTOMETRY and CELL SORTING (FCCS)	29,442	(19,844)	9,598	192,206	(31,533)	(151,075)	-	(151,075)
E070161	REGIONAL BIOCONTAINMENT LAB (RBL)	1,178,859	(20,000)	1,158,859	1,528,661	(567,520)	197,718	-	197,718
E070165	PROTEOMICS AND METABOLOMICS CORE (PMC)-PROTEOMICS UNIT	150,325	0	150,325	130,261	(40,135)	60,199	-	60,199
E070179	MOLECULAR BIOINFORMATICS (mBIO)	196,580	(5,000)	191,580	159,347	(15,847)	48,080	-	48,080
E070182	RESEARCH HISTOLOGY CORE (RHC)	51,060	(34,414)	16,646	67,373	(13,261)	(37,466)	-	(37,466)
E070184	MEDICINAL CHEMISTRY CORE (MedChem)	13,253	(6,312)	6,941	71,943	(15,545)	(49,457)	-	(49,457)
E070185	METABOLIC PHENOTYPING MASS SPECTROMETRY (MPMS) UNIT OF PMC	32,642	(22,000)	10,642	53,358	(21,140)	(21,576)	-	(21,576)
E070186	ADVANCED IMAGING CORE (AIC)	7,418	(5,000)	2,418	120,922	(11,785)	(106,719)	-	(106,719)
E070187						0			
	SUBTOTAL UNRESTRICTED ACCOUNTS	***3,045,080***	***(142,570)***	***2,902,510***	***6,627,621***	***(3,961,874)***	***236,763***	***0***	***236,763***
	ADDITIONAL OPERATIONAL FUNDS			0					0
E070183	***NET SUBTOTAL UNRESTRICTED ACCOUNTS***	**3,045,080**	**(142,570)**	**2,902,510**	**6,627,621**	**(3,961,874)**	**236,763**	**0**	**$ 236,763**

Restricted	ACCOUNT NAME	FY22 EXPENSE BUDGET	FY21 THEC CARRYOVER	FY22 THEC FUNDED BUDGET	Cumulative Actual Expenses	Cumulative Internal Recovery & External Income	THEC BUDGET BALANCE *income / (subsidy)*	EXPENDITURES FUNDED BY OTHER SOURCES	TOTAL MRC THEC Rollover/(Subsidy)
ACCT NO.	MOLECULAR RESOURCE CENTER (MRC) of Excellence, FY21, THEC appropriation	664,821	8,972	673,793	929,406	(207,501)	(48,112)	-	(48,112)
R079700143	***SUBTOTAL RESTRICTED ACCOUNT***	***664,821***	***8,972***	***673,793***	***929,406***	***(207,501)***	***(48,112)***	***-***	***(48,112)***
	TOTAL ACROSS ALL ACCOUNTS:	**$ 3,709,901**	**$ (133,598)**	**$ 3,576,303**	**$ 7,557,027**	**$ (4,169,375)**	**$ (48,112)**	***0***	**$ (48,112)**

OVERALL NET DEFICIT, EXCLUDING THEC ROLLOVER	**$ 188,651**
OVERALL NET DEFICIT, INCLUDING FY21 ROLLOVER	**$ 179,679**

APPENDIX H

INSTITUTIONAL CORE LAB BUDGET BALANCES
VICE CHANCELLOR FOR RESEARCH
FISCAL YEAR END 2023

Unrestricted	ACCOUNT NAME	FY23 EXPENSE BUDGET	FY23 INCOME BUDGET	FY23 NET STATE FUNDED BUDGET	Cumulative Actual Expenses	Cumulative Internal Recovery & External Income	BUDGET BALANCE *income / (subsidy)*	EXPENDITURES FUNDED BY OTHER SOURCES (*a*)	TOTAL income/(subsidy)
ACCT NO.	LABORATORY ANIMAL CARE (LACU)	1,442,651	(40,000)	1,402,651	4,795,877	(3,842,691)	449,465	-	449,465
E070160002	FLOW CYTOMETRY and CELL SORTING (FCCS)	24,643	(34,688)	(10,045)	177,162	(32,034)	(155,173)	-	(155,173)
E070161	REGIONAL BIOCONTAINMENT LAB (RBL)	926,516	(20,000)	906,516	1,388,040	(453,322)	(28,202)	-	(28,202)
E070165	PROTEOMICS AND METABOLOMICS CORE (PMC)-PROTEOMICS UNIT	129,474	0	129,474	181,027	(52,888)	1,335	-	1,335
E070179	MOLECULAR BIOINFORMATICS (mBIO)	168,189	(5,000)	163,189	120,391	(24,119)	66,917	-	66,917
E070182	RESEARCH HISTOLOGY CORE (RHC)	42,737	(63,828)	(21,091)	65,405	(15,786)	(70,710)	-	(70,710)
E070184	MEDICINAL CHEMISTRY CORE (MedChem)	13,470	(7,624)	5,846	80,784	(39,187)	(35,751)	-	(35,751)
E070185	METABOLIC PHENOTYPING MASS SPECTROMETRY (MPMS) UNIT OF PMC	30,125	(39,000)	(8,875)	23,342	(1,710)	(30,507)	-	(30,507)
E070186	ADVANCED IMAGING CORE (AIC)	6,209	(5,000)	1,209	133,470	(8,900)	(123,361)	-	(123,361)
E070187						0			
	SUBTOTAL UNRESTRICTED ACCOUNTS	***2,784,014***	***(215,140)***	***2,568,874***	***6,965,498***	***(4,470,637)***	***74,013***	***0***	***74,013***
	ADDITIONAL OPERATIONAL FUNDS			0					0
E070183	***NET SUBTOTAL UNRESTRICTED ACCOUNTS***	**2,784,014**	**(215,140)**	**2,568,874**	**6,965,498**	**(4,470,637)**	**74,013**	**0**	**$ 74,013**

Restricted	ACCOUNT NAME	FY23 EXPENSE BUDGET	FY22 THEC CARRYOVER	FY23 THEC FUNDED BUDGET	Cumulative Actual Expenses	Cumulative Internal Recovery & External Income	THEC BUDGET BALANCE *income / (subsidy)*	EXPENDITURES FUNDED BY OTHER SOURCES	TOTAL MRC THEC Rollover/(Subsidy)
ACCT NO.	MOLECULAR RESOURCE CENTER (MRC) of Excellence, FY23, THEC appropriation	688,330	-	688,330	820,610	(137,326)	5,046	-	5,046
R079700143	***SUBTOTAL RESTRICTED ACCOUNT***	***688,330***	***-***	***688,330***	***820,610***	***(137,326)***	***5,046***	***-***	***5,046***
	TOTAL ACROSS ALL ACCOUNTS:	**$ 3,472,344**	**$ (215,140)**	**$ 3,257,204**	**$ 7,786,108**	**$ (4,607,963)**	**$ 5,046**	***0***	**$ 5,046**

OVERALL NET DEFICIT, EXCLUDING THEC ROLLOVER	**$ 79,059**
OVERALL NET DEFICIT, INCLUDING FY22 ROLLOVER	**$ 79,059**

Lab Animal Care Unit (LACU) Institutional Research Core Facility Analysis Report- FY23

Written by David Hamilton, DVM; Detric Stigall, Joyce Jones; and Tiffany Seagroves, PhD

1. Relative to a specific core's mission, is the designation as an "institutional core" appropriate?

The LACU core designation as an institutional core is appropriate since it served 107 internal users across 23 departments within four colleges (COM, COP, COHP and COD) and three external users (US Biologic, Diatech Diabetics, and Dr. Joel Bumgardner of the University of Memphis).

2. Does the core pass the multi-departmental, multi-investigator litmus test?

Yes. Service was provided to 107 unique internal users across 23 departments within four colleges (COM, COP, COHP and COD). The LACU also served three external users. The top four departments ranked by their contribution to FY23 core internal revenues were, in order, the Department of Physiology (20.11%, COM), the Department of Pediatrics (16.10%, COM), the Department of Genetics, Genomics and Informatics (12.04%, COM), and the Department of Anatomy and Neurobiology (8.81%, COM). The other 19 departments collectively accounted for 42.94% of all internal revenues. The top five users, based on FY23 invoices for completed services, accounted for 27.61% of internal revenues. These investigators were: 1) Suheeta Roy (7.09%, GGI, COM), 2) Hao Chen (7.01%, Pharmacology, COM), 3) Adebiyi Adebowale (5.97%, Physiology, COM), 4) Amadeep Bajwa (4.02%, Transplant Surgery, COM) and 5) Zhongjie Sun (3.52%, Physiology, COM). Drs. Chen, Adebowale, Bajwa and Sun were also top 5 users in FY22.

3. Is there sufficient intra- and inter-departmental use and if not, why?

Yes. There were 107 unique internal users who were served across 23 departments within four colleges at the UT Health Science Center.

4. Can the services for the core be outsourced more economically?

No. There is no competition for this institutional core facility since it is the only accredited unit that can provide services for animal care and welfare on the UTHSC campus. There are three other institutions in Memphis that support research using laboratory animals (the VA, the University of Memphis and St. Jude Children's Research Hospital), but the majority of UTHSC investigators do not have faculty appointments at these institutions.

5. Are there unaccounted benefits beyond fiscal consideration to warrant continued institutional underwriting (e.g., grants funded through investigator use, publications, etc.)?

Yes. In FY23, core activities led to 256 unique PubMed-indexed publications and supported 112 extramural grants and contracts. The LACU also provided training and orientation to animal use in research to 54 investigators and research staff in FY23.

6. Is the core currently self-sufficient, or is it subsidized by the institution?
In FY23, the core was subsidized by the institution. After accounting for the state appropriation ($1,402,651), the total net income was $449,465.

Accomplishments this past year:

- The LACU veterinary team continued regularly scheduled hands-on training classes for the campus. Two different hands-on labs are offered: one in basic rodent techniques and one in aseptic surgical technique. A total of 17 rodent handling techniques and 6 aseptic technique laboratories were held in FY23 for a total of 54 research staff trained.
- The LACU continued with its goal of technician training and education leading to certification by the American Association for Laboratory Animal Science (AALAS). As of FY23, 53% of husbandry technicians are AALAS certified, with those not certified being new hires who are attending training classes to achieve certification. In addition, several cage wash technicians have also obtained certification.
- Dr. Monica Sidhu presented a platform session at the 73rd National American Association for Laboratory Animal Science (AALAS) meeting in Louisville, Kentucky October 23-27, 2022:
    - **H Sidhu**, CL Perkins, KS Henderson, **B Hibl**, S Nouer, E Tolley, **D Hamilton.** *Efficacy of a Novel Battery-operated Tumbler Device Compared to Live Animal Sentinels for Mouse Pathogen Detection*
- Dr. Monica Sidhu submitted a manuscript to the Journal of the American Association for Laboratory Animal Science (JAALAS) which is currently under review for publication:
    - Efficacy of a novel battery-operated tumbler device for mouse pathogen detection. **Harmaneek K Sidhu**, Cheryl L Perkins, Ken S Henderson, **Brianne M Hibl**, Simonne S Nouer, Elizabeth A Tolley, **David J Hamilton**
- The LACU core supported numerous publications, abstract presentations and extramural and intramural awards. A total of 256 manuscripts were published in FY23 in which animal work was conducted.
- The LACU continued its mission of education by participating in coursework related to animals in research, orienting new faculty and staff to the animal care facilities, and providing hands-on training to laboratory personnel.

Financial overview:

TOTALS	FY18	FY19	FY20	FY21	FY23	FY23
Revenues	2,351,047	2,640,045	2,891,915	3,064,422	3,245,107	3,842,691
Expenses	(3,874,369)	(3,791,590)	(3,952,325)	(3,900,980)	(4,303,550)	(4,795,877)
Income (Subsidy)	(1,523,322)	(1,151,545)	(1,060,410)	(836,558)	(1,058,443)	(953,186)
Equipment	72,000	0	0	0	0	0
Net Income (Subsidy)	(1,595,322)	(1,151,545)	(1,060,410)	(836,558)	(1,058,443)	(953,186)
State Appropriation	715,209	744,864	828,840	1,075,284	1,355,501	1,402,651
Net Income (Subsidy)	(880,113)	(406,681)	(231,570)	238,726	297,058	449,465
Other Expense (Caging in FY18)	550,952	0	0	0	0	0
Net Income (Subsidy)	(1,431,065)	(406,681)	(231,570)	238,726	297,058	449,465
Subsidy, % before State Appropriation	47.7%	30.3%	26.8%	21%	25%	20%
Subsidy, % after State Appropriation	31.8%	10.72%	5.9%	--	--	--

7. Suggested outcomes:

It is recommended that the LACU continue as an institutional core. It is also recommended that the state appropriation budget allocated internally to LACU be reduced and redistributed to other small cores that have been historically underfunded for their operating budgets.

Laboratory Animal Care Unit (LACU) Institutional Core Facility
Summary of institutional Core Activities for FY23

Written by David Hamilton, DVM; Detric Stigall; Joyce Jones; and Tiffany Seagroves, PhD

I. PUBLICATIONS (Journal publication dates: July 1, 2022 to June 30, 2023)

Bou Sleiman M, Roy S, Gao AW, Sadler MC, von Alvensleben GVG, Li H, Sen S, Harrison DE, Nelson JF, Strong R, Miller RA, Kutalik Z, Williams RW, Auwerx J. Sex- and age-dependent genetics of longevity in a heterogeneous mouse population. Science. 2022 Sep 30;377(6614):eabo3191. doi: 10.1126/science.abo3191. Epub 2022 Sep 30. PMID: 36173858; PMCID: PMC9905652.

Karki R, Lee S, Mall R, Pandian N, Wang Y, Sharma BR, Malireddi RS, Yang D, Trifkovic S, Steele JA, Connelly JP, Vishwanath G, Sasikala M, Reddy DN, Vogel P, Pruett-Miller SM, Webby R, Jonsson CB, Kanneganti TD. ZBP1-dependent inflammatory cell death, PANoptosis, and cytokine storm disrupt IFN therapeutic efficacy during coronavirus infection. Sci Immunol. 2022 Aug 26;7(74):eabo6294. doi: 10.1126/sciimmunol.abo6294. Epub 2022 Aug 26. PMID: 35587515; PMCID: PMC9161373.

Ma S, Dubin AE, Romero LO, Loud M, Salazar A, Chu S, Klier N, Masri S, Zhang Y, Wang Y, Chesler AT, Wilkinson KA, Vásquez V, Marshall KL, Patapoutian A. Excessive mechanotransduction in sensory neurons causes joint contractures. Science. 2023 Jan 13;379(6628):201-206. doi: 10.1126/science.add3598. Epub 2023 Jan 12. PMID: 36634173; PMCID: PMC10163824.

Blanco DB, Chapman NM, Raynor JL, Xu C, Su W, Kc A, Li W, Lim SA, Schattgen S, Shi H, Risch I, Sun Y, Dhungana Y, Kim Y, Wei J, Rankin S, Neale G, Thomas PG, Yang K, Chi H. PTEN directs developmental and metabolic signaling for innate-like T cell fate and tissue homeostasis. Nat Cell Biol. 2022 Nov;24(11):1642-1654. doi: 10.1038/s41556-022-01011-w. Epub 2022 Oct 27. PMID: 36302969; PMCID: PMC10080469.

Wang X, Liu M, Zhang J, Brown NK, Zhang P, Zhang Y, Liu H, Du X, Wu W, Devenport M, Tao W, Mao-Draayer Y, Chen GY, Chen YE, Zheng P, Liu Y. CD24-Siglec axis is an innate immune checkpoint against metaflammation and metabolic disorder. Cell Metab. 2022 Aug 2;34(8):1088-1103.e6. doi: 10.1016/j.cmet.2022.07.005. PMID: 35921817; PMCID: PMC9393047.

Wang Y, Zhang L, Huang T, Wu GR, Zhou Q, Wang FX, Chen LM, Sun F, Lv Y, Xiong F, Zhang S, Yu Q, Yang P, Gu W, Xu Y, Zhao J, Zhang H, Xiong W, Wang CY. The methyl-CpG-binding domain 2 facilitates pulmonary fibrosis by orchestrating fibroblast to myofibroblast differentiation. Eur Respir J. 2022 Sep 29;60(3):2003697. doi: 10.1183/13993003.03697-2020. PMID: 35086828; PMCID: PMC9520034.

Thiyagarajan T, Ponnusamy S, Hwang DJ, He Y, Asemota S, Young KL, Johnson DL, Bocharova V, Zhou W, Jain AK, Petricoin EF, Yin Z, Pfeffer LM, Miller DD, Narayanan R.

Inhibiting androgen receptor splice variants with cysteine- selective irreversible covalent inhibitors to treat prostate cancer. Proc Natl Acad Sci U S A. 2023 Jan 3;120(1):e2211832120. doi: 10.1073/pnas.2211832120. Epub 2022 Dec 28. PMID: 36577061; PMCID: PMC9910435.

Alway SE, Paez HG, Pitzer CR, Ferrandi PJ, Khan MM, Mohamed JS, Carson JA, Deschenes MR. Mitochondria transplant therapy improves regeneration and restoration of injured skeletal muscle. J Cachexia Sarcopenia Muscle. 2023 Feb;14(1):493-507. doi: 10.1002/jcsm.13153. Epub 2023 Jan 5. PMID: 36604839; PMCID: PMC9891964.

Farokhnia M, Rentsch CT, Chuong V, McGinn MA, Elvig SK, Douglass EA, Gonzalez LA, Sanfilippo JE, Marchette RCN, Tunstall BJ, Fiellin DA, Koob GF, Justice AC, Leggio L, Vendruscolo LF. Spironolactone as a potential new pharmacotherapy for alcohol use disorder: convergent evidence from rodent and human studies. Mol Psychiatry. 2022 Nov;27(11):4642-4652. doi: 10.1038/s41380-022-01736-y. Epub 2022 Sep 20. PMID: 36123420; PMCID: PMC10231646.

Chen X, Chen L, Lin G, Wang Z, Kodali MC, Li M, Chen H, Lebovitz SG, Ortyl TC, Li L, Ismael S, Singh P, Malik KU, Ishrat T, Zhou FM, Zheng W, Liao FF. White matter damage as a consequence of vascular dysfunction in a spontaneous mouse model of chronic mild chronic hypoperfusion with eNOS deficiency. Mol Psychiatry. 2022 Nov;27(11):4754-4769. doi: 10.1038/s41380-022-01701-9. Epub 2022 Aug 10. PMID: 35948662; PMCID: PMC9734049.

Zhou Q, Verne GN. Epigenetic modulation of visceral nociception. Neurogastroenterol Motil. 2022 Sep;34(9):e14443. doi: 10.1111/nmo.14443. Epub 2022 Aug 10. PMID: 35950237; PMCID: PMC9787514.

Hardee JP, Carson JA. Muscular contraction's therapeutic potential for cancer-induced wasting. Am J Physiol Cell Physiol. 2022 Aug 1;323(2):C378-C384. doi: 10.1152/ajpcell.00021.2022. Epub 2022 Jun 15. PMID: 35704693; PMCID: PMC9359654.

Johnson GA, Tian Y, Ashbrook DG, Cofer GP, Cook JJ, Gee JC, Hall A, Hornburg K, Kaczorowski CC, Qi Y, Yeh FC, Wang N, White LE, Williams RW. Merged magnetic resonance and light sheet microscopy of the whole mouse brain. Proc Natl Acad Sci U S A. 2023 Apr 25;120(17):e2218617120. doi: 10.1073/pnas.2218617120. Epub 2023 Apr 17. Erratum in: Proc Natl Acad Sci U S A. 2023 Jun 20;120(25):e2308718120. PMID: 37068254; PMCID: PMC10151475.

Radic M, Muller S. LL-37, a Multi-Faceted Amphipathic Peptide Involved in NETosis. Cells. 2022 Aug 8;11(15):2463. doi: 10.3390/cells11152463. PMID: 35954305; PMCID: PMC9368159.

Pervaiz N, Kathuria I, Aithabathula RV, Singla B. Matricellular proteins in atherosclerosis development. Matrix Biol. 2023 Jun;120:1-23. doi: 10.1016/j.matbio.2023.04.003. Epub 2023 Apr 20. PMID: 37086928; PMCID: PMC10225360.

Kim JY, Silvaroli JA, Martinez GV, Bisunke B, Luna Ramirez AV, Jayne LA, Feng MJHH, Girotra B, Acosta Martinez SM, Vermillion CR, Karel IZ, Ferrell N, Weisleder N, Chung S, Christman JW, Brooks CR, Madhavan SM, Hoyt KR, Cianciolo RE, Satoskar AA, Zepeda-Orozco D, Sullivan JC, Davidson AJ, Bajwa A, Pabla NS. Zinc finger protein 24-dependent transcription factor SOX9 up-regulation protects tubular epithelial cells during acute kidney injury. Kidney Int. 2023 Jun;103(6):1093-1104. doi: 10.1016/j.kint.2023.02.026. Epub 2023 Mar 13. PMID: 36921719; PMCID: PMC10200760.

Wang Z, Li H, Gou L, Li W, Wang Y. Antibody-drug conjugates: Recent advances in payloads. Acta Pharm Sin B. 2023 Oct;13(10):4025-4059. doi: 10.1016/j.apsb.2023.06.015. Epub 2023 Jun 30. PMID: 37799390; PMCID: PMC10547921.

Laribee RN, Boucher AB, Madireddy S, Pfeffer LM. The STAT3-Regulated Autophagy Pathway in Glioblastoma. Pharmaceuticals (Basel). 2023 Apr 29;16(5):671. doi: 10.3390/ph16050671. PMID: 37242454; PMCID: PMC10223172.

Paranjpe V, Galor A, Grambergs R, Mandal N. The role of sphingolipids in meibomian gland dysfunction and ocular surface inflammation. Ocul Surf. 2022 Oct;26:100-110. doi: 10.1016/j.jtos.2022.07.006. Epub 2022 Aug 13. PMID: 35973562; PMCID: PMC10259413.

de Jong TV, Chen H, Brashear WA, Kochan KJ, Hillhouse AE, Zhu Y, Dhande IS, Hudson EA, Sumlut MH, Smith ML, Kalbfleisch TS, Doris PA. mRatBN7.2: familiar and unfamiliar features of a new rat genome reference assembly. Physiol Genomics. 2022 Jul 1;54(7):251-260. doi: 10.1152/physiolgenomics.00017.2022. Epub 2022 May 11. PMID: 35543507; PMCID: PMC9236863.

Yu Y, Li W, Jiang J. TRPC channels as emerging targets for seizure disorders. Trends Pharmacol Sci. 2022 Sep;43(9):787-798. doi: 10.1016/j.tips.2022.06.007. Epub 2022 Jul 12. PMID: 35840362; PMCID: PMC9378536.

Kim JW, Park JK, Garcia-Godoy F, Kwon YH. Evaluation of autofluorescence and image of oral pathogens and the tooth. Am J Dent. 2022 Aug;35(4):212-216. PMID: 35986938.

Park F. The heart is where AAV9 lies. Physiol Genomics. 2022 Aug 1;54(8):316-318. doi: 10.1152/physiolgenomics.00102.2022. Epub 2022 Jul 11. PMID: 35816650.

Hori RT, Moshahid Khan M, Xiao J, Hargrove PW, Moss T, LeDoux MS. Behavioral and molecular effects of Ubtf knockout and knockdown in mice. Brain Res. 2022 Oct 15;1793:148053. doi: 10.1016/j.brainres.2022.148053. Epub 2022 Aug 13. PMID: 35973608.

Kumar S, Singla B, Singh AK, Thomas-Gooch SM, Zhi K, Singh UP. Hepatic, Extrahepatic and Extracellular Vesicle Cytochrome P450 2E1 in Alcohol and Acetaminophen-Mediated

Adverse Interactions and Potential Treatment Options. Cells. 2022 Aug 23;11(17):2620. doi: 10.3390/cells11172620. PMID: 36078027; PMCID: PMC9454765.

Mamidi MK, Huang J, Honjo K, Li R, Tabengwa EM, Neeli I, Randall NL, Ponnuchetty MV, Radic M, Leu CM, Davis RS. FCRL1 immunoregulation in B cell development and malignancy. Front Immunol. 2023 Sep 25;14:1251127. doi: 10.3389/fimmu.2023.1251127. PMID: 37822931; PMCID: PMC10562807.

Zhang Y, Zhang J, Wang J, Chen H, Ouyang L, Wang Y. Targeting GRK2 and GRK5 for treating chronic degenerative diseases: Advances and future perspectives. Eur J Med Chem. 2022 Dec 5;243:114668. doi: 10.1016/j.ejmech.2022.114668. Epub 2022 Aug 13. PMID: 36055000.

Marathe SJ, Snider MA, Flores-Torres AS, Dubin PJ, Samarasinghe AE. Human matters in asthma: Considering the microbiome in pulmonary health. Front Pharmacol. 2022 Dec 2;13:1020133. doi: 10.3389/fphar.2022.1020133. PMID: 36532717; PMCID: PMC9755222.

Rakib A, Kiran S, Mandal M, Singh UP. MicroRNAs: a crossroad that connects obesity to immunity and aging. Immun Ageing. 2022 Dec 14;19(1):64. doi: 10.1186/s12979-022-00320-w. PMID: 36517853; PMCID: PMC9749272.

Manley A, Meshkat BI, Jablonski MM, Hollingsworth TJ. Cellular and Molecular Mechanisms of Pathogenesis Underlying Inherited Retinal Dystrophies. Biomolecules. 2023 Feb 1;13(2):271. doi: 10.3390/biom13020271. PMID: 36830640; PMCID: PMC9953031.

Young EN, Dogan M, Watkins C, Bajwa A, Eason JD, Kuscu C, Kuscu C. A Review of Defatting Strategies for Non-Alcoholic Fatty Liver Disease. Int J Mol Sci. 2022 Oct 5;23(19):11805. doi: 10.3390/ijms231911805. PMID: 36233107; PMCID: PMC9569609.

Jiang J, Santhakumar V, Zhu X. Editorial: Neuroinflammation in acquired epilepsy. Front Cell Dev Biol. 2022 Nov 7;10:1074537. doi: 10.3389/fcell.2022.1074537. PMID: 36420137; PMCID: PMC9677101.

Puchowicz MA, Parveen K, Sethuraman A, Ishrat T, Xu K, LaManna J. Pro- survival Phenotype of HIF-1α: Neuroprotection Through Inflammatory Mechanisms. Adv Exp Med Biol. 2023;1438:33-36. doi: 10.1007/978-3-031-42003-0_6. PMID: 37845436.

Almeida C, Pongilio RP, Móvio MI, Higa GSV, Resende RR, Jiang J, Kinjo ER, Kihara AH. Distinct Cell-specific Roles of NOX2 and MyD88 in Epileptogenesis. Front Cell Dev Biol. 2022 Jul 4;10:926776. doi: 10.3389/fcell.2022.926776. PMID: 35859905; PMCID: PMC9289522.

Bahouth SW, Nooh MM, Mancarella S. Involvement of SAP97 anchored multiprotein complexes in regulating cardiorenal signaling and trafficking networks. Biochem Pharmacol. 2023 Feb;208:115406. doi: 10.1016/j.bcp.2022.115406. Epub 2022 Dec 31. PMID: 36596415.

Perkins RS, Singh R, Abell AN, Krum SA, Miranda-Carboni GA. The role of WNT10B in physiology and disease: A 10-year update. Front Cell Dev Biol. 2023 Feb 6;11:1120365. doi: 10.3389/fcell.2023.1120365. PMID: 36814601; PMCID: PMC9939717.

Sluter MN, Li Q, Yasmen N, Chen Y, Li L, Hou R, Yu Y, Yang CY, Meibohm B, Jiang J. The inducible prostaglandin E synthase (mPGES-1) in neuroinflammatory disorders. Exp Biol Med (Maywood). 2023 May;248(9):811-819. doi: 10.1177/15353702231179926. Epub 2023 Jul 29. PMID: 37515545; PMCID: PMC10468642.

Shoraka S, Samarasinghe AE, Ghaemi A, Mohebbi SR. Host mitochondria: more than an organelle in SARS-CoV-2 infection. Front Cell Infect Microbiol. 2023 Aug 25;13:1228275. doi: 10.3389/fcimb.2023.1228275. PMID: 37692170; PMCID: PMC10485703.

Hou R, Yu Y, Jiang J. Prostaglandin E2 in neuroblastoma: Targeting synthesis or signaling? Biomed Pharmacother. 2022 Dec;156:113966. doi: 10.1016/j.biopha.2022.113966. Epub 2022 Nov 3. PMID: 36411643; PMCID: PMC9682161.

Odobasic D, Hawkins CL, Radic M. Editorial: New roles of neutrophils and granulocytic MDSC in autoimmune diseases, inflammation, and anti-microbial immunity. Front Immunol. 2022 Jul 29;13:974062. doi: 10.3389/fimmu.2022.974062. PMID: 35967293; PMCID: PMC9372723.

Vaithianathan T, Schneider EH, Bukiya AN, Dopico AM. Cholesterol and PIP₂ Modulation of BK-Ca Channels. Adv Exp Med Biol. 2023;1422:217-243. doi: 10.1007/978-3-031-21547-6_8. PMID: 36988883.

Alehossein P, Taheri M, Tayefeh Ghahremani P, Dakhlallah D, Brown CM, Ishrat T, Nasoohi S. Transplantation of Exercise-Induced Extracellular Vesicles as a Promising Therapeutic Approach in Ischemic Stroke. Transl Stroke Res. 2023 Apr;14(2):211-237. doi: 10.1007/s12975-022-01025-4. Epub 2022 May 21. PMID: 35596116.

Patel PS, Castelow C, Patel DS, Bhattacharya SK, Kuscu C, Kuscu C, Makowski L, Eason JD, Bajwa A. Mitochondrial Role in Oncogenesis and Potential Chemotherapeutic Strategy of Mitochondrial Infusion in Breast Cancer. Int J Mol Sci. 2022 Oct 27;23(21):12993. doi: 10.3390/ijms232112993. PMID: 36361782; PMCID: PMC9658440.

Temrikar ZH, Golden JE, Jonsson CB, Meibohm B. Clinical and Translational Pharmacology Considerations for Anti-infectives Approved Under the FDA Animal Rule. Clin Pharmacokinet. 2023 Jul;62(7):943-953. doi: 10.1007/s40262-023-01267-x. Epub 2023 Jun 16. PMID: 37326917; PMCID: PMC10471120.

Khan MM, Paez HG, Pitzer CR, Alway SE. The Therapeutic Potential of Mitochondria Transplantation Therapy in Neurodegenerative and Neurovascular Disorders. Curr Neuropharmacol. 2023;21(5):1100-1116. doi: 10.2174/1570159X05666220908100545. PMID: 36089791; PMCID: PMC10286589.

Silva V, Radic M. COVID-19 Pathology Sheds Further Light on Balance between Neutrophil Proteases and Their Inhibitors. Biomolecules. 2022 Dec 30;13(1):82. doi: 10.3390/biom13010082. PMID: 36671467; PMCID: PMC9855895.

Ding Y, Chen J, Li S, Wren JD, Bajpai AK, Wang J, Tanaka T, Rice HC, Hays FA, Lu L, Zhang XA. EWI2 and its relatives in Tetraspanin-enriched membrane domains regulate malignancy. Oncogene. 2023 Mar;42(12):861-868. doi: 10.1038/s41388-023-02623-8. Epub 2023 Feb 14. PMID: 36788350.

Allen M, Varga S, Heck DH. Respiratory rhythms of the predictive mind. Psychol Rev. 2023 Jul;130(4):1066-1080. doi: 10.1037/rev0000391. Epub 2022 Aug 18. PMID: 35980689.

Pitzer CR, Paez HG, Alway SE. The Contribution of Tumor Derived Exosomes to Cancer Cachexia. Cells. 2023 Jan 12;12(2):292. doi: 10.3390/cells12020292. PMID: 36672227; PMCID: PMC9856599.

Bukiya AN, Rosenhouse-Dantsker A. From Crosstalk to Synergism: The Combined Effect of Cholesterol and PI(4,5)P₂ on Inwardly Rectifying Potassium Channels. Adv Exp Med Biol. 2023;1422:169-191. doi: 10.1007/978-3-031-21547-6_6. PMID: 36988881.

Cai X, Allison MA, Ambale-Venkatesh B, Jorgensen NW, Lima JAC, Muse ED, McClelland RL, Shea S, Lebeche D. Resistin and risks of incident heart failure subtypes and cardiac fibrosis: the Multi-Ethnic Study of Atherosclerosis. ESC Heart Fail. 2022 Oct;9(5):3452-3460. doi: 10.1002/ehf2.14064. Epub 2022 Jul 20. PMID: 35860859; PMCID: PMC9715803.

Heck DH, Varga S. "The great mixing machine": multisensory integration and brain-breath coupling in the cerebral cortex. Pflugers Arch. 2023 Jan;475(1):5-11. doi: 10.1007/s00424-022-02738-z. Epub 2022 Jul 29. PMID: 35904636; PMCID: PMC10163438.

Kumar A, Sinha N, Kodidela S, Zhou L, Singh UP, Kumar S. Effect of benzo(a)pyrene on oxidative stress and inflammatory mediators in astrocytes and HIV-infected macrophages. PLoS One. 2022 Oct 14;17(10):e0275874. doi: 10.1371/journal.pone.0275874. PMID: 36240258; PMCID: PMC9565757.

Slayden A, Mysiewicz S, North K, Dopico A, Bukiya A. Cerebrovascular Effects of Alcohol Combined with Tetrahydrocannabinol. Cannabis Cannabinoid Res. 2022 Sep 15. doi: 10.1089/can.2021.0234. Epub ahead of print. PMID: 36108317.

Heck DH, Fox MB, Correia Chapman B, McAfee SS, Liu Y. Cerebellar control of thalamocortical circuits for cognitive function: A review of pathways and a proposed mechanism. Front Syst Neurosci. 2023 Mar 30;17:1126508. doi: 10.3389/fnsys.2023.1126508. PMID: 37064161; PMCID: PMC10097962.

Li L, Chen Y, Sluter MN, Hou R, Hao J, Wu Y, Chen GY, Yu Y, Jiang J. Ablation of Siglec-E augments brain inflammation and ischemic injury. J Neuroinflammation. 2022 Jul 20;19(1):191. doi: 10.1186/s12974-022-02556-1. PMID: 35858866; PMCID: PMC9301848.

Bhattacharya S, Yin J, Yang C, Wang Y, Sims M, Pfeffer LM, Chaum E. STAT3 suppresses the AMPKα/ULK1-dependent induction of autophagy in glioblastoma cells. J Cell Mol Med. 2022 Jul;26(14):3873-3890. doi: 10.1111/jcmm.17421. Epub 2022 Jun 6. PMID: 35670018; PMCID: PMC9279602.

Radic MZ, Zouali M. Editorial: SARS-CoV-2 variants, B lymphocytes, and autoreactivity. Front Immunol. 2023 Jan 10;13:1125732. doi: 10.3389/fimmu.2022.1125732. PMID: 36703988; PMCID: PMC9872959.

Deng S, Krutilina RI, Hartman KL, Chen H, Parke DN, Wang R, Mahmud F, Ma D, Lukka PB, Meibohm B, Seagroves TN, Miller DD, Li W. Colchicine-Binding Site Agent CH-2-77 as a Potent Tubulin Inhibitor Suppressing Triple-Negative Breast Cancer. Mol Cancer Ther. 2022 Jul 5;21(7):1103-1114. doi: 10.1158/1535-7163.MCT-21-0899. PMID: 35499388; PMCID: PMC9256790.

Freda PJ, Ghosh A, Zhang E, Luo T, Chitre AS, Polesskaya O, St Pierre CL, Gao J, Martin CD, Chen H, Garcia-Martinez AG, Wang T, Han W, Ishiwari K, Meyer P, Lamparelli A, King CP, Palmer AA, Li R, Moore JH. Automated quantitative trait locus analysis (AutoQTL). BioData Min. 2023 Apr 10;16(1):14. doi: 10.1186/s13040-023-00331-3. PMID: 37038201; PMCID: PMC10088184.

Paez HG, Pitzer CR, Alway SE. Age-Related Dysfunction in Proteostasis and Cellular Quality Control in the Development of Sarcopenia. Cells. 2023 Jan 7;12(2):249. doi: 10.3390/cells12020249. PMID: 36672183; PMCID: PMC9856405.

Huang CY, Garcia-Godoy F, Parker GC. Editorial: Special Issue on "Stem Cells and Degenerative Diseases of Cartilaginous Tissues". Stem Cells Dev. 2022 Aug;31(15-16):397-398. doi: 10.1089/scd.2022.29012.cyh. PMID: 35917501.

Mitachi K, Mingle D, Effah W, Sánchez-Ruiz A, Hevener KE, Narayanan R, Clemons WM Jr, Sarabia F, Kurosu M. Concise Synthesis of Tunicamycin V and Discovery of a Cytostatic DPAGT1 Inhibitor. Angew Chem Int Ed Engl. 2022 Aug 1;61(31):e202203225. doi: 10.1002/anie.202203225. Epub 2022 Jun 10. PMID: 35594368; PMCID: PMC9329268.

Taylor MK, Williams EP, Xue Y, Jenjaroenpun P, Wongsurawat T, Smith AP, Smith AM, Parvathareddy J, Kong Y, Vogel P, Cao X, Reichard W, Spruill-Harrell B, Samarasinghe AE, Nookaew I, Fitzpatrick EA, Smith MD, Aranha M, Smith JC, Jonsson CB. Dissecting Phenotype from Genotype with Clinical Isolates of SARS- CoV-2 First Wave Variants. Viruses. 2023 Feb 23;15(3):611. doi: 10.3390/v15030611. PMID: 36992320; PMCID: PMC10059853.

Devlin P, Ishrat T, Stanfill AG. A Systematic Review of Inflammatory Cytokine Changes Following Aneurysmal Subarachnoid Hemorrhage in Animal Models and Humans. Transl Stroke Res. 2022 Dec;13(6):881-897. doi: 10.1007/s12975-022-01001-y. Epub 2022 Mar 9. PMID: 35260989.

Russell CM, Rybak JA, Miao J, Peters BM, Barrera FN. Candidalysin: Connecting the pore forming mechanism of this virulence factor to its immunostimulatory properties. J Biol Chem. 2023 Feb;299(2):102829. doi: 10.1016/j.jbc.2022.102829. Epub 2022 Dec 26. PMID: 36581211; PMCID: PMC9852700.

Adams A, Murphy QM, Dougherty OP, Sawyer AM, Bai F, Edholm CJ, Williams EP, Allen LJS, Jonsson CB. Data-driven models for replication kinetics of Orthohantavirus infections. Math Biosci. 2022 Jul;349:108834. doi: 10.1016/j.mbs.2022.108834. Epub 2022 May 19. PMID: 35598641.

Sanchez V, Galor A, Jensen K, Mondal K, Mandal N. Relationships between ocular surface sphingomyelinases, Meibum and Tear Sphingolipids, and clinical parameters of meibomian gland dysfunction. Ocul Surf. 2022 Jul;25:101-107. doi: 10.1016/j.jtos.2022.06.003. Epub 2022 Jun 14. PMID: 35714913.

Sanders B, Pokhrel S, Labbe A, Mathews I, Cooper C, Davidson R, Phillips G, Weiss K, Zhang Q, O'Neill H, Kaur M, Ferrins L, Schmidt J, Reichard W, Surendranathan S, Parvathareddy J, Phillips L, Rainville C, Sterner D, Kumaran D, Andi B, Babnigg G, Moriarrty N, Adams P, Joachimiak A, Hurst B, Kumar S, Butt T, Jonsson C, Wakatsuki S, Galanie S, Head M, Parks J. Potent and Selective Covalent Inhibition of the Papain-like Protease from SARS-CoV-2. Res Sq [Preprint]. 2022 Jul 21:rs.3.rs-906621. doi: 10.21203/rs.3.rs-906621/v1. Update in: Nat Commun. 2023 Mar 28;14(1):1733. PMID: 34642689; PMCID: PMC8509099.

Albadari N, Xie Y, Liu T, Wang R, Gu L, Zhou M, Wu Z, Li W. Synthesis and biological evaluation of dual MDM2/XIAP inhibitors based on the tetrahydroquinoline scaffold. Eur J Med Chem. 2023 Jul 5;255:115423. doi: 10.1016/j.ejmech.2023.115423. Epub 2023 Apr 26. PMID: 37130471; PMCID: PMC10246915.

Yu Z, Zhan J, Dong W, Lu L, Jablonski MM, Aleya L, Chen J, Zhang P, Chen H, Gu W. Potential Similarities in Sex Difference in Key Genes and Their Expression, Network, EQTL and Pathways between COVID-19 and Chronic Kidney Disease Based on Mouse Model. J Pers Med. 2022 Jul 21;12(7):1190. doi: 10.3390/jpm12071190. PMID: 35887687; PMCID: PMC9323909.

Huang X, Li L, Zhou S, Kong D, Luo J, Lu L, Xu HM, Wang X. Multi-omics analysis reveals expression complexity and functional diversity of mouse kinome. Proteomics. 2022 Nov;22(22):e2200120. doi: 10.1002/pmic.202200120. Epub 2022 Jul 26. PMID: 35856475.

Yao L, Aleya L, Howard SC, Cao Y, Wang CY, Day SW, Graff JC, Sun D, Gu W. Variations of COVID-19 mortality are affected by economic disparities across countries.

Sci Total Environ. 2022 Aug 1;832:154770. doi: 10.1016/j.scitotenv.2022.154770. Epub 2022 Mar 25. PMID: 35341873; PMCID: PMC8949690.

Rakib A, Mandal M, Showkat A, Kiran S, Mazumdar S, Singla B, Bajwa A, Kumar S, Park F, Singh UP. Piceatannol induces regulatory T cells and modulates the inflammatory response and adipogenesis. Biomed Pharmacother. 2023 May;161:114514. doi: 10.1016/j.biopha.2023.114514. Epub 2023 Mar 13. PMID: 36921534; PMCID: PMC10071559.

Si L, Bai H, Oh CY, Jiang A, Hong F, Zhang T, Ye Y, Jordan TX, Logue J, McGrath M, Belgur C, Calderon K, Nurani A, Cao W, Carlson KE, Prantil-Baun R, Gygi SP, Yang D, Jonsson CB, tenOever BR, Frieman M, Ingber DE. Self-assembling short immunostimulatory duplex RNAs with broad-spectrum antiviral activity. Mol Ther Nucleic Acids. 2022 Sep 13;29:923-940. doi: 10.1016/j.omtn.2022.08.031. Epub 2022 Aug 24. PMID: 36032397; PMCID: PMC9398551.

Qiu J, Li Q, Li J, Zhou F, Sang P, Xia Z, Wang W, Wang L, Yu Y, Jiang J. Complementary roles of EP2 and EP4 receptors in malignant glioma. Br J Pharmacol. 2023 Oct;180(20):2623-2640. doi: 10.1111/bph.16148. Epub 2023 Jun 28. PMID: 37232020;

Hollingsworth TJ, Wang X, Simpson RN, White WA, Williams RW, Jablonski MM. Current Advancements in Mouse Models of Retinal Disease. Adv Exp Med Biol. 2023;1415:371-376. doi: 10.1007/978-3-031-27681-1_54. PMID: 37440059.

Yu Z, Jiao Y, Zhao Y, Gu W. Level of Estrogen in Females-The Different Impacts at Different Life Stages. J Pers Med. 2022 Dec 2;12(12):1995. doi: 10.3390/jpm12121995. PMID: 36556216; PMCID: PMC9781566.

Salman M, Akram M, Shahrukh M, Ishrat T, Parvez S. Effects of pramipexole on beta-amyloid1-42 memory deficits and evaluation of oxidative stress and mitochondrial function markers in the hippocampus of Wistar rat. Neurotoxicology. 2022 Sep;92:91-101. doi: 10.1016/j.neuro.2022.07.006. Epub 2022 Jul 19. PMID: 35868426.

Musicante M, Kim HH, Chen Y, Liao F, Bhattacharya SK, Lu L, Sun Y. Regulation of endothelial nitric oxide synthase in cardiac remodeling. Int J Cardiol. 2022 Oct 1;364:96-101. doi: 10.1016/j.ijcard.2022.05.013. Epub 2022 May 30. PMID: 35654172.

Wu Y, Yang D, Chen GY. Targeted disruption of Gdi2 causes early embryonic lethality. Placenta. 2022 Aug;126:17-25. doi: 10.1016/j.placenta.2022.05.005. Epub 2022 May 13. PMID: 35689892.

Xu X, Zhang C, Jiang J, Xin M, Hao J. Effect of TDP43-CTFs35 on Brain Endothelial Cell Functions in Cerebral Ischemic Injury. Mol Neurobiol. 2022 Jul;59(7):4593-4611. doi: 10.1007/s12035-022-02869-5. Epub 2022 May 18. PMID: 35581521.

Jiang J, Yu Y. Pharmacologically targeting transient receptor potential channels for seizures and epilepsy: Emerging preclinical evidence of druggability. Pharmacol Ther.

2023 Apr;244:108384. doi: 10.1016/j.pharmthera.2023.108384. Epub 2023 Mar 16. PMID: 36933703; PMCID: PMC10124570.

Shukla PK, Rao RG, Meena AS, Giorgianni F, Lee SC, Raju P, Shashikanth N, Shekhar C, Beranova S, Balazs L, Tigyi G, Gosain A, Rao R. Paneth cell dysfunction in radiation injury and radio-mitigation by human α-defensin 5. Front Immunol. 2023 Aug 10;14:1174140. doi: 10.3389/fimmu.2023.1174140. PMID: 37638013; PMCID: PMC10448521.

Swanson M, Yun J, Collier DM, Seif C, Yang CY, Regner KR, Park F. Identification of cell division cycle protein 20 in various forms of acute and chronic kidney injury in mice. Am J Physiol Renal Physiol. 2023 Aug 1;325(2):F248-F261. doi: 10.1152/ajprenal.00302.2022. Epub 2023 Jun 22. PMID: 37348027.

Halle JL, Counts BR, Paez HG, Baumfalk DR, Zhang Q, Mohamed JS, Glazer ES, Puppa MJ, Smuder AJ, Alway SE, Carson JA. Recovery from FOLFOX chemotherapy- induced systemic and skeletal muscle metabolic dysfunction in mice. Am J Physiol Endocrinol Metab. 2023 Aug 1;325(2):E132-E151. doi: 10.1152/ajpendo.00096.2023. Epub 2023 Jun 28. PMID: 37378624; PMCID: PMC10393342.

Mozhui K, O'Callaghan JP, Ashbrook DG, Prins P, Zhao W, Lu L, Jones BC. Epigenetic analysis in a murine genetic model of Gulf War illness. Front Toxicol. 2023 Jun 14;5:1162749. doi: 10.3389/ftox.2023.1162749. PMID: 37389175; PMCID: PMC10300436.

: Lamanilao GG, Dogan M, Patel PS, Azim S, Patel DS, Bhattacharya SK, Eason JD, Kuscu C, Kuscu C, Bajwa A. Key hepatoprotective roles of mitochondria in liver regeneration. Am J Physiol Gastrointest Liver Physiol. 2023 Mar 1;324(3):G207-G218. doi: 10.1152/ajpgi.00220.2022. Epub 2023 Jan 17. PMID: 36648139; PMCID: PMC9988520.

Zhong M, Wang Y, Lin G, Liao FF, Zhou FM. Dopamine-independent development and maintenance of mouse striatal medium spiny neuron dendritic spines. Neurobiol Dis. 2023 Jun 1;181:106096. doi: 10.1016/j.nbd.2023.106096. Epub 2023 Mar 29. PMID: 37001611.

Yang D, Wu Y, Turan I, Keil J, Li K, Chen MH, Liu R, Wang L, Sun XL, Chen GY. Targeting intracellular Neu1 for coronavirus infection treatment. iScience. 2023 Feb 17;26(2):106037. doi: 10.1016/j.isci.2023.106037. Epub 2023 Jan 24. PMID: 36714013; PMCID: PMC9870608.

Ahmed HA, Ismael S, Salman M, Devlin P, McDonald MP, Liao FF, Ishrat T. Direct AT2R Stimulation Slows Post-stroke Cognitive Decline in the 5XFAD Alzheimer's Disease Mice. Mol Neurobiol. 2022 Jul;59(7):4124-4140. doi: 10.1007/s12035-022-02839-x. Epub 2022 Apr 29. PMID: 35486224.

Kedia SK, Ahuja N, Dillon PJ, Jones A, Kumar S, Satapathy S. Efficacy of Extended-Release Injectable Naltrexone on Alcohol Use Disorder Treatment: A Systematic Review. J Psychoactive Drugs. 2023 Apr-Jun;55(2):233-245. doi: 10.1080/02791072.2022.2073300. Epub 2022 May 28. PMID: 35635191.

Kiran S, Mandal M, Rakib A, Bajwa A, Singh UP. miR-10a-3p modulates adiposity and suppresses adipose inflammation through TGF-β1/Smad3 signaling pathway. Front Immunol. 2023 Jun 2;14:1213415. doi: 10.3389/fimmu.2023.1213415. PMID: 37334370; PMCID: PMC10272755.

Myers LK, Ouyang YX, Patel JR, Odens HH, Woo-Rasberry V, Park J, Yi AK, Rosloniec EF, Brand DD, Stuart JM, Kang AH. Role of Citrullinated Collagen in Autoimmune Arthritis. Int J Mol Sci. 2022 Aug 30;23(17):9833. doi: 10.3390/ijms23179833. PMID: 36077232; PMCID: PMC9456437.

Sanders BC, Pokhrel S, Labbe AD, Mathews II, Cooper CJ, Davidson RB, Phillips G, Weiss KL, Zhang Q, O'Neill H, Kaur M, Schmidt JG, Reichard W, Surendranathan S, Parvathareddy J, Phillips L, Rainville C, Sterner DE, Kumaran D, Andi B, Babnigg G, Moriarty NW, Adams PD, Joachimiak A, Hurst BL, Kumar S, Butt TR, Jonsson CB, Ferrins L, Wakatsuki S, Galanie S, Head MS, Parks JM. Potent and selective covalent inhibition of the papain-like protease from SARS- CoV-2. Nat Commun. 2023 Mar 28;14(1):1733. doi: 10.1038/s41467-023-37254-w. PMID: 36977673; PMCID: PMC10044120.

Goodman MB, Haswell ES, Vásquez V. Mechanosensitive membrane proteins: Usual and unusual suspects in mediating mechanotransduction. J Gen Physiol. 2023 Mar 6;155(3):e202213248. doi: 10.1085/jgp.202213248. Epub 2023 Jan 25. PMID: 36696153; PMCID: PMC9930137.

Deng S, Banerjee S, Chen H, Pochampally S, Wang Y, Yun MK, White SW, Parmar K, Meibohm B, Hartman KL, Wu Z, Miller DD, Li W. SB226, an inhibitor of tubulin polymerization, inhibits paclitaxel-resistant melanoma growth and spontaneous metastasis. Cancer Lett. 2023 Feb 28;555:216046. doi: 10.1016/j.canlet.2022.216046. Epub 2022 Dec 31. PMID: 36596380; PMCID: PMC10321023.

Basu SK, Mandal N. Image-Based Longitudinal Characterization of Corneal Wound to Understand the Role of Sphingosine-1-Phosphate. Methods Mol Biol. 2023;2625:337-345. doi: 10.1007/978-1-0716-2966-6_28. PMID: 36653655.

Liu SH, Xiao Z, Mishra SK, Mitchell JC, Smith JC, Quarles LD, Petridis L. Identification of Small-Molecule Inhibitors of Fibroblast Growth Factor 23 Signaling via In Silico Hot Spot Prediction and Molecular Docking to α-Klotho. J Chem Inf Model. 2022 Aug 8;62(15):3627-3637. doi: 10.1021/acs.jcim.2c00633. Epub 2022 Jul 22. PMID: 35868851; PMCID: PMC10018682.

Krutilina RI, Hartman KL, Oluwalana D, Playa HC, Parke DN, Chen H, Miller DD, Li W, Seagroves TN. Sabizabulin, a Potent Orally Bioavailable Colchicine Binding Site Agent, Suppresses HER2+ Breast Cancer and Metastasis. Cancers (Basel). 2022 Oct

29;14(21):5336. doi: 10.3390/cancers14215336. PMID: 36358755; PMCID: PMC9658816.

Staszko SM, Boughter JD Jr, Fletcher ML. The impact of familiarity on cortical taste coding. Curr Biol. 2022 Nov 21;32(22):4914-4924.e4. doi: 10.1016/j.cub.2022.09.053. Epub 2022 Oct 18. PMID: 36261035; PMCID: PMC9691541.

Li M, Li L, Asemota S, Kakhniashvili D, Narayanan R, Wang X, Liao FF. Reciprocal interplay between OTULIN-LUBAC determines genotoxic and inflammatory NF-κB signal responses. Proc Natl Acad Sci U S A. 2022 Aug 16;119(33):e2123097119. doi: 10.1073/pnas.2123097119. Epub 2022 Aug 8. PMID: 35939695; PMCID: PMC9388121.

Nichols JH, Williams EP, Parvathareddy J, Cao X, Kong Y, Fitzpatrick E, Webby RJ, Jonsson CB. Upper Respiratory Infection Drives Clinical Signs and Inflammatory Responses Following Heterologous Challenge of SARS-CoV-2 Variants of Concern in K18 Mice. Viruses. 2023 Apr 11;15(4):946. doi: 10.3390/v15040946. PMID: 37112926; PMCID: PMC10144791.

Guo H, Zhang W, Wang J, Zhao G, Wang Y, Zhu BM, Dong P, Watari H, Wang B, Li W, Tigyi G, Yue J. Cryptotanshinone inhibits ovarian tumor growth and metastasis by degrading c-Myc and attenuating the FAK signaling pathway. Front Cell Dev Biol. 2022 Sep 28;10:959518. doi: 10.3389/fcell.2022.959518. PMID: 36247016; PMCID: PMC9554091.

Wilkerson JL, Basu SK, Mandal NA. Angiogenesis Model of Cornea to Understand the Role of Sphingosine 1-Phosphate. Methods Mol Biol. 2023;2625:231-240. doi: 10.1007/978-1-0716-2966-6_20. PMID: 36653647.

Schneider EH, Fitzgerald AC, Ponnapula SS, Dopico AM, Bukiya AN. Differential distribution of cholesterol pools across arteries under high- cholesterol diet. Biochim Biophys Acta Mol Cell Biol Lipids. 2022 Dec;1867(12):159235. doi: 10.1016/j.bbalip.2022.159235. Epub 2022 Sep 13. PMID: 36113825.

Meena AS, Shukla PK, Rao R, Canelas C, Pierre JF, Rao R. TRPV6 deficiency attenuates stress and corticosterone-mediated exacerbation of alcohol-induced gut barrier dysfunction and systemic inflammation. Front Immunol. 2023 Jan 31;14:1093584. doi: 10.3389/fimmu.2023.1093584. PMID: 36817471; PMCID: PMC9929865.

Zhao S, Martin-Vicente A, Colabardini AC, Pereira Silva L, Rinker DC, Fortwendel JR, Goldman GH, Gibbons JG. Genomic and Molecular Identification of Genes Contributing to the Caspofungin Paradoxical Effect in Aspergillus fumigatus. Microbiol Spectr. 2022 Oct 26;10(5):e0051922. doi: 10.1128/spectrum.00519-22. Epub 2022 Sep 12. PMID: 36094204; PMCID: PMC9603777.

Brizuela C, Huang GT, Diogenes A, Botero T, Khoury M. The Four Pillars for Successful Regenerative Therapy in Endodontics: Stem Cells, Biomaterials, Growth Factors, and

Their Synergistic Interactions. Stem Cells Int. 2022 Sep 19;2022:1580842. doi: 10.1155/2022/1580842. PMID: 36193253; PMCID: PMC9526564.

Meade RK, Long JE, Jinich A, Rhee KY, Ashbrook DG, Williams RW, Sassetti CM, Smith CM. Genome-wide screen identifies host loci that modulate M. tuberculosis fitness in immunodivergent mice. bioRxiv [Preprint]. 2023 Mar 6:2023.03.05.528534. doi: 10.1101/2023.03.05.528534. Update in: G3 (Bethesda). 2023 Jul 05;: PMID: 36945430; PMCID: PMC10028809.

Fan J, Wang S, Chen K, Sun Z. Aging impairs arterial compliance via Klotho- mediated downregulation of B-cell population and IgG levels. Cell Mol Life Sci. 2022 Aug 24;79(9):494. doi: 10.1007/s00018-022-04512-x. PMID: 36001158; PMCID: PMC10082671.

Merigeon EY, Yang D, Ihms EA, Bassit LC, Fitzpatrick EA, Jonsson CB, Schinazi RF, Block DS, Olsen HS. An ACE2-IgG4 Fc Fusion Protein Demonstrates Strong Binding to All Tested SARS-CoV-2 Variants and Reduced Lung Inflammation in Animal Models of SARS-CoV-2 and Influenza. Pathog Immun. 2022 Aug 23;7(1):104-121. doi: 10.20411/pai.v7i1.491. PMID: 36072571; PMCID: PMC9438944.

Beatty LA, Mansour KL, Bryant EJ, Garcia-Godoy F Jr, Santos Pantaleon D, Sawatari Y, Huang CY, Garcia-Godoy F. Chondroprotective Effects of Periodontal Ligament-Derived Stem Cells Conditioned Medium on Articular Cartilage After Impact Injury. Stem Cells Dev. 2022 Aug;31(15-16):498-505. doi: 10.1089/scd.2022.0130. PMID: 35730119.

Redei EE, Udell ME, Solberg Woods LC, Chen H. The Wistar Kyoto Rat: A Model of Depression Traits. Curr Neuropharmacol. 2023;21(9):1884-1905. doi: 10.2174/1570159X21666221129120902. PMID: 36453495; PMCID: PMC10514523.

Caires R, Garrud TAC, Romero LO, Fernández-Peña C, Vásquez V, Jaggar JH, Cordero-Morales JF. Genetic- and diet-induced ω-3 fatty acid enrichment enhances TRPV4-mediated vasodilation in mice. Cell Rep. 2022 Sep 6;40(10):111306. doi: 10.1016/j.celrep.2022.111306. PMID: 36070688; PMCID: PMC9498980.

Noël A, Ashbrook DG, Xu F, Cormier SA, Lu L, O'Callaghan JP, Menon SK, Zhao W, Penn AL, Jones BC. Genomic Basis for Individual Differences in Susceptibility to the Neurotoxic Effects of Diesel Exhaust. Int J Mol Sci. 2022 Oct 18;23(20):12461. doi: 10.3390/ijms232012461. PMID: 36293318; PMCID: PMC9603950.

Honig MG, Del Mar NA, Moore BM, Reiner A. Raloxifene Mitigates Emotional Deficits after Mild Traumatic Brain Injury in Mice. Neurotrauma Rep. 2022 Nov 24;3(1):534-544. doi: 10.1089/neur.2022.0052. PMID: 36479361; PMCID: PMC9718433.

Dong Y, Chen J, Sun H, Chen Y, Jiao Y, Gu W, Chen H, Liu S. Traditional Chinese medicine as a novel therapy for colorectal cancer by modulating intestinal flora. J Cancer. 2023 Sep 4;14(14):2720-2725. doi: 10.7150/jca.87719. PMID: 37779871; PMCID: PMC10539393.

Rasiah PK, Jha KA, Gentry J, Del Mar NA, Townsend T, Torgbe KE, Reiner A, Gangaraju R. A Long-Term Safety and Efficacy Report on Intravitreal Delivery of Adipose Stem Cells and Secretome on Visual Deficits After Traumatic Brain Injury. Transl Vis Sci Technol. 2022 Oct 3;11(10):1. doi: 10.1167/tvst.11.10.1. PMID: 36180031; PMCID: PMC9547363.

Pinky L, DeAguero JR, Remien CH, Smith AM. How Interactions during Viral- Viral Coinfection Can Shape Infection Kinetics. Viruses. 2023 May 31;15(6):1303. doi: 10.3390/v15061303. PMID: 37376603; PMCID: PMC10301061.

Liu T, Gu L, Wu Z, Albadari N, Li W, Zhou M. MYCN mRNA degradation and cancer suppression by a selective small-molecule inhibitor in MYCN-amplified neuroblastoma. Front Oncol. 2022 Nov 24;12:1058726. doi: 10.3389/fonc.2022.1058726. PMID: 36505784; PMCID: PMC9730801.

Vázquez-Borrego MC, Del Río-Moreno M, Pyatkov M, Sarmento-Cabral A, Mahmood M, Pelke N, Wnek M, Cordoba-Chacon J, Waxman DJ, Puchowicz MA, McGuinness OP, Kineman RD. Direct and systemic actions of growth hormone receptor (GHR)-signaling on hepatic glycolysis, de novo lipogenesis and insulin sensitivity, associated with steatosis. Metabolism. 2023 Jul;144:155589. doi: 10.1016/j.metabol.2023.155589. Epub 2023 May 13. PMID: 37182789.

Tunctan B, Senol SP, Temiz-Resitoglu M, Yilmaz DE, Guden DS, Bahceli O, Horat MF, Sahan-Firat S, Sari AN, Falck JR, Anugu RR, Malik KU. Activation of GPR75 Signaling Pathway Contributes to the Effect of a 20-HETE Mimetic, 5,14-HEDGE, to Prevent Hypotensive and Tachycardic Responses to Lipopolysaccharide in a Rat Model of Septic Shock. J Cardiovasc Pharmacol. 2022 Aug 1;80(2):276-293. doi: 10.1097/FJC.0000000000001265. PMID: 35323151.

Hu H, Mady Traore MD, Li R, Yuan H, He M, Wen B, Gao W, Jonsson CB, Fitzpatrick EA, Sun D. Optimization of the Prodrug Moiety of Remdesivir to Improve Lung Exposure/Selectivity and Enhance Anti-SARS-CoV-2 Activity. J Med Chem. 2022 Sep 22;65(18):12044-12054. doi: 10.1021/acs.jmedchem.2c00758. Epub 2022 Sep 7. PMID: 36070561.

Shrestha AP, Saravanakumar A, Konadu B, Madireddy S, Gibert Y, Vaithianathan T. Embryonic Hyperglycemia Delays the Development of Retinal Synapses in a Zebrafish Model. Int J Mol Sci. 2022 Aug 26;23(17):9693. doi: 10.3390/ijms23179693. PMID: 36077087; PMCID: PMC9456524.

Smith AP, Lane LC, Ramirez Zuniga I, Moquin DM, Vogel P, Smith AM. Increased virus dissemination leads to enhanced lung injury but not inflammation during influenza-associated secondary bacterial infection. FEMS Microbes. 2022 Jul 25;3:xtac022. doi: 10.1093/femsmc/xtac022. PMID: 37332507; PMCID: PMC10117793.

Harbison-Price N, Rivera-Hernandez T, Osowicki J, Davies MR, Steer AC, Walker MJ, Dale JB. Current Approaches to Vaccine Development of Streptococcus pyogenes<. 2022 May 29 [updated 2022 Oct 9]. In: Ferretti JJ, Stevens DL, Fischetti VA, editors.

Streptococcus pyogenes: Basic Biology to Clinical Manifestations [Internet]. 2nd ed. Oklahoma City (OK): University of Oklahoma Health Sciences Center; 2022 Oct 8. Chapter 31. PMID: 36479760.

North KC, Shaw AA, Moreira L Jr, Bukiya AN, Dopico AM. Alcohol and pregnenolone interaction on cerebral arteries through targeting of vascular smooth muscle Ca2+- and voltage-gated K+ channels of big conductance. Adv Drug Alcohol Res. 2023;3:11735. doi: 10.3389/adar.2023.11735. Epub 2023 Aug 14. PMID: 37846408; PMCID: PMC10578043.

Al-Aqtash R, Ross MS, Collier DM. Extracellular histone proteins activate P2XR7 channel current. J Gen Physiol. 2023 Jul 3;155(7):e202213317. doi: 10.1085/jgp.202213317. Epub 2023 May 18. PMID: 37199689; PMCID: PMC10200710.

Temrikar ZH, Kodidela S, Kumar S, Liu J, Robertson GT, Lee RE, Hickey AJ, Gonzalez-Juarrero M, Meibohm B. Characterization of spectinamide 1599 efficacy against different mycobacterial phenotypes. Tuberculosis (Edinb). 2023 May;140:102342. doi: 10.1016/j.tube.2023.102342. Epub 2023 Apr 20. PMID: 37120915; PMCID: PMC10247484.

Ji N, Wang M, Tan C. Liposomal Delivery of MIW815 (ADU-S100) for Potentiated STING Activation. Pharmaceutics. 2023 Feb 14;15(2):638. doi: 10.3390/pharmaceutics15020638. PMID: 36839960; PMCID: PMC9966736.

Zhang L, Hung GC, Meng S, Evans R, Xu J. LncRNA MALAT1 Regulates Hyperglycemia Induced EMT in Keratinocyte via miR-205. Noncoding RNA. 2023 Feb 11;9(1):14. doi: 10.3390/ncrna9010014. PMID: 36827547; PMCID: PMC9963368.

Raghavan S, Brishti MA, Collier DM, Leo MD. Hypoxia induces purinergic receptor signaling to disrupt endothelial barrier function. Front Physiol. 2022 Nov 21;13:1049698. doi: 10.3389/fphys.2022.1049698. PMID: 36479340; PMCID: PMC9720161.

Pérez-Cantero A, Martin-Vicente A, Guarro J, Fortwendel JR, Capilla J. Analysis of the cyp51 genes contribution to azole resistance in Aspergillus section Nigri with the CRISPR-Cas9 technique. Antimicrob Agents Chemother. 2023 May 1;65(5):e01996-20. doi: 10.1128/AAC.01996-20. Epub 2021 Mar 8. PMID: 33685892; PMCID: PMC8092891.

Wilkerson JL, Basu SK, Stiles MA, Prislovsky A, Grambergs RC, Nicholas SE, Karamichos D, Allegood JC, Proia RL, Mandal N. Ablation of Sphingosine Kinase 1 Protects Cornea from Neovascularization in a Mouse Corneal Injury Model. Cells. 2022 Sep 17;11(18):2914. doi: 10.3390/cells11182914. PMID: 36139489; PMCID: PMC9497123.

Ismael S, Patrick D, Salman M, Parveen A, Stanfill AG, Ishrat T. Verapamil inhibits TXNIP-NLRP3 inflammasome activation and preserves functional recovery after intracerebral hemorrhage in mice. Neurochem Int. 2022 Dec;161:105423. doi: 10.1016/j.neuint.2022.105423. Epub 2022 Oct 14. PMID: 36244583.

Romero LO, Caires R, Kaitlyn Victor A, Ramirez J, Sierra-Valdez FJ, Walsh P, Truong V, Lee J, Mayor U, Reiter LT, Vásquez V, Cordero-Morales JF. Linoleic acid improves PIEZO2 dysfunction in a mouse model of Angelman Syndrome. Nat Commun. 2023 Mar 1;14(1):1167. doi: 10.1038/s41467-023-36818-0. PMID: 36859399; PMCID: PMC9977963.

: Lai W, Zhao S, Lai Q, Zhou W, Wu M, Jiang X, Wang X, Peng Y, Wei X, Ouyang L, Gou L, Chen H, Wang Y, Yang J. Design, Synthesis, and Bioevaluation of a Novel Hybrid Molecular Pyrrolobenzodiazepine-Anthracenecarboxyimide as a Payload for Antibody-Drug Conjugate. J Med Chem. 2022 Sep 8;65(17):11679-11702. doi: 10.1021/acs.jmedchem.2c00471. Epub 2022 Aug 18. PMID: 35982539.

Fouda AY, Ahmed HA, Pillai B, Kozak A, Hardigan T, Ergul A, Fagan SC, Ishrat T. Contralesional angiotensin type 2 receptor activation contributes to recovery in experimental stroke. Neurochem Int. 2022 Sep;158:105375. doi: 10.1016/j.neuint.2022.105375. Epub 2022 Jun 7. PMID: 35688299; PMCID: PMC9719365.

Jia Y, Gao MD, Liu YF, Lu L, Chen G, Chen Y. Genetic dissection of glutathione S-transferase omega-1: identification of novel downstream targets and Alzheimer's disease pathways. Neural Regen Res. 2022 Nov;17(11):2452-2458. doi: 10.4103/1673-5374.339004. PMID: 35535896; PMCID: PMC9120681.

Bhatti FU, Jeong YH, Kim DG, Yi AK, Brand DD, Hasty KA, Cho H. Characterization of Non-Invasively Induced Post-Traumatic Osteoarthritis in Mice. Antioxidants (Basel). 2022 Sep 9;11(9):1783. doi: 10.3390/antiox11091783. PMID: 36139857; PMCID: PMC9495497.

Saito-Diaz K, Dietrich P, Wu HF, Sun X, Patel AJ, Wzientek CG, Prudden AR, Boons GJ, Chen S, Studer L, Xu B, Dragatsis I, Zeltner N. Genipin Crosslinks the Extracellular Matrix to Rescue Developmental and Degenerative Defects, and Accelerates Regeneration of Peripheral Neurons. bioRxiv [Preprint]. 2023 Mar 24:2023.03.22.533831. doi: 10.1101/2023.03.22.533831. PMID: 36993570; PMCID: PMC10055431.

Tian C, Li L, Fan L, Brown A, Norris EJ, Morrison M, Glazer ES, Zhu L. A hepatoprotective role of peritumoral non-parenchymal cells in early liver tumorigenesis. Dis Model Mech. 2023 Mar 1;16(3):dmm049750. doi: 10.1242/dmm.049750. Epub 2023 Mar 9. PMID: 36728410; PMCID: PMC10040241.

Hu W, Hu Y, Pei Y, Li R, Xu F, Chi X, Mi J, Bergquist J, Lu L, Zhang L, Yang C. Silencing DTX3L Inhibits the Progression of Cervical Carcinoma by Regulating PI3K/AKT/mTOR Signaling Pathway. Int J Mol Sci. 2023 Jan 3;24(1):861. doi: 10.3390/ijms24010861. PMID: 36614304; PMCID: PMC9821498.

Shiah YJ, Shan L, Radin DI, Huang GT. Effects of intentionally treated water on the growth of mesenchymal stem cells: An exploratory study. Explore (NY). 2022 Nov-

Dec;18(6):663-669. doi: 10.1016/j.explore.2021.11.007. Epub 2021 Nov 24. PMID: 34887234.

Chaib M, Hafeez BB, Mandil H, Daria D, Pingili AK, Kumari S, Sikander M, Kashyap VK, Chen GY, Anning E, Tripathi MK, Khan S, Behrman S, Yallapu MM, Jaggi M, Makowski L, Chauhan SC. Reprogramming of pancreatic adenocarcinoma immunosurveillance by a microbial probiotic siderophore. Commun Biol. 2022 Nov 4;5(1):1181. doi: 10.1038/s42003-022-04102-4. PMID: 36333531; PMCID: PMC9636404.

Afolabi JM, Kanthakumar P, Williams JD, Kumar R, Soni H, Adebiyi A. Post- injury Inhibition of Endothelin-1 Dependent Renal Vasoregulation Mitigates Rhabdomyolysis-Induced Acute Kidney Injury. Function (Oxf). 2023 May 4;4(4):zqad022. doi: 10.1093/function/zqad022. PMID: 37342410; PMCID: PMC10278989.

Singla B, Aithbathula RV, Pervaiz N, Kathuria I, Swanson M, Ekuban FA, Ahn W, Park F, Gyamfi M, Cherian-Shaw M, Singh UP, Kumar S. CD47 Activation by Thrombospondin-1 in Lymphatic Endothelial Cells Suppresses Lymphangiogenesis and Promotes Atherosclerosis. Arterioscler Thromb Vasc Biol. 2023 Jul;43(7):1234-1250. doi: 10.1161/ATVBAHA.122.318904. Epub 2023 Jun 1. PMID: 37259865; PMCID: PMC10281185.

Orgil BO, Munkhsaikhan U, Pierre JF, Li N, Xu F, Alberson NR, Johnson JN, Wetzel GT, Boukens BJD, Lu L, Towbin JA, Purevjav E. The TMEM43 S358L mutation affects cardiac, small intestine, and metabolic homeostasis in a knock- in mouse model. Am J Physiol Heart Circ Physiol. 2023 Jun 1;324(6):H866-H880. doi: 10.1152/ajpheart.00712.2022. Epub 2023 Apr 21. PMID: 37083466; PMCID: PMC10190833.

Kim S, Samanta K, Nguyen BT, Mata-Robles S, Richer L, Yoon JY, Gomes- Solecki M. A portable immunosensor provides sensitive and rapid detection of Borrelia burgdorferi antigen in spiked blood. Sci Rep. 2023 May 9;13(1):7546. doi: 10.1038/s41598-023-34108-9. PMID: 37161039; PMCID: PMC10170079.

Slominski AT, Brożyna AA, Kim TK, Elsayed MM, Janjetovic Z, Qayyum S, Slominski RM, Oak ASW, Li C, Podgorska E, Li W, Jetten AM, Tuckey RC, Tang EKY, Elmets C, Athar M. CYP11A1-derived vitamin D hydroxyderivatives as candidates for therapy of basal and squamous cell carcinomas. Int J Oncol. 2022 Aug;61(2):96. doi: 10.3892/ijo.2022.5386. Epub 2022 Jul 1. PMID: 35775377; PMCID: PMC9262157.

Mysiewicz S, North KC, Moreira L Jr, Odum SJ, Bukiya AN, Dopico AM. Interspecies and regional variability of alcohol action on large cerebral arteries: regulation by KCNMB1 proteins. Am J Physiol Regul Integr Comp Physiol. 2023 Apr 1;324(4):R480-R496. doi: 10.1152/ajpregu.00103.2022. Epub 2023 Jan 30. PMID: 36717168; PMCID: PMC10027090.

Parmar KR, Lukka PB, Wagh S, Temrikar ZH, Liu J, Lee RE, Braunstein M, Hickey AJ, Robertson GT, Gonzalez-Juarrero M, Edginton A, Meibohm B. Development of a

Minimalistic Physiologically Based Pharmacokinetic (mPBPK) Model for the Preclinical Development of Spectinamide Antibiotics. Pharmaceutics. 2023 Jun 17;15(6):1759. doi: 10.3390/pharmaceutics15061759. PMID: 37376207; PMCID: PMC10305115.

Cao X, Yang D, Parvathareddy J, Chu YK, Kim EJ, Fitz-Henley JN, Li X, Lukka PB, Parmar KR, Temrikar ZH, Dhole P, Adcock RS, Gabbard J, Bansal S, Lee J, Zalduondo L, Hayes E, Stabenow J, Meibohm B, Fitzpatrick EA, Bailey K, Campos RK, Julander JG, Rossi SL, Chung D, Jonsson CB, Golden JE. Efficacy of a brain- penetrant antiviral in lethal Venezuelan and eastern equine encephalitis mouse models. Sci Transl Med. 2023 Apr 12;15(691):eabl9344. doi: 10.1126/scitranslmed.abl9344. Epub 2023 Apr 12. PMID: 37043558.

Kim S, Kim YE, Kim IH. Simultaneous analysis of social behaviors and neural responses in mice using round social arena system. STAR Protoc. 2022 Dec 16;3(4):101722. doi: 10.1016/j.xpro.2022.101722. Epub 2022 Sep 24. PMID: 36153733; PMCID: PMC9513260.

Meombe Mbolle A, Thapa S, Bukiya AN, Jiang H. High-resolution imaging in studies of alcohol effect on prenatal development. Adv Drug Alcohol Res. 2023;3:10790. doi: 10.3389/adar.2023.10790. Epub 2023 Feb 1. PMID: 37593366; PMCID: PMC10433240.

Mondal K, Grambergs RC, Gangaraju R, Mandal N. A Comprehensive Profiling of Cellular Sphingolipids in Mammalian Endothelial and Microglial Cells Cultured in Normal and High-Glucose Conditions. Cells. 2022 Sep 30;11(19):3082. doi: 10.3390/cells11193082. PMID: 36231042; PMCID: PMC9563724.

Franks H, Wang R, Li M, Wang B, Wildmann A, Ortyl T, O'Brien S, Young D, Liao FF, Sakata K. Heat shock factor HSF1 regulates BDNF gene promoters upon acute stress in the hippocampus, together with pCREB. J Neurochem. 2023 Apr;165(2):131-148. doi: 10.1111/jnc.15707. Epub 2022 Nov 17. PMID: 36227087; PMCID: PMC10097844.

Fowler S, Wang T, Munro D, Kumar A, Chitre AS, Hollingsworth TJ, Garcia Martinez A, St Pierre CL, Bimschleger H, Gao J, Cheng R, Mohammadi P, Chen H, Palmer AA, Polesskaya O, Jablonski MM. Genome-wide association study finds multiple loci associated with intraocular pressure in HS rats. Front Genet. 2023 Jan 30;13:1029058. doi: 10.3389/fgene.2022.1029058. PMID: 36793389; PMCID: PMC9922724.

Govatati S, Pichavaram P, Kumar R, Rao GN. Blockade of CD47 function attenuates restenosis by promoting smooth muscle cell efferocytosis and inhibiting their migration and proliferation. J Biol Chem. 2023 Apr;299(4):104594. doi: 10.1016/j.jbc.2023.104594. Epub 2023 Mar 8. PMID: 36898577; PMCID: PMC10124914.

Gu M, Yu Y, Xue M, Jiang J, Cai J. The discovery of cyclic γ-AApeptides as the promising ligands targeting EP2. Bioorg Med Chem Lett. 2023 May 1;87:129255. doi: 10.1016/j.bmcl.2023.129255. Epub 2023 Mar 23. PMID: 36965536; PMCID: PMC10141659.

Kodidela S, Sinha N, Kumar A, Zhou L, Godse S, Kumar S. Extracellular vesicles released from macrophages modulates interleukin-1β in astrocytic and neuronal cells. Sci Rep. 2023 Feb 21;13(1):3005. doi: 10.1038/s41598-023-29746-y. PMID: 36810605; PMCID: PMC9944928.

Zhou Q, Yang L, Verne ML, Zhang BB, Fields J, Verne GN. Catechol-O-Methyltransferase Loss Drives Cell-Specific Nociceptive Signaling via the Enteric Catechol-O-Methyltransferase/microRNA-155/Tumor Necrosis Factor α Axis. Gastroenterology. 2023 Apr;164(4):630-641.e34. doi: 10.1053/j.gastro.2022.12.041. Epub 2023 Jan 6. PMID: 36623778; PMCID: PMC10038873.

Gabriel DBK, Liley AE, Franks HT, Minnes GL, Tutaj M, Dwinell MR, de Jong TV, Williams RW, Mulligan MK, Chen H, Simon NW. Divergent risky decision-making and impulsivity behaviors in Lewis rat substrains with low genetic difference. Behav Neurosci. 2023 Aug;137(4):254-267. doi: 10.1037/bne0000557. Epub 2023 Apr 27. PMID: 37104777; PMCID: PMC10524952.

Cruz B, Vozella V, Carper BA, Xu JC, Kirson D, Hirsch S, Nolen T, Bradley L, Fain K, Crawford M, Kosten TR, Zorrilla EP, Roberto M. FKBP5 inhibitors modulate alcohol drinking and trauma-related behaviors in a model of comorbid post-traumatic stress and alcohol use disorder. Neuropsychopharmacology. 2023 Jul;48(8):1144-1154. doi: 10.1038/s41386-022-01497-w. Epub 2022 Nov 18. PMID: 36396784; PMCID: PMC10267127.

Baker JA, Brettin JT, Mulligan MK, Hamre KM. Effects of Genetics and Sex on Acute Gene Expression Changes in the Hippocampus Following Neonatal Ethanol Exposure in BXD Recombinant Inbred Mouse Strains. Brain Sci. 2022 Nov 29;12(12):1634. doi: 10.3390/brainsci12121634. PMID: 36552094; PMCID: PMC9776411.

Joshi RP, Schultz KJ, Wilson JW, Kruel A, Varikoti RA, Kombala CJ, Kneller DW, Galanie S, Phillips G, Zhang Q, Coates L, Parvathareddy J, Surendranathan S, Kong Y, Clyde A, Ramanathan A, Jonsson CB, Brandvold KR, Zhou M, Head MS, Kovalevsky A, Kumar N. AI-Accelerated Design of Targeted Covalent Inhibitors for SARS-CoV-2. J Chem Inf Model. 2023 Mar 13;63(5):1438-1453. doi: 10.1021/acs.jcim.2c01377. Epub 2023 Feb 21. PMID: 36808989.

Souza ACO, Ge W, Wiederhold NP, Rybak JM, Fortwendel JR, Rogers PD. hapE and 1hmg Mutations Are Drivers of cyp51A<-Independent Pan-Triazole Resistance in an Aspergillus fumigatus Clinical Isolate. Microbiol Spectr. 2023 Jun 15;11(3):e0518822. doi: 10.1128/spectrum.05188-22. Epub 2023 May 4. PMID: 37140376; PMCID: PMC10269825.

Dwyer AR, Perez Kerkvliet C, Truong TH, Hagen KM, Krutilina RI, Parke DN, Oakley RH, Liddle C, Cidlowski JA, Seagroves TN, Lange CA. Glucocorticoid Receptors Drive Breast Cancer Cell Migration and Metabolic Reprogramming via PDK4. Endocrinology. 2023 Jun

6;164(7):bqad083. doi: 10.1210/endocr/bqad083. Erratum in: Endocrinology. 2023 Jun 26;164(8): PMID: 37224504; PMCID: PMC10251300.

Fanous MS, Afolabi JM, Michael OS, Falayi OO, Iwhiwhu SA, Adebiyi A. Transdermal Measurement of Glomerular Filtration Rate in Mechanically Ventilated Piglets. J Vis Exp. 2022 Sep 13;(187):10.3791/64413. doi: 10.3791/64413. PMID: 36190295; PMCID: PMC9835146.

Bajpai AK, Gu Q, Orgil BO, Xu F, Torres-Rojas C, Zhao W, Chen C, Starlard- Davenport A, Jones B, Lebeche D, Towbin JA, Purevjav E, Lu L, Zhang W. Cardiac copper content and its relationship with heart physiology: Insights based on quantitative genetic and functional analyses using BXD family mice. Front Cardiovasc Med. 2023 Feb 2;10:1089963. doi: 10.3389/fcvm.2023.1089963. PMID: 36818345; PMCID: PMC9931904.

VanderVeen BN, Cardaci TD, Madero SS, McDonald SJ, Bullard BM, Price RL, Carson JA, Fan D, Murphy EA. 5-Fluorouracil disrupts skeletal muscle immune cells and impairs skeletal muscle repair and remodeling. J Appl Physiol (1985). 2022 Oct 1;133(4):834-849. doi: 10.1152/japplphysiol.00325.2022. Epub 2022 Aug 25. PMID: 36007896; PMCID: PMC9529268.

Pochampally S, Hartman KL, Wang R, Wang J, Yun MK, Parmar K, Park H, Meibohm B, White SW, Li W, Miller DD. Design, Synthesis, and Biological Evaluation of Pyrimidine Dihydroquinoxalinone Derivatives as Tubulin Colchicine Site-Binding Agents That Displayed Potent Anticancer Activity Both In Vitro and In Vivo. ACS Pharmacol Transl Sci. 2023 Mar 22;6(4):526-545. doi: 10.1021/acsptsci.2c00108. PMID: 37082747; PMCID: PMC10111625.

Kumar R, Soni H, Afolabi JM, Kanthakumar P, Mankuzhy PD, Iwhiwhu SA, Adebiyi A. Induction of reactive oxygen species by mechanical stretch drives endothelin production in neonatal pig renal epithelial cells. Redox Biol. 2022 Sep;55:102394. doi: 10.1016/j.redox.2022.102394. Epub 2022 Jul 4. PMID: 35841629; PMCID: PMC9289874.

Zhang C, Yao J, Liu C, Yang K, Zhang W, Sun D, Gu W. The Role of Thyroid Hormone Synthesis Gene-Related miRNAs Profiling in Structural and Functional Changes of The Thyroid Gland Induced by Excess Iodine. Biol Trace Elem Res. 2023 May 27. doi: 10.1007/s12011-023-03691-3. Epub ahead of print. PMID: 37243879.

Miao J, Regan J, Cai C, Palmer GE, Williams DL, Kruppa MD, Peters BM. Glycogen Metabolism in Candida albicans Impacts Fitness and Virulence during Vulvovaginal and Invasive Candidiasis. mBio. 2023 Apr 25;14(2):e0004623. doi: 10.1128/mbio.00046-23. Epub 2023 Feb 22. PMID: 36840583; PMCID: PMC10127583.

Heo SC, Keum BR, Seo EJ, Yoon J, Jeong S, Tigyi GJ, Norman D, Jang IH, Kim HJ. Lysophosphatidic acid induces proliferation and osteogenic differentiation of human dental pulp stem cell through lysophosphatidic acid receptor 3/extracellular signal-

regulated kinase signaling axis. J Dent Sci. 2023 Jul;18(3):1219-1226. doi: 10.1016/j.jds.2023.01.029. Epub 2023 Feb 9. PMID: 37404649; PMCID: PMC10316439.

Rodriguez L, Kirson D, Wolfe SA, Patel RR, Varodayan FP, Snyder AE, Gandhi PJ, Khom S, Vlkolinsky R, Bajo M, Roberto M. Alcohol Dependence Induces CRF Sensitivity in Female Central Amygdala GABA Synapses. Int J Mol Sci. 2022 Jul 16;23(14):7842. doi: 10.3390/ijms23147842. PMID: 35887190; PMCID: PMC9318832.

Song SY, Park JK, Kwon YH, Garcia-Godoy F. Autofluorescence spectra and image to differentiate restorative dental resins from the tooth. Am J Dent. 2022 Oct;35(5):263-267. PMID: 36261407.

Maloney SE, Alshiraihi IM, Singh A, Stewart IE, Mariner Gonzalez J, Gonzalez-Juarrero M, Meibohm B, Hickey AJ. Spray dried tigecycline dry powder aerosols for the treatment of Nontuberculous mycobacterial pulmonary infections. Tuberculosis (Edinb). 2023 Mar;139:102306. doi: 10.1016/j.tube.2023.102306. Epub 2023 Jan 20. PMID: 36716525; PMCID: PMC10191180.

Guo S, Chen J, Hu P, Li C, Wang X, Chen N, Sun J, Wang Y, Wang J, Gu W, Wu S. The Value of Circulating Tumor Cells and Tumor Markers Detection in Lung Cancer Diagnosis. Technol Cancer Res Treat. 2023 Jan-Dec;22:15330338231166754. doi: 10.1177/15330338231166754. PMID: 37093867; PMCID: PMC10134176.

Khom S, Borgonetti V, Vozella V, Kirson D, Rodriguez L, Gandhi P, Bianchi PC, Snyder A, Vlkolinsky R, Bajo M, Oleata CS, Ciccocioppo R, Roberto M. Glucocorticoid receptors regulate central amygdala GABAergic synapses in Marchigian-Sardinian alcohol-preferring rats. Neurobiol Stress. 2023 Jun 4;25:100547. doi: 10.1016/j.ynstr.2023.100547. PMID: 37547774; PMCID: PMC10401345.

Fan J, Wang S, Lu X, Sun Z. Transplantation of bone marrow cells from miR150 knockout mice improves senescence-associated humoral immune dysfunction and arterial stiffness. Metabolism. 2022 Sep;134:155249. doi: 10.1016/j.metabol.2022.155249. Epub 2022 Jul 2. PMID: 35792174; PMCID: PMC9796492.

Nicholas SE, Choi AJ, Lam TN, Basu SK, Mandal N, Karamichos D. Potentiation of Sphingolipids and TGF-β in the human corneal stroma reveals intricate signaling pathway crosstalks. Exp Eye Res. 2023 Jun;231:109487. doi: 10.1016/j.exer.2023.109487. Epub 2023 Apr 19. PMID: 37084874.

Perry CH, Mullins NA, Sweileh RBA, Shendy NAM, Roberto PA, Broadhurst AL, Nelson HA, Miranda-Carboni GA, Abell AN. MAP3K4 promotes fetal and placental growth by controlling the receptor tyrosine kinases IGF1R/IR and Akt signaling pathway. J Biol Chem. 2022 Sep;298(9):102310. doi: 10.1016/j.jbc.2022.102310. Epub 2022 Jul 31. PMID: 35921893; PMCID: PMC9463538.

Baker JA, Mulligan MK, Hamre KM. Effects of genetics and sex on adolescent behaviors following neonatal ethanol exposure in BXD recombinant inbred strains. Front Neurosci.

2023 Jul 26;17:1197292. doi: 10.3389/fnins.2023.1197292. PMID: 37564365; PMCID: PMC10410115.

Chen J, Lin Y, Sun Z. Inhibition of miR-101-3p prevents human aortic valve interstitial cell calcification through regulation of CDH11/SOX9 expression. Mol Med. 2023 Feb 21;29(1):24. doi: 10.1186/s10020-023-00619-4. PMID: 36809926; PMCID: PMC9945614.

Zhu C, Gu W, Sun D, Wei W. The mechanism underlying fluoride-induced low- renin hypertension is related to an imbalance in the circulatory and local renin-angiotensin systems. Toxicol Lett. 2023 May 15;381:36-47. doi: 10.1016/j.toxlet.2023.04.010. Epub 2023 Apr 25. PMID: 37105417.

Kim YE, Kim S, Kim IH. Neural circuit-specific gene manipulation in mouse brain in vivo using split-intein-mediated split-Cre system. STAR Protoc. 2022 Nov 3;3(4):101807. doi: 10.1016/j.xpro.2022.101807. PMID: 36386891; PMCID: PMC9641071.

Tian C, Li L, Pan Q, Xu B, Li Y, Fan L, Brown A, Morrison M, Dey K, Yang JJ, Yu J, Glazer ES, Zhu L. Spatiotemporal regulation of cholangiocarcinoma growth and dissemination by peritumoral myofibroblasts in a Vcam1-dependent manner. Oncogene. 2023 Apr;42(15):1196-1208. doi: 10.1038/s41388-023-02639-0. Epub 2023 Feb 24. PMID: 36828890; PMCID: PMC10079548.

Munkhsaikhan U, Kwon YI, Sahyoun AM, Galán M, Gonzalez AA, Ait-Aissa K, Abidi AH, Kassan A, Kassan M. The Beneficial Effect of Lomitapide on the Cardiovascular System in LDLr-/- Mice with Obesity. Antioxidants (Basel). 2023 Jun 16;12(6):1287. doi: 10.3390/antiox12061287. PMID: 37372017; PMCID: PMC10295391.

Liu Y, McAfee SS, Van Der Heijden ME, Dhamala M, Sillitoe RV, Heck DH. Causal Evidence for a Role of Cerebellar Lobulus Simplex in Prefrontal- Hippocampal Interaction in Spatial Working Memory Decision-Making. Cerebellum. 2022 Oct;21(5):762-775. doi: 10.1007/s12311-022-01383-7. Epub 2022 Feb 26. PMID: 35218525; PMCID: PMC10230449.

Ruisanchez É, Janovicz A, Panta RC, Kiss L, Párkányi A, Straky Z, Korda D, Liliom K, Tigyi G, Benyó Z. Enhancement of Sphingomyelinase-Induced Endothelial Nitric Oxide Synthase-Mediated Vasorelaxation in a Murine Model of Type 2 Diabetes. Int J Mol Sci. 2023 May 6;24(9):8375. doi: 10.3390/ijms24098375. PMID: 37176081; PMCID: PMC10179569.

Hu H, Cai J, Qi D, Li B, Yu L, Wang C, Bajpai AK, Huang X, Zhang X, Lu L, Liu J, Zheng F. Identification of Potential Biomarkers for Group I Pulmonary Hypertension Based on Machine Learning and Bioinformatics Analysis. Int J Mol Sci. 2023 Apr 28;24(9):8050. doi: 10.3390/ijms24098050. PMID: 37175757; PMCID: PMC10178909.

Liu X, Zhang J, Li P, Han P, Kang YJ, Zhang W. Gene expression patterns and related pathways in the hearts of rhesus monkeys subjected to prolonged myocardial ischemia.

Exp Biol Med (Maywood). 2023 Feb;248(4):350-360. doi: 10.1177/15353702231151968. Epub 2023 Feb 22. PMID: 36814407; PMCID: PMC10159524.

Antonia RJ, Karelehto E, Toriguchi K, Matli M, Warren RS, Pfeffer LM, Donner DB. STAT3 regulates inflammatory cytokine production downstream of TNFR1 by inducing expression of TNFAIP3/A20. J Cell Mol Med. 2022 Aug;26(16):4591-4601. doi: 10.1111/jcmm.17489. Epub 2022 Jul 16. PMID: 35841281; PMCID: PMC9357623.

Piemjai M, Waleepitackdej O, Garcia-Godoy F. Marginal Micro-Seal and Tensile Bond Strength of a Biopolymer Hybrid Layer Coupled with Dental Prosthesis Using a Primerless-Wet System. Polymers (Basel). 2023 Jan 5;15(2):283. doi: 10.3390/polym15020283. PMID: 36679164; PMCID: PMC9862600.

Passarelli PC, Lopez MA, Netti A, Rella E, Leonardis M, Svaluto Ferro L, Lopez A, Garcia-Godoy F, D'Addona A. Effects of Flap Design on the Periodontal Health of Second Lower Molars after Impacted Third Molar Extraction. Healthcare (Basel). 2022 Nov 30;10(12):2410. doi: 10.3390/healthcare10122410. PMID: 36553934; PMCID: PMC9777857.

Beasley MM, Gunawan T, Tunstall BJ, Kearns DN. Intermittent access training produces greater motivation for a non-drug reinforcer than long access training. Learn Behav. 2022 Dec;50(4):509-523. doi: 10.3758/s13420-022-00512-w. Epub 2022 Feb 7. PMID: 35132517; PMCID: PMC10237344.

Bhattarai RS, Bariwal J, Kumar V, Hao C, Deng S, Li W, Mahato RI. pH- sensitive nanomedicine of novel tubulin polymerization inhibitor for lung metastatic melanoma. J Control Release. 2022 Oct;350:569-583. doi: 10.1016/j.jconrel.2022.08.023. Epub 2022 Sep 2. PMID: 36037976; PMCID: PMC10322201.

Suthon S, Perkins RS, Lin J, Crockarell JR Jr, Miranda-Carboni GA, Krum SA. GATA4 and estrogen receptor alpha bind at SNPs rs9921222 and rs10794639 to regulate AXIN1 expression in osteoblasts. Hum Genet. 2022 Dec;141(12):1849-1861. doi: 10.1007/s00439-022-02463-8. Epub 2022 Jun 9. PMID: 35678873.

Slayden AV, Dyer CL, Ma D, Li W, Bukiya AN, Parrill AL, Dopico AM. Discovery of agonist-antagonist pairs for the modulation of Ca+[2] and voltage-gated + channels of large conductance that contain beta1 subunits. Bioorg Med Chem. 2022 Aug 15;68:116876. doi: 10.1016/j.bmc.2022.116876. Epub 2022 Jun 13. PMID: 35716586; PMCID: PMC10464842.

Chitre AS, Polesskaya O, Munro D, Cheng R, Mohammadi P, Holl K, Gao J, Bimschleger H, Martinez AG, George AM, Gileta AF, Han W, Horvath A, Hughson A, Ishiwari K, King CP, Lamparelli A, Versaggi CL, Martin CD, St Pierre CL, Tripi JA, Richards JB, Wang T, Chen H, Flagel SB, Meyer P, Robinson TE, Solberg Woods LC, Palmer AA. An exponential increase in QTL detection with an increased sample size. Genetics. 2023

May 26;224(2):iyad054. doi: 10.1093/genetics/iyad054. Erratum in: Genetics. 2023 May 18;: PMID: 36974931; PMCID: PMC10213487.

Stephenson EJ, Stayton AS, Sethuraman A, Rao PK, Meyer A, Gomes CK, Mulcahy MC, McAllan L, Puchowicz MA, Pierre JF, Bridges D, Han JC. Chronic intake of high dietary sucrose induces sexually dimorphic metabolic adaptations in mouse liver and adipose tissue. Nat Commun. 2022 Oct 13;13(1):6062. doi: 10.1038/s41467-022-33840-6. PMID: 36229459; PMCID: PMC9561177.

Dutta SR, Singh P, Malik KU. Ovariectomy Via 12/15-lipoxygenase Augments Angiotensin II-Induced Hypertension and Its Pathogenesis in Female Mice. Hypertension. 2023 Jun;80(6):1245-1257. doi: 10.1161/HYPERTENSIONAHA.122.20836. Epub 2023 Apr 6. PMID: 37021560; PMCID: PMC10191208.

Halle JL, Counts BR, Zhang Q, Carson JA. Short duration treadmill exercise improves physical function and skeletal muscle mitochondria protein expression after recovery from FOLFOX chemotherapy in male mice. FASEB J. 2022 Aug;36(8):e22437. doi: 10.1096/fj.202200460R. PMID: 35816153.

Orgil BO, Xu F, Munkhsaikhan U, Alberson NR, Bajpai AK, Johnson JN, Sun Y, Towbin JA, Lu L, Purevjav E. Echocardiography phenotyping in murine genetic reference population of BXD strains reveals significant QTLs associated with cardiac function and morphology. Physiol Genomics. 2023 Feb 1;55(2):51-66. doi: 10.1152/physiolgenomics.00120.2022. Epub 2022 Dec 19. PMID: 36534598; PMCID: PMC9902221.

Khan F, Anelo OM, Sadiq Q, Effah W, Price G, Johnson DL, Ponnusamy S, Grimes B, Morrison ML, Fowke JH, Hayes DN, Narayanan R. Racial Differences in Androgen Receptor (AR) and AR Splice Variants (AR-SVs) Expression in Treatment- Naïve Androgen-Dependent Prostate Cancer. Biomedicines. 2023 Feb 21;11(3):648. doi: 10.3390/biomedicines11030648. PMID: 36979627; PMCID: PMC10044992.

Niture S, Gadi S, Qi Q, Gyamfi MA, Varghese RS, Rios-Colon L, Chimeh U, Vandana, Ressom HW, Kumar D. MicroRNA-483-5p Inhibits Hepatocellular Carcinoma Cell Proliferation, Cell Steatosis, and Fibrosis by Targeting PPARα and TIMP2. Cancers (Basel). 2023 Mar 10;15(6):1715. doi: 10.3390/cancers15061715. PMID: 36980601; PMCID: PMC10046356.

Munro D, Wang T, Chitre AS, Polesskaya O, Ehsan N, Gao J, Gusev A, Woods LCS, Saba LM, Chen H, Palmer AA, Mohammadi P. The regulatory landscape of multiple brain regions in outbred heterogeneous stock rats. Nucleic Acids Res. 2022 Oct 28;50(19):10882-10895. doi: 10.1093/nar/gkac912. PMID: 36263809; PMCID: PMC9638908.

Wagner AS, Vogel AK, Lumsdaine SW, Phillips EK, Willems HME, Peters BM, Reynolds TB. Mucosal Infection with Unmasked Candida albicans Cells Impacts Disease Progression in a Host Niche-Specific Manner. Infect Immun. 2022 Dec

15;90(12):e0034222. doi: 10.1128/iai.00342-22. Epub 2022 Nov 14. PMID: 36374100; PMCID: PMC9753624.

Swanson ML, Regner KR, Moore BM 2nd, Park F. Cannabinoid Type 2 Receptor Activation Reduces the Progression of Kidney Fibrosis Using a Mouse Model of Unilateral Ureteral Obstruction. Cannabis Cannabinoid Res. 2022 Dec;7(6):790-803. doi: 10.1089/can.2021.0127. Epub 2022 Feb 23. PMID: 35196117.

Madadi Y, Sun J, Chen H, Williams R, Yousefi S. Detecting retinal neural and stromal cell classes and ganglion cell subtypes based on transcriptome data with deep transfer learning. Bioinformatics. 2022 Sep 15;38(18):4321-4329. doi: 10.1093/bioinformatics/btac514. PMID: 35876552; PMCID: PMC9991888.

Ismael S, Ishrat T. Compound 21, a Direct AT2R Agonist, Induces IL-10 and Inhibits Inflammation in Mice Following Traumatic Brain Injury. Neuromolecular Med. 2022 Sep;24(3):274-278. doi: 10.1007/s12017-021-08687-7. Epub 2021 Sep 20. PMID: 34542832; PMCID: PMC9479688.

Mishra NK, Shrinath P, Rao R, Shukla PK. Sex-Specific Whole-Transcriptome Analysis in the Cerebral Cortex of FAE Offspring. Cells. 2023 Jan 15;12(2):328. doi: 10.3390/cells12020328. PMID: 36672262; PMCID: PMC9856965.

Beasley MM, Tunstall BJ, Kearns DN. Intermittent access cocaine self- administration produces context-specific escalation and increased motivation. Drug Alcohol Depend. 2023 Apr 1;245:109797. doi: 10.1016/j.drugalcdep.2023.109797. Epub 2023 Feb 4. PMID: 36801708; PMCID: PMC10033440.

Huang X, Bajpai AK, Sun J, Xu F, Lu L, Yousefi S. A new gene-scoring method for uncovering novel glaucoma-related genes using non-negative matrix factorization based on RNA-seq data. Front Genet. 2023 Jun 12;14:1204909. doi: 10.3389/fgene.2023.1204909. PMID: 37377596; PMCID: PMC10292752.

Miura S, Habibabady ZA, Pollok F, Ma M, Rosales IA, Kinoshita K, Pratts S, McGrath G, Chaban R, Fogarty S, Meibohm B, Daugherty B, Lederman S, Pierson RN 3rd. TNX-1500, a crystallizable fragment-modified anti-CD154 antibody, prolongs nonhuman primate cardiac allograft survival. Am J Transplant. 2023 Aug;23(8):1182-1193. doi: 10.1016/j.ajt.2023.03.025. Epub 2023 Apr 7. PMID: 37030662; PMCID: PMC10524282.

Wang TS, Kim ES, Duh QY, Gosain A, Kao LS, Kothari AN, Tsai S, Tseng JF, Tsung A, Wang KS, Wexner SD. Proceedings From the Advances in Surgery Channel Diversity, Equity, and Inclusion Series: Lessons Learned From Asian Academic Surgeons. J Surg Res. 2022 Oct;278:14-30. doi: 10.1016/j.jss.2022.04.030. Epub 2022 May 16. PMID: 35588571.

Epifania E, di Lauro AE, Ausiello P, Mancone A, Garcia-Godoy F, Mendes Tribst JP. Effect of crown stiffness and prosthetic screw absence on the stress distribution in implant-supported restoration: A 3D finite element analysis. PLoS One. 2023 May

5;18(5):e0285421. doi: 10.1371/journal.pone.0285421. PMID: 37146083; PMCID: PMC10162567.

Maksimov MO, Wu C, Ashbrook DG, Villani F, Colonna V, Mousavi N, Ma N, Lu L, Pritchard JK, Goren A, Williams RW, Palmer AA, Gymrek M. A novel quantitative trait locus implicates Msh3 in the propensity for genome-wide short tandem repeat expansions in mice. Genome Res. 2023 May;33(5):689-702. doi: 10.1101/gr.277576.122. Epub 2023 May 1. PMID: 37127331; PMCID: PMC10317118.

Lassiter G, Otsuka R, Hirose T, Rosales I, Karadagi A, Tomosugi T, Dehnadi A, Lee H, Colvin RB, Baardsnes J, Moraitis A, Smith EE, Ali Z, Berhe P, Mulder A, Meibohm B, Daugherty B, Fogarty S, Pierson RN, Lederman S, Kawai T. TNX-1500, a crystallizable fragment-modified anti-CD154 antibody, prolongs nonhuman primate renal allograft survival. Am J Transplant. 2023 Aug;23(8):1171-1181. doi: 10.1016/j.ajt.2023.03.022. Epub 2023 Apr 4. PMID: 37019335; PMCID: PMC10527606.

Nasoohi S, Tayefeh Ghahremani P, Alehossein P, Elyasizadeh S, BaniArdalan S, Ismael S, Vatanpour H, Ahmadiani A, Ishrat T. The p75 neurotrophin receptor inhibitor, LM11A-31, ameliorates acute stroke injury and modulates astrocytic proNGF. Exp Neurol. 2023 Jan;359:114161. doi: 10.1016/j.expneurol.2022.114161. Epub 2022 Jul 2. PMID: 35787888.

Xu F, Ziebarth JD, Goeminne LJ, Gao J, Williams EG, Quarles LD, Makowski L, Cui Y, Williams RW, Auwerx J, Lu L. Gene network based analysis identifies a coexpression module involved in regulating plasma lipids with high-fat diet response. J Nutr Biochem. 2023 Sep;119:109398. doi: 10.1016/j.jnutbio.2023.109398. Epub 2023 Jun 10. PMID: 37302664.

Vannier E, Richer LM, Dinh DM, Brisson D, Ostfeld RS, Gomes-Solecki M. Deployment of a Reservoir-Targeted Vaccine Against Borrelia burgdorferi Reduces the Prevalence of Babesia microti Coinfection in Ixodes scapularis Ticks. J Infect Dis. 2023 May 12;227(10):1127-1131. doi: 10.1093/infdis/jiac462. PMID: 36416014; PMCID: PMC10175066.

Xiao Z, Cao L, Smith MD, Li H, Li W, Smith JC, Quarles LD. Genetic interactions between Polycystin-1 and TAZ in osteoblasts define a novel mechanosensing mechanism regulating bone formation in mice. Res Sq [Preprint]. 2023 May 29:rs.3.rs-2957026. doi: 10.21203/rs.3.rs-2957026/v1. PMID: 37398127; PMCID: PMC10312920.

Afolabi JM, Michael OS, Falayi OO, Kanthakumar P, Mankuzhy PD, Soni H, Adebiyi A. Activation of renal vascular smooth muscle TRPV4 channels by 5-hydroxytryptamine impairs kidney function in neonatal pigs. Microvasc Res. 2023 Jul;148:104516. doi: 10.1016/j.mvr.2023.104516. Epub 2023 Mar 6. PMID: 36889668; PMCID: PMC10258165.

Yang X, Lin C, Liu J, Zhang Y, Deng T, Wei M, Pan S, Lu L, Li X, Tian G, Mi J, Xu F, Yang C. Identification of the regulatory mechanism of ACE2 in COVID-19-induced kidney

damage with systems genetics approach. J Mol Med (Berl). 2023 Apr;101(4):449-460. doi: 10.1007/s00109-023-02304-9. Epub 2023 Mar 23. PMID: 36951969; PMCID: PMC10034233.

Lenin R, Jha KA, Gentry J, Shrestha A, Culp EV, Vaithianathan T, Gangaraju R. Tauroursodeoxycholic Acid Alleviates Endoplasmic Reticulum Stress-Mediated Visual Deficits in Diabetic tie2-TNF Transgenic Mice via TGR5 Signaling. J Ocul Pharmacol Ther. 2023 Mar;39(2):159-174. doi: 10.1089/jop.2022.0117. Epub 2023 Feb 15. PMID: 36791327; PMCID: PMC10081728.

Zhang J, Tan L, Wu C, Li Y, Chen H, Liu Y, Wang Y. Discovery and biological evaluation of 4,6-pyrimidine analogues with potential anticancer agents as novel colchicine binding site inhibitors. Eur J Med Chem. 2023 Feb 15;248:115085. doi: 10.1016/j.ejmech.2022.115085. Epub 2023 Jan 2. PMID: 36621138.

Wang Q, Qi H, Wu Y, Yu L, Bouchareb R, Li S, Lassén E, Casalena G, Stadler K, Ebefors K, Yi Z, Shi S, Salem F, Gordon R, Lu L, Williams RW, Duffield J, Zhang W, Itan Y, Böttinger E, Daehn I. Genetic susceptibility to diabetic kidney disease is linked to promoter variants of XOR. Nat Metab. 2023 Apr;5(4):607-625. doi: 10.1038/s42255-023-00776-0. Epub 2023 Apr 6. PMID: 37024752.

Nasoohi S, Alehossein P, Jorjani M, Brown CM, Ishrat T. Intra-arterial verapamil improves functional outcomes of thrombectomy in a preclinical model of extended hyperglycemic stroke. Front Pharmacol. 2023 Apr 13;14:1161999. doi: 10.3389/fphar.2023.1161999. PMID: 37124219; PMCID: PMC10134451.

Gu Q, Palani CD, Smith A, Li B, Amos-Abanyie EK, Ogu U, Lu L, Pace BS, Starlard-Davenport A. MicroRNA29B induces fetal hemoglobin via inhibition of the HBG repressor protein MYB in vitro and in humanized sickle cell mice. Front Med (Lausanne). 2022 Nov 25;9:1043686. doi: 10.3389/fmed.2022.1043686. PMID: 36507536; PMCID: PMC9732025.

Dong W, Postlethwaite BC, Wheller PA, Brand D, Jiao Y, Li W, Myers LK, Gu W. Beta-caryophyllene prevents the defects in trabecular bone caused by Vitamin D deficiency through pathways instated by increased expression of klotho. Bone Joint Res. 2022 Aug;11(8):528-540. doi: 10.1302/2046-3758.118.BJR-2021-0392.R1. PMID: 35920089; PMCID: PMC9396919.

Ranea-Robles P, Pavlova NN, Bender A, Pereyra AS, Ellis JM, Stauffer B, Yu C, Thompson CB, Argmann C, Puchowicz M, Houten SM. A mitochondrial long-chain fatty acid oxidation defect leads to transfer RNA uncharging and activation of the integrated stress response in the mouse heart. Cardiovasc Res. 2022 Dec 29;118(16):3198-3210. doi: 10.1093/cvr/cvac050. PMID: 35388887; PMCID: PMC9799058.

Kassan M, Kwon Y, Munkhsaikhan U, Sahyoun AM, Ishrat T, Galán M, Gonzalez AA, Abidi AH, Kassan A, Ait-Aissa K. Protective Role of Short-Chain Fatty Acids against Ang-II-Induced Mitochondrial Dysfunction in Brain Endothelial Cells: A Potential Role of Heme Oxygenase 2. Antioxidants (Basel). 2023 Jan 10;12(1):160. doi: 10.3390/antiox12010160. PMID: 36671022; PMCID: PMC9854784.

Borooah S, Chekuri A, Pachauri S, Sahu B, Vorochikhina M, Suk JJ, Bartsch DU, Chavali VRM, Jablonski MM, Ayyagari R. A Novel Mouse Model for Late-Onset Retinal Degeneration (L-ORD) Develops RPE Abnormalities Due to the Loss of C1qtnf5/Ctrp5. Adv Exp Med Biol. 2023;1415:335-340. doi: 10.1007/978-3-031-27681-1_48. PMID: 37440053.

Yasmen N, Sluter MN, Li L, Yu Y, Jiang J. Transient inhibition of microsomal prostaglandin E synthase-1 after status epilepticus blunts brain inflammation and is neuroprotective. Mol Brain. 2023 Jan 25;16(1):14. doi: 10.1186/s13041-023-01008-y. PMID: 36694204; PMCID: PMC9875432.

Mysiewicz SC, Hawks SM, Bukiya AN, Dopico AM. Differential Functional Contribution of BK Channel Subunits to Aldosterone-Induced Channel Activation in Vascular Smooth Muscle and Eventual Cerebral Artery Dilation. Int J Mol Sci. 2023 May 12;24(10):8704. doi: 10.3390/ijms24108704. PMID: 37240049; PMCID: PMC10218309.

Yang B, Parker RB, Meibohm B, Temrikar ZH, Srivastava A, Laizure SC. Alcohol inhibits the metabolism of dimethyl fumarate to the active metabolite responsible for decreasing relapse frequency in the treatment of multiple sclerosis. PLoS One. 2022 Nov 28;17(11):e0278111. doi: 10.1371/journal.pone.0278111. PMID: 36441753; PMCID: PMC9704628.

Gage GA, Muench MA, Jee C, Kearns DN, Chen H, Tunstall BJ. Intermittent- access operant alcohol self-administration promotes binge-like drinking and drinking despite negative consequences in male and female heterogeneous stock rats. Neuropharmacology. 2023 Sep 1;235:109564. doi: 10.1016/j.neuropharm.2023.109564. Epub 2023 May 5. PMID: 37149215; PMCID: PMC10247413.

Xiao Y, Feng Q, Huang L, Meng X, Han P, Zhang W, Kang YJ. Copper promotes cardiac functional recovery via suppressing the transformation of fibroblasts to myofibroblasts in ischemia-infarcted monkey hearts. J Nutr Biochem. 2023 Jan;111:109180. doi: 10.1016/j.jnutbio.2022.109180. Epub 2022 Oct 12. PMID: 36240958.

Samanta K, Azevedo JF, Nair N, Kundu S, Gomes-Solecki M. Infected Ixodes scapularis Nymphs Maintained in Prolonged Questing under Optimal Environmental Conditions for One Year Can Transmit Borrelia burgdorferi (Borreliella genus novum) to Uninfected Hosts. Microbiol Spectr. 2022 Aug 31;10(4):e0137722. doi: 10.1128/spectrum.01377-22. Epub 2022 Jul 11. PMID: 35862961; PMCID: PMC9431577.

Sipe LM, Chaib M, Korba EB, Jo H, Lovely MC, Counts BR, Tanveer U, Holt JR, Clements JC, John NA, Daria D, Marion TN, Bohm MS, Sekhri R, Pingili AK, Teng B, Carson JA, Hayes DN, Davis MJ, Cook KL, Pierre JF, Makowski L. Response to immune checkpoint blockade improved in pre-clinical model of breast cancer after bariatric surgery. Elife. 2022 Jul 1;11:e79143. doi: 10.7554/eLife.79143. PMID: 35775614; PMCID: PMC9342954.

Finkel TH, Radic M. Chimeric receptors broaden the therapeutic landscape for autoimmune disease. Nat Rev Rheumatol. 2023 Jun;19(6):327-328. doi: 10.1038/s41584-023-00968-8. PMID: 37118507.

Sluter MN, Bhuniya R, Yuan X, Ramaraju A, Chen Y, Yu Y, Parmar KR, Temrikar ZH, Srivastava A, Meibohm B, Jiang J, Yang CY. Novel, Brain-Permeable, Cross- Species Benzothiazole Inhibitors of Microsomal Prostaglandin E Synthase-1 (mPGES-1) Dampen Neuroinflammation In Vitro< and In Vivo. ACS Pharmacol Transl Sci. 2023 Mar 21;6(4):587-599. doi: 10.1021/acsptsci.2c00241. PMID: 37082746; PMCID: PMC10111624.

Yasmen N, Sluter MN, Yu Y, Jiang J. Ganaxolone for management of seizures associated with CDKL5 deficiency disorder. Trends Pharmacol Sci. 2023 Feb;44(2):128-129. doi: 10.1016/j.tips.2022.11.007. Epub 2022 Dec 12. PMID: 36517284; PMCID: PMC10031766.

Ismail HS, Azees PAA, Wang H, Ali AI, Mehesen RE, Mahmoud SH, Chen XD, Yeh CK, Garcia-Godoy F. Periodontopathic bacterial adhesion to different restorative materials used to elevate proximal subgingival margins. Eur J Oral Sci. 2023 Feb;131(1):e12909. doi: 10.1111/eos.12909. Epub 2022 Dec 16. PMID: 36526586.

Song SY, Garcia-Godoy F, Kwon YH, Park JK. Bactericidal effect on S. mutans using N-TiO2 with combined treatment of low concentration H2O2 and visible light. Am J Dent. 2022 Dec;35(6):315-318. PMID: 36508187.

Hu W, Liu J, Hu Y, Xu Q, Deng T, Wei M, Lu L, Mi J, Bergquist J, Xu F, Tian G. Transcriptome-wide association study reveals cholesterol metabolism gene Lpl is a key regulator of cognitive dysfunction. Front Mol Neurosci. 2022 Dec 15;15:1044022. doi: 10.3389/fnmol.2022.1044022. PMID: 36590920; PMCID: PMC9798092.

Radic M, Randolph B. Autologous Anti-CD19 CAR T Cells as Therapy for Systemic Lupus Erythematosus. Transplant Cell Ther. 2023 Jan;29(1):3-4. doi: 10.1016/j.jtct.2022.12.003. PMID: 36608961.

Yang X, Tripathi R, Wang M, Lu W, Anifowose A, Tan C, Wang B. Toward "CO in a Pill": Silica-Immobilized Organic CO Prodrugs for Studying the Feasibility of Systemic Delivery of CO via In Situ Gastrointestinal CO Release. Mol Pharm. 2023 Mar 6;20(3):1850-1856. doi: 10.1021/acs.molpharmaceut.2c01104. Epub 2023 Feb 20. PMID: 36802675; PMCID: PMC9997063.

Hwang DJ, He Y, Ponnusamy S, Thiyagarajan T, Mohler ML, Narayanan R, Miller DD. Metabolism-Guided Selective Androgen Receptor Antagonists: Design, Synthesis, and Biological Evaluation for Activity against Enzalutamide-Resistant Prostate Cancer. J Med Chem. 2023 Mar 9;66(5):3372-3392. doi: 10.1021/acs.jmedchem.2c01858. Epub 2023 Feb 24. PMID: 36825758; PMCID: PMC10243532.

Kumar A, Zhou L, Godse S, Sinha N, Ma D, Parmar K, Kumar S. Intranasal delivery of darunavir improves brain drug concentrations in mice for effective HIV treatment. Biochem Biophys Rep. 2022 Dec 8;33:101408. doi: 10.1016/j.bbrep.2022.101408. PMID: 36532875; PMCID: PMC9747527.

Aithabathula RV, Pervaiz N, Kathuria I, Swanson M, Singh UP, Kumar S, Park F, Singla B. Hydrogen sulfide donor activates AKT-eNOS signaling and promotes lymphatic vessel formation. PLoS One. 2023 Oct 26;18(10):e0292663. doi: 10.1371/journal.pone.0292663. PMID: 37883422; PMCID: PMC10602273.

Dietrich P, Dragatsis I. Striatum-specific mechanisms regulate neuronal cell cycle re-entry: the choice between life and death. Neural Regen Res. 2023 Mar;18(3):523-524. doi: 10.4103/1673-5374.346482. PMID: 36018159; PMCID: PMC9727427.

II. PRESENTATIONS GIVEN TO PROMOTE CORE USAGE

A. New Faculty Orientation

One of the LACU veterinarians attends each of the UT Health Science Center new faculty orientation days and meets with investigators who plan to use animals as part of their research. Information is provided regarding LACU contact information, facility locations, services provided and a copy of the current LACU per diem rate sheet is distributed. Dr. Hamilton also meets with new faculty recruits in their interviewing process to learn more about their research needs and to enlighten them on the various services that LACU offers. Dr. Hamilton also attends the Research Resource Fair that is held yearly.

B. Courses

CMED711 Essentials of Animal Experimentation – Department of Comparative Medicine. This graduate course is offered every fall semester and 16 students enrolled in 2022. The course is a requirement for the Laboratory Research and Management Program in the College of Graduate Health Sciences. The course involves didactic and hands-on training and covers the animal species most used in research. Students learn handling and common techniques for rats and mice and perform a practice surgery. They also receive a tour of one of the animal facilities, learn how to write an IACUC protocol and are introduced the various regulations surrounding the use of animals in research.

C. Facility Orientations

The training coordinator, Leadra Williford, conducts facility orientations and meets with all new investigators and all new research staff prior to granting card access to an animal facility. This is generally the first introduction of new research staff to the LACU and allows LACU to become familiar with the lab's research focus and to offer expertise and training, if necessary. The facility orientation consists of a PowerPoint presentation followed by a tour of the animal facility in the building in which the lab is located. The entire orientation lasts 1-1.5 hours and provides information on:

- LACU contact information for each animal facility, including after hour phone numbers
- LACU services (e.g., animal ordering, animal imports, technical services)
- Available equipment for research use (e.g., ultrasound machine, x-ray unit, micro CT)
- Rodent cage types and drinking water options
- Animal facility traffic patterns
- IACUC policies (e.g., animal transport, euthanasia, animal density)
- LACU policies (e.g., personal protective equipment, animal ordering, reporting sick animals, animal bites)
- Census management training and cage card printing

The orientation is followed by a tour of the facility by the supervisor where the research staff get to meet other members of the LACU, including the area supervisor and learn where to find equipment, store feed, etc. Proper cage changing practices using microisolator techniques are also demonstrated during the tour. At the end of the orientation, a copy of the presentation, along with the various policies and documents that were discussed during the orientation, are emailed to the individual.

For FY23, a total of 87 orientations were presented for research staff training.

III. SUMMARY OF ACTIVITIES FOR FY23

A. Personnel

In FY23, the LACU consisted of 44 permanent and 1 temporary staff members:

- **Director:** Dr. David Hamilton (100%)
- **Clinical Veterinarian:** Dr. Tyler Aycock and Dr. Brianne Hibl (100% effort)
- **Post-Doctoral Veterinarians:** (1) Dr. Monica Sidhu
- **Operations Management:** (2) Stanley Latocha (100% effort) and Casey Inman (100% effort)
- **Administrative Staff:**
  Business Manager: Detric Stigall (100% effort)
  Financial Coordinator: Joyce Jones (100% effort)
  Accounting Assistant: Veronica Fant (100% effort)
- **Supervisors:**
  Husbandry: (3) Sherry Frazier (100% effort), Brad Stevens (100% effort) and Tyler Patterson (100% effort, passed away 01/17/2023), Lloyd Taylor (100% effort, start date 06/05/23)
- **Training Coordinator:** Leadra Williford (100% effort)
- **Veterinary Technicians**: (2) Kayla Hopper (100% effort), Corbin Mustain (100% effort)
- **Husbandry Technicians**: 17 @ 100% effort
- **Cage Wash Technicians**: 10 @ 100% effort
- **Service Assistants**: 3 @ 100% effort
- **Temporary Cage Wash Technician:** 1 @ 100% effort

There were 6 buildings on campus which contain animal facilities:

- Cancer Research Building (CRB)
- Coleman Building
- Translational Sciences Research Building (TSRB)
- TriMetis
- Wittenborg Building
- Regional Biocontainment Laboratory (RBL)

B. Advisory Board

The Laboratory Animal Care Unit Internal Advisory Board (IAB) consisted of the following members for FY23:

- Ade Adebiyi (Physiology, COM)-has left UTHSC, to be replaced by David Ashbrook (GGI, COM) in FY24
- Kevin Freeman (GGI, COM)
- Tauheed Ishrat (Anatomy and Neurobiology, COM)
- Joseph Pierre (Pediatrics, COM); former *chair-left UTHSC*, was replaced by Jarrod Fortwendel (Clinical Pharmacy, COP) in FY24

C. Equipment

Equipment currently housed in the LACU core for shared investigator use

Equipment	Cost	Funding Source	Date Purchased
VisualSonics Vevo 2100 ultrasound machine	$400,013.00	J07002200	01/23/2009
Starr MouseOx pulse oximeter	$4,950.00	LACU Core	06/06/2008
Sedecal/Idexx X-ray machine	$103,500.00	J07002200	01/25/2010
Anesthetic Machines (5)	$25,000	LACU Core	multiple

D. Service Contracts, FY23

Contract Type:	Vendor:	Expense:
Automatic Watering System: Coleman, Wittenborg, TSRB & CRB	Avidity Sciences LLC	$59,883
Avidity (Edstrom) PM Service Renewal for TriMetis facility	Avidity Sciences LLC	$14,152
SHL Periodic Maintenance Service Agreement	Adam Stonaker, Stonaker Hospital and Lab, LLC	$100,185
Techniplast Service Agreement Equipment in TSRB	Techniplast	$89,210
TOTAL		**$264,130**

E. Core Revenues, Internal Investigators, FY23

UTHSC PI	Recharges, $	% of Total
Roy, Suheeta	270,645.70	7.09%
Chen, Hao	267,366.62	7.01%
Adebiyi, Adebowale	227,896.46	5.97%
Bajwa, Amandeep	153,286.03	4.02%
Sun, Zhongjie	134,357.51	3.52%
Garcia-Godoy, Franklin	124,931.97	3.27%
Jonsson, Colleen	123,315.14	3.23%
Jones, Byron	103,908.54	2.72%
Jaggar, Jonathan	93,627.40	2.45%
Zhou, Qiqi	90,613.03	2.37%
Rao, Radhakrishna	87,529.93	2.29%
Jablonski, Monica	84,429.98	2.21%
Hayes, Liza	81,006.83	2.12%
Kim, Il Hwan	78,974.75	2.07%
Gyamfi, Maxwell	74,593.55	1.95%
Mandal, Nawajes	74,336.32	1.95%
Samarasinghe, Amali	70,687.44	1.85%
Tigyi, Gabor	62,454.98	1.64%
Sharp, Burt	57,435.90	1.51%
Dopico, Alejandro	57,106.06	1.50%
Alway, Stephen	53,942.94	1.41%
Not Assigned	51,795.38	1.36%
Liao, Francesca-Fang	51,792.85	1.36%
Du, Jianyang	51,661.68	1.35%
Ishrat, Tauheed	49,858.22	1.31%
Hamilton, David	45,588.17	1.19%
Cordero-Morales, Julio	43,578.95	1.14%
Fletcher, Max	42,352.45	1.11%
Chizhikov, Viktor	37,326.32	0.98%
Narayanan, Ramesh	36,598.26	0.96%
Kong, Ying	35,293.55	0.92%
Hamre, Kristin	33,037.00	0.87%
Jiang, Jianxiong	32,962.31	0.86%
Meibohm, Bernd	31,791.94	0.83%
Bukiya, Anna	31,079.86	0.81%
Camors, Emmanuel	30,944.75	0.81%
Singla, Bhupesh	29,728.79	0.78%
Pfeffer, Lawrence	29,556.79	0.77%
Smith, Amber	28,921.26	0.76%
Xu, Junwang	28,356.67	0.74%
Tunstall, Brendan	27,751.89	0.73%
Fitzpatrick, Elizabeth	27,289.92	0.72%

Ashbrook, David	26,768.95	0.70%
Hole, Camaron	25,790.27	0.68%
Malik, Kafait	25,055.33	0.66%
Dragatsis, Ioannis	24,139.00	0.63%
Zhou, Fuming	23,827.00	0.62%
Gangaraju, Raja Shekhar	23,639.78	0.62%
Seagroves, Tiffany	23,207.98	0.61%
Yi, Ae-Kyung	23,077.04	0.60%
Mancarella, Salvatore	21,990.18	0.58%
Collier, Daniel	21,542.95	0.56%
Khan, Mohammad Moshahid	21,346.21	0.56%
Dale, James	19,721.17	0.52%
Parfenova, Elena	18,596.74	0.49%
Fortwendel, Jarrod	18,411.84	0.48%
Purevjav, Enkhsaikhan	17,739.59	0.46%
Gadiparthi, Rao	17,722.57	0.46%
Xiao, Zhousheng	17,671.00	0.46%
Brown, Chester	17,070.58	0.45%
Mulligan, Megan	15,324.84	0.40%
Chen, Guoyun	13,269.00	0.35%
Tan, Chalet	13,185.27	0.35%
Gomes-Solecki, Maria	13,113.61	0.34%
Vasquez, Valeria	13,078.56	0.34%
Carson, James	12,624.93	0.33%
Boughter, John	12,455.15	0.33%
Xiao, Jianfeng	11,831.06	0.31%
Leo, Marie Dennis	10,230.82	0.27%
Park, Frank	9,764.76	0.26%
Freeman, Kevin	9,595.58	0.25%
Singh, Udai	8,920.60	0.23%
Kumar, Santosh	8,795.80	0.23%
Sathanandam, Shyam	8,380.51	0.22%
Kirson, Dean	8,348.97	0.22%
Gosain, Ankush	8,006.45	0.21%
Kim, Ki Suk	7,372.73	0.19%
Palmer, Glen	7,163.76	0.19%
Nowak, Thaddeus	7,059.20	0.19%
Sun, Wen Lin	6,389.45	0.17%
Pi, Min	6,222.70	0.16%
Foehring, Robert	5,306.00	0.14%
Waters, Robert	5,213.12	0.14%
Towbin, Jeffrey	4,991.00	0.13%
Li, Wei	4,672.21	0.12%
Mohamed, Junaith	4,636.20	0.12%

Bahouth, Suleiman	4,627.83	0.12%
Miranda-Carboni, Gustavo	4,528.80	0.12%
Xin, Wenkuan	3,974.88	0.10%
Vaithianathan, Thirumalini	3,846.99	0.10%
Radic, Marko	3,588.32	0.09%
Steketee, Jeffery	2,457.60	0.06%
Zhang, Wenjing	2,350.00	0.06%
Lebeche, Djamel	2,319.91	0.06%
Sakata, Kazuko	2,312.80	0.06%
Peters, Brian	2,069.19	0.05%
Miranda, Susan	2,032.93	0.05%
Puchowicz, Michelle	1,778.15	0.05%
Kassan, Modar	1,544.00	0.04%
Huang, George	1,540.21	0.04%
Parthasarathi, Kaushik	1,524.33	0.04%
Heck, Detlef	756.00	0.02%
Reiner, Anton	440.00	0.01%
Gu, Weikuan	345.00	0.01%
Lu, Lu	201.00	0.01%
Hibl, Brianne	177.55	<0.01%
Glazer, Evan	175.80	<0.01%
TOTAL	**3,815,575.84**	**100%**

F. Core Invoices for External Users, FY23

Vendor	Contact PI:	Invoiced:
Diatech Diabetics	Samuel Aycock	61,019.05
US Biologic Inc.	Jolieke Van Oosterwijk	31,666.31
University of Memphis	Joel Bumgardner	270.00
TOTAL		**92,955.36**

G. Multi-year trends

Mouse care days, total (all types of caging)

Year	Care days	Total revenues
FY23	2,308,858	$2,355,431
FY22	2,102,674	$2,055,480
FY21	2,260,818	$2,154,520
FY20	2,218,366	$2,054,958
FY19	1,962,365	$1,760,552

Rat care days, total (all types of caging)

Year	Care days	Total revenues
FY23	257,009	$413,087
FY22	234,276	$366,362
FY21	157,061	$239,240
FY20	118,681	$175,517
FY19	95,641	$137,051

Rabbit care days

Year	Care days	Total revenues
FY23	11,390	$24,693
FY22	4,643	$9,988
FY21	4,314	$9,320
FY20	3,599	$7,432
FY19	1,626	$3,135

Pig care days

Year	Care days	Total revenues
FY23	4,417	$46,581
FY22	1,549	$14,263
FY21	736	$6,605
FY20	1,230	$11,248
FY19	938	$7,938

Hamster care days

Year	Care days	Total revenues
FY23	4,656	$12,392
FY22	3,913	$8,343
FY21	5,594	$10,952
FY20	3,813	$7,183
FY19	86	$132

Peromyscus care days

Year	Care days	Total revenues
FY23	0	0
FY22	5,039	$4,888
FY21	6,345	$6,183
FY20	3,702	$2,629
FY19	10,268	$7,889

Zebrafish care days

Year	Care days	Total revenues
FY23	15,865	$4,032
FY22	17,432	$4,471
FY21	17,894	$3,980
FY20	7,225	$959
FY19	2,960	$69

Total Veterinarian or Technical Service Fee Revenues

Year	Total revenues
FY23	185,669
FY22	$149,055
FY21	$117,306
FY20	$113,526
FY19	$125,892

Total LACU Animal and Supplies Orders Revenues

Year	Total revenues
FY23	$816,329
FY22	$718,742
FY21	$629,601
FY20	$618,082
FY19	$626,428

H. FY23 Fee Structure

LACU revenue is primarily generated through per diem rates and charges for special services. Animal housing is billed through a daily per diem charge, depending on the species, animal size and cage type. Management and veterinary staff submit charge tickets/material orders through the internal ACIM system to invoice for special services such as veterinary procedures, animal transport or equipment usage.

FY23 Per Diem Rates

Mouse Per Diem, Standard box (75 in2):	
Microisolator box*:	$1.00/box/day
IVC box**:	$1.00/box/day
IVC box + water bottle:	$1.10/box/day
Sterile microisolator care***:	$1.61/box/day
Biocontainment (ABSL2)****:	$1.25/box/day
Sterile microisolator care, ABSL2:	$1.93/box/day
Diabetic Mouse Per Diem, Standard box (75 in2):	
Microisolator box*:	$1.18/box/day
IVC box**:	$1.18/box/day
IVC box + water bottle:	$1.31/box/day
Sterile microisolator care***:	$1.93/box/day
Biocontainment (ABSL2)****:	$1.50/box/day
Sterile microisolator care, ABSL2:	$2.32/box/day
Mouse Per Diem, Metabolism Box:	$1.45/box/day
Mouse Per Diem, Large box (157 in2):	
Microisolator box*:	$1.60/box/day
IVC box**:	$1.60/box/day
IVC box + water bottle:	$1.72/box/day
Biocontainment (ABSL2)****:	$1.91/box/day
Diabetic Mouse Per Diem, Large box (157 in2):	
Microisolator box*:	$1.92/box/day
IVC box**:	$1.92/box/day
Biocontainment (ABSL2)****:	$2.31/box/day
Rat Per Diem:	
Standard box*:	$1.60/box/day
IVC box**:	$1.60/box/day
IVC box + water bottle:	$1.72/box/day
Sterile microisolator care***:	$2.12/box/day
Biocontainment (ABSL2)****:	$1.92/box/day

Diabetic Rat Per Diem:	
Standard box*:	$1.92/box/day
IVC box**:	$1.92/box/day
IVC box + water bottle:	$2.04/box/day
Sterile microisolator care***:	$2.55/box/day
Biocontainment (ABSL2)****:	$2.31/box/day

Rat Per Diem, Metabolism Box:	$2.40/box/day

Rodent care descriptions:
*Standard box refers to standard charges for husbandry practices for a given facility or room, which includes caging, standard diet, standard bedding and a water bottle.
**IVC box refers to a box placed on a ventilated rack system with an automatic watering system. The per diem rate includes caging, standard diet, standard bedding and automatic water.
***Sterile microisolator care is provided at the request of the PI. The box is fully assembled (lid, grill, bottom, standard bedding) prior to autoclaving as a unit.
****ABSL2 is required for animals inoculated with human-derived materials (cells, tissue fragments, etc.), or for animals exposed to viral particles or other hazards deemed to require ABSL2 care.

Standard bedding:	Standard Feed:
Mice: Shepherd's Cob	Mice: Envigo 7912 or 7904 (breeder diet)
Rats: Shepherd's Cob	Rats: Envigo 7912

To request the use of non-standard bedding/feed, or special handling (e.g. autoclaving) of feed/bedding, please complete a LACU Resource Request Form and submit to the LACU Director of Operations, Stan Latocha (slatocha@uthsc.edu), as the above per diem rates will require adjustment.

Rabbits:	
<2 kg:	$2.14/animal/day
2-5.4 kg:	$2.31/animal/day
>5.4 kg:	$2.42/animal/day

Swine:	
Neonate:	$9.46/animal/day
< 25 lbs.:	$10.30/animal/day
25-75 lbs.:	$11.12/animal/day
> 75 lbs.:	$11.94/animal/day

Guinea Pig:	$2.41/enclosure/day

Hamster:

Microisolator Box*:	$1.52/box/day
Biocontainment (ABSL2)****:	$1.83/box/day

Ferret:

Standard:	$7.37/animal/day
Biocontainment (ABSL2):	$8.84/animal/day

Zebrafish:

1.0 Liter tank:	$0.08/tank/day
3.5 Liter tank:	$0.27/tank /day
8.0 Liter tank:	$0.43/tank/day

Xenopus Frog: $2.56/tank/day

For other species not listed above, please consult with LACU director

Veterinarian, Vet Tech and Husbandry Tech Services:

Veterinarian services (M-F, 8am-5pm):	$71.91/hr
Veterinarian services, after-hrs/ weekends and holidays:	$107.90/hr,2h minimum
Veterinary Tech services (M-F, 8am-5pm):	$28.83/hr
Veterinary Tech services, after-hrs/ weekends and holidays:	$43.24/h.,2h minimum
Husbandry Tech services (M-F, 8am-5pm):	$19.46/hr
Husbandry Tech services, after-hrs/ weekends and holidays:	$29.20/hr,2h minimum

Other services:

Rodent ultrasound:	$95.52/hr
Rodent ultrasound anesthesia:	$47.76/day
Surgery room, with sterile surgery pack:	$115.93/use
Gas sterilization:	$35.81
Steam sterilization:	$35.81
Radiography:	$35.81/hr
Surgery room cleaning charge:	$53.74
Custom projects or services:	Please consult the LACU director

Purchasing surcharges:

Animal order late fee (after 2pm Wednesday):	$59.71
Ordering fee, non-approved vendors:	$59.71
Drug and other supply orders*:	15% above cost

The LACU no longer routinely orders drugs and supplies for research needs. All investigators are encouraged to obtain the necessary licenses to order drugs and supplies from medical distributors.

Transportation services surcharges:

Airport pickup/order	$71.65

Feed & bedding delivery/trip	$71.65
Special animal transport/trip	$71.65

External users rate surcharge, per service: 30%

Projected per diem and services charges, FY24 - beyond: 3% annually over prior FY basis

IV. EXTRAMURAL GRANTS SUPPORTED BY THE CORE, FY23

Adebiyi, Adebowale
HHS - NIH - NIDDK - National Institute of Diabetes and Digestive and Kidney Diseases, Vascular ion channels and microcirculation in neonatal urinary tract obstruction

HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute, Control of microvascular function by ion channels

HHS - NIH - NIDDK - National Institute of Diabetes and Digestive and Kidney Diseases, Urotensin II and renal insufficiency in growth-restricted infants.

Alway, Stephen
DOD - Army - MRMC - Medical Research and Material Command, Using mitochondria therapy to improve restoration of neuromuscular function following injury

Bajwa, Amandeep
HHS - NIH - NIDDK - National Institute of Diabetes and Digestive and Kidney Diseases, Mitochondrial Therapy for Kidney Injury

Boughter, John
HHS - NIH - NIDCD - National Institute on Deafness and Other Communication Disorders, Spatial taste coding in mouse gustatory cortex

Bukiya, Anna
HHS - NIH - NIAAA - National Institute on Alcohol Abuse and Alcoholism, Fetal cerebral arteries and prenatal alcohol exposure

Carson, James
HHS - NIH - NIAMS - National Institute of Arthritis and Musculoskeletal and Skin Diseases, Muscle GPRC6A regulation of protein turnover with overload and disuse recovery

Chen, Guoyun
HHS - NIH - NIAID - National Institute of Allergy and Infectious Diseases, Targeting Siglec-9/E for therapy of sepsis

Chen, Hao
HHS - NIH - NIDA - National Institute on Drug Abuse, Reduced complexity mapping of oxycodone self-administration and stress responsiveness in rats

University of California, San Diego (UCSD), Integrated GWAS of Complex Behavioral and Gene Expression Traits in Outbred Rats

HHS - NIH - NIDA - National Institute on Drug Abuse, System genetics of menthol and nicotine addiction

Chizhikov, Viktor
HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke, Mesenchymal-neuroepithelial interactions in the developing telencephalon.

Choi, Chang
HHS - NIH - NIDDK - National Institute of Diabetes and Digestive and Kidney Diseases, Dysbiosis in Hirschsprung Associated Enterocolitis Pathogenesis

Collier, Daniel
HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute, Trauma Induced Endothelial Cell Ca2+ Signaling

Cordero-Morales, Julio
HHS - NIH - NIGMS - National Institute of General Medical Sciences, The Role of Bioactive Lipids in Transient Receptor Potential Channels Gating

Dale, James
HHS - NIH - NIAID - National Institute of Allergy and Infectious Diseases, Structure-Based Design of a Broadly Protective Group A Streptococcal Vaccine

Dopico, Alejandro
HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute, Regulation of arterial diameter through specific sensing of endogenous steroids and novel nonsteroidal analogs by BK channel subunits.

HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute, Cholesterol regulation of smooth muscle BK channel proteins and consequent control of cerebral artery diameter

HHS - NIH - NIEHS - National Institute of Environmental Health Sciences, Ionic mechanisms of toluene cerebrovascular actions

Dragatsis, Ioannis
HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke, Genetic restoration of IKAP as a tool to study Familial Dysautonomia

Du, Jianyang
HHS - NIH - NIMH - National Institute of Mental Health, CO2 inhalation enhances the lability of fear memory.

Fitzpatrick, Elizabeth
Emory University, Broad-spectrum therapeutics against SARS-CoV-2 3CL protease.

Fletcher, Max
HHS - NIH - NIDCD - National Institute on Deafness and Other Communication Disorders, Cholinergic modulation of olfactory bulb glomerular sensitivity

Foehring, Robert
HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke, Dynamics of Kv channel function in identified populations of pyramidal neurons in neocortex

Fortwendel, Jarrod
HHS - NIH - NIAID - National Institute of Allergy and Infectious Diseases, Unlocking the cidal activity of echinocandins against Aspergillus fumigatus

Freeman, Kevin
HHS - NIH - NCI - National Cancer Institute, Dissecting the contribution of the transcriptional regulators of SNS fate to neuroblastoma oncogenesis

Gadiparthi, Rao
HHS - NIH - NEI - National Eye Institute, Mechanisms of retinal angiogenesis

HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute, GPCR Signaling and Vascular Wall Remodeling

HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute, Lipid mediators and vascular diseases

Gangaraju, Raja Shekhar
DOD - Department of Defense, TSG6 Exosomes for Treatment of Visual Dysfunction as Related to Military-Relevant Trauma

HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke, Regulation of Mesenchymal Stem Cell Secretome for Treatment of Microglia Damage in Traumatic Brain Injury

Gomes-Solecki, Maria
University of Iowa, Field trial and modeling of transmission-blocking vaccine to prevent Lyme disease

Gosain, Ankush
HHS - NIH - NIDDK - National Institute of Diabetes and Digestive and Kidney Diseases, Dysbiosis in Hirschsprung Associated Enterocolitis Pathogenesis

Gu, Weikuan
First Hospital of Qiqihar City, Contract with Qiqihar hospital (Amendment 1)

Gyamfi, Maxwell
HHS - NIH - NIAAA - National Institute on Alcohol Abuse and Alcoholism, Human pregnane X receptor and sexual dimorphism in alcoholic liver disease

Makowski (Hayes), Liza
HHS - NIH - NCI - National Cancer Institute, Role of microbial-modulated bile acid receptor signaling in breast cancer

HHS - NIH - NCI - National Cancer Institute, Determining the contribution of microbial-derived metabolites to protective immunity in obesity-driven cancer risk.

HHS - NIH - NCI - National Cancer Institute, Determining susceptibility loci in triple negative breast cancer using a novel pre-clinical model

Heck, Detlef
HHS - NIH - NIMH - National Institute of Mental Health, Neuronal mechanisms of cerebellar cognitive function

Memorial Sloan Kettering Cancer Center, Engrailed genes and cerebellum morphology, spatial gene expression and circuitry

Hole, Camaron
HHS - NIH - NIAID - National Institute of Allergy and Infectious Diseases, Cryptococcal Chitin Synthase 3 and Host Immune Responses

Jablonski, Monica
HHS - NIH - NEI - National Eye Institute, Genetic Modulation of Glaucoma

HHS - NIH - NEI - National Eye Institute, Novel Extended Release Glaucoma Therapy for Once Daily Dosing

Jaggar, Jonathan
HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute, Blood pressure regulation by smooth muscle cell ion channels

HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute, Endothelial cell potassium channels

HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute, PKD proteins in endothelial cells

HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute, SK3 channel trafficking in endothelial cells

HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute, Chloride channels in endothelial cells

Jiang, Jianxiong
HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke, Inflammatory regulation of neurotrophin signaling in epileptogenesis

HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke, Targeting Prostaglandin Receptor EP2 for Glioma and Associated Epilepsy

National Institute of Neurological Disorders and Stroke, Targeting TRPC3 Channels for Epileptic Seizures

Jones, Byron
HHS - NIH - NIEHS - National Institute of Environmental Health Sciences, Genetics of epigenetic response to high circulating glucocorticoids and organophosphorus compounds

Jonsson, Colleen
HHS - FDA - Food and Drug Administration, Evaluation of Small Animal Models for COVID-19 and their application in Nonclinical Safety and Efficacy Studies of Investigational Therapeutics

HHS - NIH - NIAID - National Institute of Allergy and Infectious Diseases, Center of Excellence for Encephalitic Alphavirus Therapeutics [CEEAT]

University of North Carolina at Chapel Hill (UNC-Chapel), Rapidly Emerging Antiviral Drug Discovery Initiative (READDI)

Kassan, Modar
HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute, MiR-204 regulates type 1 IP3R/Ca2+ axis to control vascular smooth muscle cell contractility and blood pressure: Potential role of the gut microbiome

Khan, Mohammad Moshahid
HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke, Examining Progression of a Neurodegenerative Disorder

HHS - NIH - NIA - National Institute on Aging, Development of a novel gene therapy for the treatment of tauopathy

Kim, Il Hwan
HHS - NIH - NIMH - National Institute of Mental Health, Genes, Neural Circuits and Behavior

Virginia Tech (VT), Losing specificity: the role of the locus coeruleus in age-related distractibility

Kumar, Santosh
HHS - NIH - NIMH - National Institute of Mental Health, Extracellular vesicles-based drug delivery of antiretroviral regimen to target CNS HIV reservoirs

Leo, Marie Dennis
HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute, Chloride channels in diabetic vascular disease

Li, Kui
HHS - NIH - NIAID - National Institute of Allergy and Infectious Diseases, Host genetic determinants regulating susceptibility/resistance to SARS-CoV-2

Li, Wei
HHS - NIH - NCI - National Cancer Institute, Targeting brain and bone metastases in metastatic breast cancer for improved patient survival

Liao, Francesca-Fang
HHS - NIH - NIA - National Institute on Aging, Novel mechanistic link between metabolic changes and dementia potential role of miRNA21

HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke, Blood-brain-barrier and white matter mechanisms underlying dementia

Malik, Kafait
HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute, Angiotensins, Prostaglandins, Adrenergic Interactions

Malysz, John
HHS - NIH - NIDDK - National Institute of Diabetes and Digestive and Kidney Diseases, Role of TRP Channels in human detrusor function and dysfunction

Mancarella, Salvatore
HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute, Defining the roles of Orai3 channel in cardiomyocytes and cardiomyopathy.

Mandal, Nawajes
HHS - NIH - NEI - National Eye Institute, Sphingolipids and their Impact in Corneal Wound Healing

DOD - Department of Defense, Therapeutic Potential of n-3 PUFAs TBI Mediated Visual Dysfunction

Meibohm, Bernd
St Jude Children's Research Hospital, Spectinomycins for Non-tuberculous Mycobacterial Infections

HHS - NIH - NIAID - National Institute of Allergy and Infectious Diseases, Center of Excellence for Encephalitic Alphavirus Therapeutics [CEEAT]

Colorado State University (CSU), Inhaled tigecycline therapy for pulmonary M. abscessus infections

Narayanan, Ramesh
Oncternal Therapeutics, Oncternal SRA

Nowak, Thaddeus
HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke, Genetics of stroke vulnerability in C57BL/6 mouse substrains

Palmer, Glen
HHS - NIH - NIAID - National Institute of Allergy and Infectious Diseases, Broad spectrum antifungals targeting fatty acid biosynthesis

HHS - NIH - NIAID - National Institute of Allergy and Infectious Diseases, Antifungal antagonism as a cause of treatment failure for invasive mycoses

Parfenova, Elena
HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke, Endothelial Vasoprotection by Hypothermia

Peters, Brian
HHS - NIH - NIAID - National Institute of Allergy and Infectious Diseases, Candidalysin: a key mediator of Candida vaginitis immunopathology

Quarles, Leigh (Darryl)
HHS - NIH - NIAMS - National Institute of Arthritis and Musculoskeletal and Skin Diseases, Skeletal Functions of Polycystins and TAZ

HHS - NIH - NIDDK - National Institute of Diabetes and Digestive and Kidney Diseases, Optimization of Novel Small Molecules to Antagonize FGF-23

HHS - NIH - NIDDK - National Institute of Diabetes and Digestive and Kidney Diseases, Genetic and Environmental Determinants of GPRC6A Regulation of Energy Metabolism Using Genetically Engineered Mice and Systems Biology.

Rao, Radhakrishna
HHS - NIH - NIAAA - National Institute on Alcohol Abuse and Alcoholism, Defining the Role of Intestinal Calcium Channels in Alcoholic Liver Damage

HHS - NIH - NIAID - National Institute of Allergy and Infectious Diseases, Radiation-Induced Paneth Cell Dysfunction

Sakata, Kazuko
HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke, Heat shock factor HSF1 regulation of promoter-specific BDNF transcription

Seagroves, Tiffany
DOD - Department of Defense, Discovery of Orally Bioavailable Tubulin Inhibitors to Overcome Taxane Resistance in Metastatic Breast Cancer (Partnering PI)

DOD - Department of Defense, Targeting Creatine Kinase Brain Isoform (CKB) to Inhibit Brain and Bone Metastasis

Sharp, Burt
HHS - NIH - NIDA - National Institute on Drug Abuse, Genetics of oxycodone intake in a hybrid rat diversity panel

Singh, Udai
HHS - NIH - NIAID - National Institute of Allergy and Infectious Diseases, Adipose T cell microRNAs (miRs) regulate macrophage function during obesity

Smith, Amber
HHS - NIH - NIAID - National Institute of Allergy and Infectious Diseases, Predictive Modeling of Influenza-Pneumococcal Coinfection

HHS - NIH - NIAID - National Institute of Allergy and Infectious Diseases, Virtual Patient Cohorts to Illuminate Immunologic Drivers of Influenza Severity

Stires, Alicia
HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute, MiR-204 regulates type 1 IP3R/Ca2+ axis to control vascular smooth muscle cell contractility and blood pressure: Potential role of the gut microbiome

Sun, Zhongjie
HHS - NIH - NIA - National Institute on Aging, Investigation into Heart Aging

HHS - NIH - NIA - National Institute on Aging, Epigenetic Regulation of Kidney Function and Blood Pressure

HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute, Investigation into Arterial Stiffness and Hypertension

Tan, Chalet
University of Nebraska Medical Center (UNMC), Nanomedicine of Hedgehog and AKT/ERK Dual Inhibitors for Pancreatic Cancer

University of Mississippi (UM), U19 Project 1- Unraveling immune enhancement by Immulina

Tigyi, Gabor
HHS - NIH - NCI - National Cancer Institute, Anticancer Strategies Targeting the Autotaxin-LPA Receptor Axis

University of Maryland, Baltimore, Intercollaborative Radiation Countermeasure (INTERACT) Consortium for Advanced Development of Medical Countermeasures to Mitigate/Treat Acute and Delayed Radiation Syndromes

RXBio, Inc., IND-Enabling Development of Rx100 as a Medical Countermeasure for Gastrointestinal Acute Radiation Syndrome

Towbin, Jeffrey
HHS - NIH - NHLBI - National Heart, Lung, and Blood Institute, Discovery of modifier genes in cardiomyopathy

Tsao, Jack
HHS - NIH - NICHD - Eunice Kennedy Shriver National Institute of Child Health and Human Development, Investigations into the Etiology of Phantom Limb Sensations and Phantom Limb Pain

Vaithianathan, Thirumalini
HHS - NIH - NEI - National Eye Institute, Dynamics of calcium signals control neurotransmitter release in retinal ribbon synapses

Vasquez, Valeria
HHS - NIH - NIGMS - National Institute of General Medical Sciences, Regulation of mechanosensitive ion channels by membrane lipids.

Verne, G. Nicholas
HHS - NIH - NIDDK - National Institute of Diabetes and Digestive and Kidney Diseases, Mechanisms of Gastrointestinal Post-Inflammatory Disease

Waters, Robert
HHS - NIH - NICHD - Eunice Kennedy Shriver National Institute of Child Health and Human Development, Investigations into the Etiology of Phantom Limb Sensations and Phantom Limb Pain

Williams, Robert
HHS - NIH - NIA - National Institute on Aging, Imaging Genetics of Brain Structure and Cognitive Aging in Murine Models of Alzheimer's Disease

Xiao, Jianfeng
HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke, Identification and characterization of the gene associated with the spontaneous autosomal recessive Spinning mice

HHS - NIH - NIDDK - National Institute of Diabetes and Digestive and Kidney Diseases, Optimization of Novel Small Molecules to Antagonize FGF-23

Xu, Junwang
HHS - NIH - NIGMS - National Institute of General Medical Sciences, The role of long non-coding RNA GAS5 in diabetic wounds

Zhou, Fuming
HHS - NIH - NINDS - National Institute of Neurological Disorders and Stroke, Ion channel mechanisms of striatal dopaminergic motor stimulation

V. BUSINESS DEVELOPMENT SUMMARY

A. Market Assessment – Business in the LACU increased in FY23, with an increase to a total value of provided services of $3,842,691 (including sentinel/training fees and RBL animal recharges prior to transfer to the RBL base budget). Overall, revenues from internal use increased by $519,383 over FY22 levels. External use also increased from $14,725 in FY22 to $92,926 in FY23. Although revenues increased in FY23, some high-volume animal users recently left UTHSC, including Dr. Adebowale Adebiyi, in the top 3 of all users (recharged $227,896 in FY23) and Dr. Julio Cordero-Morales (recharged $43,579 in FY23), which may impact FY24 revenues. Otherwise, animal use continues to increase post-pandemic and in response to peak extramural funding levels reached in FY22 to over $135M.

B. Competitive Analysis – The LACU is the only core on the UTHSC campus that provides animal research services. Of all animal research cores in the Memphis area, we are the primary one which can offer services to outside entities, particularly with regard to large animal surgical projects. We already perform collaborative work with the Memphis VA, the University of Memphis, Le Bonheur Children's Hospital and St. Jude Children's Research Hospital. We offer very competitive pricing and per diem rates and a flexibility with regard to resources,

which does not exist with other animal research service providers in the area. We have an established working relationship with the Medical Education and Research Institute (MERI) in Memphis, which provides fluoroscopic equipment available for use in specialized cardiovascular studies.

C. Marketing Plans to Obtain New Business – Most of our customers hear about our services through word of mouth from other investigators who have utilized services provided by the LACU. For investigators on campus, or new to the UTHSC campus, much of the information about the core and its services are relayed either through word-of-mouth, during new faculty orientations or though the facility orientations as outlined in section II. An updated one-page LACU brochure is created each year through the Office of Research and is available for download through the Office of Research "Research Resources" webpage or directly from the LACU website. This brochure is distributed to new faculty and research staff as part their orientation to the campus or animal facility. The LACU webpage has been extensively updated and highlights the level of expertise within the core, the various services available to investigators and a Frequently Asked Questions section. The LACU has a listserv email which is used to notify investigators of changes in procedures and policies and is also used to advertise new or updated services as they become available. The LACU has also created shared Outlook calendars for the animal procedure rooms throughout the facilities, so that researchers can reserve rooms in advance for their needs. A shared calendar has also been created that outlines veterinary technician availability to assist with research projects (a billable service).

D. Forecasted Volumes for New Business — It is difficult to forecast volumes for new business, as most researchers do not provide advance notice of their projects. Relative to FY23, we expect an overall increase in the number of animals used on campus in FY24. As large animal projects practically came to a halt with the COVID-19 pandemic, we expect work using large animals (e.g. pigs, etc.) to increase. Large animal work is expected to increase significantly in FY24 as pandemic restrictions have loosened and we have already commenced projects with pigs, non-human primates, and rabbits. Work with the VisualSonics Vevo 2100 ultrasound machine is expected to remain strong and to further increase in the next fiscal year as other investigators realize the power in this imaging modality. Revenues from fees for quarantine, ultrasound use, drug purchases and anesthetic machine rental also increased in FY23 and are expected to further increase in FY24. A new veterinary technician hire, Corbin Mustain, started January 30, 2023, so we should see more fee-for-service from the vet techs in FY24. Dr. Zhongjie Sun joined UTHSC as the new chair in Physiology in 2018 and has made new hires in FY23 which will provide additional revenue in FY24. Dr. Adebowale Adebiyi left the university in 2023 and he was LACU's 3rd best customer in FY23 so this represents a significant revenue loss for FY24, but is expected to recover in part from the new Physiology hires. The Department of Pharmacology hired two new faculty in FY21, Drs. Brendan Tunstall and Dean Kirson, both of whom use rats as part of their research and commenced animal studies in FY23

and are further ramping up their usage. LACU was not successful in obtaining a new veterinary resident for FY23, as an increase in pet ownership in the pandemic drove more graduating veterinarians into private practice instead of pursing further education. LACU therefore plans to hire 2 new residents to start July 2024 as our current resident, Monica Sidhu, finished her residency at the end of June 2023.

VI. Budget

FY23 Actual Budget (July 1, 2022- June 30, 2023)

FY2023	DEBITS	CREDITS
Salaries (Including Temporary Employees)	2,466,338	
Supplies	1,688,315	
Service Contracts	271,236	
Equipment (> $5,000)	67,184	
Other Expenses*	302,804	
TOTAL EXPENSES	***4,795,877***	
FY23 Internal Recoveries		3,749,765
FY23 External Recoveries		92,926
TOTAL CREDITS		***3,842,691***
Income / (Subsidy)	(953,186)	
State Appropriation	1,402,651	
Net Income / (Subsidy)	**449,465**	

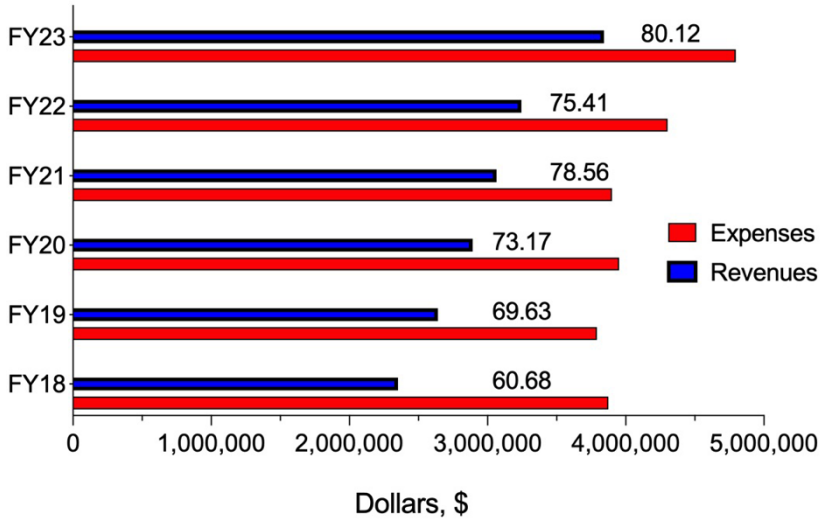
*Payments received prior to FY23 closeout

*Other expenses consist of the following categories: Communications, Travel, Maintenance/Repairs, Memberships, Copier Rental and Registration Fees.

Subsidy, % before State Appropriation 20%

Subsidy, % after State appropriation 0%

VII. Historical Revenues and Expenses, FY18-FY23



Expenses (red bars) and revenues (blue bars) are shown for each FY since FY18. The numbers beside the blue bar indicate the percentage of total expenses covered by the revenues that are generated by service fees. The state appropriation/budget subsidy allocated to the core is not reflected in this figure.

Research Biocontainment Laboratory (RBL) Institutional Research Core Facility Analysis Report - FY23

Written by Colleen Jonsson, PhD; Elizabeth Fitzpatrick PhD; Brandy Fleming; and Tiffany Seagroves, PhD

1. Relative to a specific core's mission, is the designation as an "institutional core" appropriate?

The RBL core designation as an institutional core is appropriate since it served 12 internal users across 5 departments and three colleges (COM, COP, and COHP), and 14 external users. The top five users of RBL services, based upon the value of completed services in FY23, excluding animal orders and per diems, were: 1) Colleen Jonsson (30.00%, Microbiology, Immunology and Biochemistry, COM) 2) Paul Da Silva Jardine (15.80%, external, Red Queen Therapeutics), 3) Kenneth Carlson (11.19%, external, Harvard University), 4) Kui Li (9.77%, Microbiology, Immunology and Biochemistry, COM), and 5) Elizabeth Fitzpatrick (7.34%, Microbiology, Immunology and Biochemistry, COM).

2. Does the core pass the multi-departmental, multi-investigator litmus test?

Yes. In FY23, this core supported 4,434 units of RBL services procured from 12 unique internal users across 5 departments, three colleges, and multiple external academic institutions or commercial entities.

3. Is there sufficient intra- and inter-departmental use and if not, why?

Yes.

4. Can the services for the core be outsourced more economically?

No. It should also be noted that BSL-3/ABSL-3 research requires specialized containment which the UTHSC RBL provides. The RBL was specifically constructed by NIH to meet the research needs of BSL-3 users who require this level of biocontainment, and it should be noted that there are only 11 RBL facilities in the United States. The RBL is a regional facility, providing UT Health Science Center and external users in the Memphis area with the appropriate engineering controls, facilities and resources for BSL-3 and ABSL-3 research.

5. Are there unaccounted benefits beyond fiscal consideration to warrant continued institutional underwriting (e.g., grants funded through investigator use, publications, etc.)?

Yes. Dr. Jonsson leveraged the institutional support offered by the campus and the Office of Research in the awarded NIH U19 Center of Excellence for Encephalitic Alphavirus Therapeutics (CEEAT) for which she is the program leader. In addition, in FY23, the RBL supported 49 publications and 23 extramural grants or contracts. Services available in the RBL are unique and essential for investigators to maintain their research programs using BSL-3/ABSL-3 infectious or select agents. Importantly, the RBL enhances the UT Health Science Center's ability to compete for research projects in virology, bacterial pathogenesis, bacterial generated toxins and immunology, with a focus on emerging infectious diseases and select agents.

6. Is the core currently self-sufficient, or is it subsidized by the institution?
In FY23, the core was subsidized by the institution. After the state appropriation of $906,516, the net subsidy for the core was $28,202.

Accomplishments this past year:
RBL Director, Colleen Jonsson and Associate Director, Elizabeth Fitzpatrick, have continued to revamp the existing RBL services to be more robust and to provide enhanced targeted services for ABSL-2 and ABSL-3 studies. In addition, the team has:

1. Increased faculty membership in the Institute for the Study of Host Pathogen Systems (ISHPS) to support faculty research activities on campus through promotion of interdisciplinary research and faculty recruitment.
2. Revised the RBL marketing strategy to enhance, promote and increase the *in vivo* and after life studies performed in the RBL, thus creating more collaborative partnerships with internal, external, commercial and government agencies.
3. Designed and offered new RBL services related to the SARS COV-2 (COVID-19) pandemic, including drug discovery services.
4. Designed and offered new small animal models for additional viruses.
5. Began offering histology services in-house to increase specimen turnaround time and to remain compliant with biohazard inactivation protocols.
6. Awarded in FY22 facilities grant (G20 award) to upgrade existing RBL infrastructure and to purchase new scientific equipment to enhance the existing services and to provide new services.
7. Awarded in FY23 a UC7 award to provide funds for:
    - Preventive maintenance and replacement of aging components of the mechanical infrastructure needed to maintain biocontainment,
    - A new biosafety practices core that harmonizes compliance, security, individual competency, and practices across our RBL staff and our users.
    - A new service core to provide LCMS/MS studies for infected, treated animal tissues in BSL-3 and providing drug pharmacodynamics.

Financial Overview – FY23:

TOTALS	FY18	FY19	FY20	FY21	FY22	FY23
Revenues	130,680	108,048	195,215	827,598	567,520	453,318
Expenses	(1,170,295)	(951,232)	(888,434)	(1,838,975)	(1,528,661)	(1,388,036)
Income (Subsidy)	(1,039,615)	(843,184)	(693,219)	(1,011,377)	(961,141)	(934,718)
Other Costs	0	0	0	0	0	0
Income (Subsidy)	(1,039,165)	(843,184)	(693,219)	(1,011,377)	(961,141)	(934,718)
State Appropriation	737,969	755,465	735,371	1,029,459	1,158,859	906,516
Net Income (Subsidy)	(301,646)	(87,719)	42,152	18,082	197,718	(28,202)
Subsidy, % before State Appropriation	89%	88.6%	78%	55%	63%	68%
Subsidy, % after State Appropriation	25.7%	9.2%	--	--	--	2%

7. Suggested outcomes:

It is recommended that RBL continue as an institutional core.

Regional Biocontainment Laboratory (RBL) Institutional Core Facility Summary of Institutional Core Activities for FY23

Written by Colleen Jonsson, PhD; Elizabeth Fitzpatrick, PhD; Brandy Fleming, Natalie Smith, MS; and Tiffany Seagroves, PhD

I. PUBLICATIONS (Journal publication dates: July 1, 2022 to June 30, 2023)

Full length published articles (UTHSC faculty investigators using the RBL in FY23 are indicated in bold)

Karki R, Lee S, Mall R, Pandian N, Wang Y, Sharma BR, Malireddi RS, Yang D, Trifkovic S, Steele JA, Connelly JP, Vishwanath G, Sasikala M, Reddy DN, Vogel P, Pruett-Miller SM, Webby R, **Jonsson CB**, Kanneganti TD. ZBP1-dependent inflammatory cell death, PANoptosis, and cytokine storm disrupt IFN therapeutic efficacy during coronavirus infection. Sci Immunol. 2022 Aug 26;7(74):eabo6294. doi: 10.1126/sciimmunol.abo6294. Epub 2022 Aug 26. PMID: 35587515; PMCID: PMC9161373.

Hindi SM, Petrany MJ, Greenfeld E, Focke LC, Cramer AAW, **Whitt MA**, Khairallah RJ, Ward CW, Chamberlain JS, Podbilewicz B, Prasad V, Millay DP. Enveloped viruses pseudotyped with mammalian myogenic cell fusogens target skeletal muscle for gene delivery. Cell. 2023 May 11;186(10):2062-2077.e17. doi: 10.1016/j.cell.2023.03.033. Epub 2023 Apr 18. Erratum in: Cell. 2023 Aug 3;186(16):3520. PMID: 37075755.

Alway SE, Paez HG, Pitzer CR, Ferrandi PJ, Khan MM, Mohamed JS, **Carson JA**, Deschenes MR. Mitochondria transplant therapy improves regeneration and restoration of injured skeletal muscle. J Cachexia Sarcopenia Muscle. 2023 Feb;14(1):493-507. doi: 10.1002/jcsm.13153. Epub 2023 Jan 5. PMID: 36604839; PMCID: PMC9891964.

Banerjee S, Lee S, Norman DD, **Tigyi GJ**. Designing Dual Inhibitors of Autotaxin-LPAR GPCR Axis. Molecules. 2022 Aug 26;27(17):5487. doi:10.3390/molecules27175487. PMID: 36080255; PMCID: PMC9458164.

Hardee JP, **Carson JA**. Muscular contraction's therapeutic potential for cancer-induced wasting. Am J Physiol Cell Physiol. 2022 Aug 1;323(2):C378-C384.doi: 10.1152/ajpcell.00021.2022. Epub 2022 Jun 15. PMID: 35704693; PMCID:PMC9359654.

Temrikar ZH, Golden JE, **Jonsson CB**, **Meibohm B**. Clinical and Translational Pharmacology Considerations for Anti-infectives Approved Under the FDA Animal Rule. Clin Pharmacokinet. 2023 Jul;62(7):943-953. doi:10.1007/s40262-023-01267-x. Epub 2023 Jun 16. PMID: 37326917; PMCID: PMC10471120.

Taylor MK, Williams EP, Xue Y, Jenjaroenpun P, Wongsurawat T, Smith AP, Smith AM, Parvathareddy J, Kong Y, Vogel P, Cao X, Reichard W, Spruill-Harrell B, **Samarasinghe AE**, Nookaew I, **Fitzpatrick EA**, Smith MD, Aranha M, Smith JC, **Jonsson CB**. Dissecting Phenotype from Genotype with Clinical Isolates of SARS- CoV-2 First Wave Variants. Viruses. 2023 Feb 23;15(3):611. doi: 10.3390/v15030611. PMID: 36992320; PMCID: PMC10059853.

Dacheux MA, Norman DD, **Tigyi GJ**, Lee SC. Emerging roles of lysophosphatidic acid receptor subtype 5 (LPAR5) in inflammatory diseases and cancer. Pharmacol Ther. 2023 May;245:108414. doi: 10.1016/j.pharmthera.2023.108414. Epub 2023 Apr 13. PMID: 37061203; PMCID: PMC10290275.

Russell CM, Rybak JA, Miao J, **Peters BM**, Barrera FN. Candidalysin: Connecting the pore forming mechanism of this virulence factor to its immunostimulatory properties. J Biol Chem. 2023 Feb;299(2):102829. doi: 10.1016/j.jbc.2022.102829. Epub 2022 Dec 26. PMID: 36581211; PMCID: PMC9852700.

Adams A, Murphy QM, Dougherty OP, Sawyer AM, Bai F, Edholm CJ, Williams EP, Allen LJS, **Jonsson CB**. Data-driven models for replication kinetics of Orthohantavirus infections. Math Biosci. 2022 Jul;349:108834. doi:10.1016/j.mbs.2022.108834. Epub 2022 May 19. PMID: 35598641.

Sanders B, Pokhrel S, Labbe A, Mathews I, Cooper C, Davidson R, Phillips G, Weiss K, Zhang Q, O'Neill H, Kaur M, Ferrins L, Schmidt J, Reichard W, Surendranathan S, Parvathareddy J, Phillips L, Rainville C, Sterner D, Kumaran D, Andi B, Babnigg G, Moriarrty N, Adams P, Joachimiak A, Hurst B, Kumar S, Butt T, **Jonsson C**, Wakatsuki S, Galanie S, Head M, Parks J. Potent and Selective Covalent Inhibition of the Papain-like Protease from SARS-CoV-2. Res Sq [Preprint]. 2022 Jul 21:rs.3.rs-906621. doi: 10.21203/rs.3.rs-906621/v1. Update in: Nat Commun. 2023 Mar 28;14(1):1733. PMID: 34642689; PMCID: PMC8509099.

Si L, Bai H, Oh CY, Jiang A, Hong F, Zhang T, Ye Y, Jordan TX, Logue J, McGrath M, Belgur C, Calderon K, Nurani A, Cao W, Carlson KE, Prantil-Baun R, Gygi SP, Yang D, **Jonsson CB**, tenOever BR, Frieman M, Ingber DE. Self-assembling short immunostimulatory duplex RNAs with broad-spectrum antiviral activity. Mol Ther Nucleic Acids. 2022 Sep 13;29:923-940. doi: 10.1016/j.omtn.2022.08.031. Epub 2022 Aug 24. PMID: 36032397; PMCID: PMC9398551.

Yang D, Wu Y, Turan I, Keil J, **Li K**, Chen MH, Liu R, Wang L, Sun XL, Chen GY. Targeting intracellular Neu1 for coronavirus infection treatment. iScience. 2023 Feb 17;26(2):106037. doi: 10.1016/j.isci.2023.106037. Epub 2023 Jan 24. PMID: 36714013; PMCID: PMC9870608.

Sanders BC, Pokhrel S, Labbe AD, Mathews II, Cooper CJ, Davidson RB, Phillips G, Weiss KL, Zhang Q, O'Neill H, Kaur M, Schmidt JG, Reichard W, Surendranathan S, Parvathareddy J, Phillips L, Rainville C, Sterner DE, Kumaran D, Andi B, Babnigg G, Moriarty NW, Adams PD, Joachimiak A, Hurst BL, Kumar S, Butt TR, **Jonsson CB**, Ferrins L, Wakatsuki S, Galanie S, Head MS, Parks JM. Potent and selective covalent inhibition of the papain-like protease from SARS-CoV-2. Nat Commun. 2023 Mar 28;14(1):1733. doi: 10.1038/s41467-023-37254-w. PMID: 36977673; PMCID: PMC10044120.

Li K, Wang T, Li R, Xue F, Zeng G, Zhang J, Ma Y, Feng L, **Kang YJ**. Dose-specific efficacy of adipose-derived mesenchymal stem cells in septic mice. Stem Cell Res Ther. 2023 Feb 19;14(1):32. doi: 10.1186/s13287-023-03253-3. PMID: 36804962; PMCID: PMC9940377.

Merigeon EY, Yang D, Ihms EA, Bassit LC, **Fitzpatrick EA, Jonsson CB**, Schinazi RF, Block DS, Olsen HS. An ACE2-IgG4 Fc Fusion Protein Demonstrates Strong Binding to All Tested SARS-CoV-2 Variants and Reduced Lung Inflammation in Animal Models of SARS-CoV-2 and Influenza. Pathog Immun. 2022 Aug 23;7(1):104-121. doi: 10.20411/pai.v7i1.491. PMID: 36072571; PMCID: PMC9438944.

Pinky L, DeAguero JR, Remien CH, **Smith AM**. How Interactions during Viral-Viral Coinfection Can Shape Infection Kinetics. Viruses. 2023 May 31;15(6):1303.doi: 10.3390/v15061303. PMID: 37376603; PMCID: PMC10301061.

Halle JL, Counts BR, Paez HG, Baumfalk DR, Zhang Q, Mohamed JS, Glazer ES, Puppa MJ, Smuder AJ, **Alway SE, Carson JA**. Recovery from FOLFOX chemotherapy-induced systemic and skeletal muscle metabolic dysfunction in mice. Am J Physiol Endocrinol Metab. 2023 Aug 1;325(2):E132-E151. doi: 10.1152/ajpendo.00096.2023. Epub 2023 Jun 28. PMID: 37378624; PMCID: PMC10393342.

Hu H, Mady Traore MD, Li R, Yuan H, He M, Wen B, Gao W, **Jonsson CB**, **Fitzpatrick EA,** Sun D. Optimization of the Prodrug Moiety of Remdesivir to Improve Lung Exposure/Selectivity and Enhance Anti-SARS-CoV-2 Activity. J Med Chem. 2022 Sep 22;65(18):12044-12054. doi: 10.1021/acs.jmedchem.2c00758. Epub 2022 Sep 7. PMID: 36070561.

Smith AP, Lane LC, Ramirez Zuniga I, Moquin DM, Vogel P, **Smith AM**. Increased virus dissemination leads to enhanced lung injury but not inflammation during influenza-associated secondary bacterial infection. FEMS Microbes. 2022 Jul 25;3:xtac022. doi: 10.1093/femsmc/xtac022. PMID: 37332507; PMCID: PMC10117793.

Afolabi JM, Kanthakumar P, Williams JD, Kumar R, Soni H, **Adebiyi A**. Post-injury Inhibition of Endothelin-1 Dependent Renal Vasoregulation Mitigates Rhabdomyolysis-Induced Acute Kidney Injury. Function (Oxf). 2023 May 4;4(4):zqad022. doi: 10.1093/function/zqad022. PMID: 37342410; PMCID:PMC10278989.

Shukla PK, Rao RG, Meena AS, Giorgianni F, Lee SC, Raju P, Shashikanth N, Shekhar C, Beranova S, Balazs L, **Tigyi G**, Gosain A, Rao R. Paneth cell dysfunction in radiation injury and radio-mitigation by human α-defensin 5. Front Immunol. 2023 Aug 10;14:1174140. doi: 10.3389/fimmu.2023.1174140. PMID: 37638013; PMCID: PMC10448521.

Nichols JH, Williams EP, Parvathareddy J, Cao X, Kong Y, Fitzpatrick E, Webby RJ, **Jonsson CB**. Upper Respiratory Infection Drives Clinical Signs and Inflammatory Responses Following Heterologous Challenge of SARS-CoV-2 Variants of Concern in K18 Mice. Viruses. 2023 Apr 11;15(4):946. doi: 10.3390/v15040946. PMID: 37112926; PMCID: PMC10144791.

Fanous MS, Afolabi JM, Michael OS, Falayi OO, Iwhiwhu SA, **Adebiyi A.** Transdermal Measurement of Glomerular Filtration Rate in Mechanically Ventilated Piglets. J Vis Exp. 2022 Sep 13;(187):10.3791/64413. doi: 10.3791/64413. PMID:36190295; PMCID: PMC9835146.

de Figueiredo MLG, Williams EP, **Jonsson CB**, Khan MJ, Nunes MRT, de Lima CPS, Figueiredo LTM, Costa MRF, Mourão MPG, Lacerda MVG, Aquino VH. Screening of febrile patients with suspected malaria from the Brazilian Amazon for virus infection. Arch Virol. 2022 Nov;167(11):2151-2162. doi:10.1007/s00705-022-05514-7. Epub 2022 Jul 16. PMID: 35841448.

VanderVeen BN, Cardaci TD, Madero SS, McDonald SJ, Bullard BM, Price RL, **Carson JA**, Fan D, Murphy EA. 5-Fluorouracil disrupts skeletal muscle immune cells and impairs skeletal muscle repair and remodeling. J Appl Physiol (1985). 2022 Oct 1;133(4):834-849. doi: 10.1152/japplphysiol.00325.2022. Epub 2022 Aug 25. PMID: 36007896; PMCID: PMC9529268.

Kumar R, Soni H, Afolabi JM, Kanthakumar P, Mankuzhy PD, Iwhiwhu SA, **Adebiyi A.** Induction of reactive oxygen species by mechanical stretch drives endothelin production in neonatal pig renal epithelial cells. Redox Biol. 2022 Sep;55:102394. doi: 10.1016/j.redox.2022.102394. Epub 2022 Jul 4. PMID: 35841629; PMCID: PMC9289874.

Miao J, Regan J, Cai C, Palmer GE, Williams DL, Kruppa MD, **Peters BM**.Glycogen Metabolism in Candida albicans Impacts Fitness and Virulence during Vulvovaginal and Invasive Candidiasis. mBio. 2023 Apr 25;14(2):e0004623. doi:10.1128/mbio.00046-23. Epub 2023 Feb 22. PMID: 36840583; PMCID: PMC10127583.

Heo SC, Keum BR, Seo EJ, Yoon J, Jeong S, **Tigyi GJ**, Norman D, Jang IH, Kim HJ. Lysophosphatidic acid induces proliferation and osteogenic differentiation of human dental pulp stem cell through lysophosphatidic acid receptor 3/extracellular signal-regulated kinase signaling axis. J Dent Sci. 2023 Jul;18(3):1219-1226. doi: 10.1016/j.jds.2023.01.029. Epub 2023 Feb 9. PMID: 37404649; PMCID: PMC10316439.

Joshi RP, Schultz KJ, Wilson JW, Kruel A, Varikoti RA, Kombala CJ, Kneller DW, Galanie S, Phillips G, Zhang Q, Coates L, Parvathareddy J, Surendranathan S, Kong Y, Clyde A, Ramanathan A, **Jonsson CB**, Brandvold KR, Zhou M, Head MS, Kovalevsky A, Kumar N. AI-Accelerated Design of Targeted Covalent Inhibitors for SARS-CoV-2. J Chem Inf Model. 2023 Mar 13;63(5):1438-1453. doi: 10.1021/acs.jcim.2c01377. Epub 2023 Feb 21. PMID: 36808989.

Guo H, Zhang W, Wang J, Zhao G, Wang Y, Zhu BM, Dong P, Watari H, Wang B, Li W, **Tigyi G**, Yue J. Cryptotanshinone inhibits ovarian tumor growth and metastasis by degrading c-Myc and attenuating the FAK signaling pathway. Front Cell Dev Biol. 2022 Sep 28;10:959518. doi: 10.3389/fcell.2022.959518. PMID: 36247016; PMCID: PMC9554091.

Alvira-Arill GR, Herrera OR, Tsang CCS, Wang J, **Peters BM**, Stultz JS. Comparison of catheter-related bloodstream infection rates in pediatric patients receiving parenteral nutrition with soybean oil-based intravenous fat emulsion versus a mixed oil fat emulsion. Pharmacotherapy. 2022 Dec;42(12):898-904. doi: 10.1002/phar.2740. Epub 2022 Nov 21. PMID: 36349792; PMCID: PMC9742122.
Ruisanchez É, Janovicz A, Panta RC, Kiss L, Párkányi A, Straky Z, Korda D, Liliom K, **Tigyi G**, Benyó Z. Enhancement of Sphingomyelinase-Induced Endothelial Nitric Oxide Synthase-Mediated Vasorelaxation in a Murine Model of Type 2 Diabetes. Int J Mol Sci. 2023 May 6;24(9):8375. doi: 10.3390/ijms24098375. PMID:37176081; PMCID: PMC10179569.

Ni Y, Simpson CL, Davis RL, Szpiro AA, Karr CJ, **Kovesdy CP**, Hjorten RC, Tylavsky FA, Bush NR, LeWinn KZ, Winkler CA, Kopp JB, Obi Y. Associations between APOL1 genetic variants and blood pressure in African American mothers and children from a U.S. pregnancy cohort: Modification by air pollution exposures. Environ Res. 2022 Sep;212(Pt A):113186. doi:10.1016/j.envres.2022.113186. Epub 2022 Mar 28. PMID: 35358541; PMCID: PMC9233157.

Hindi SM, Petrany MJ, Greenfeld E, Focke LC, Cramer AAW, **Whitt MA**, Prasad V, Chamberlain JS, Podbilewicz B, Millay DP. Enveloped viruses pseudotyped with mammalian myogenic cell fusogens target skeletal muscle for gene delivery. bioRxiv [Preprint]. 2023 Mar 18:2023.03.17.533157. doi:10.1101/2023.03.17.533157. Update in: Cell. 2023 Apr 12;: PMID: 36993357; PMCID:PMC10055243.

Patel S, Pinnell D, Qualls J, Rathod A, Chen W, Boutin S, Woods SD, **Kovesdy CP**, Tangri N, Sauer BC. Assessing patiromer utilization and associated serum potassium changes in US veterans with prior sodium polystyrene sulfonate exposure. Medicine (Baltimore). 2023 Mar 3;102(9):e33134. doi: 10.1097/MD.0000000000033134. PMID: 36862858; PMCID: PMC9981426.

Vizcaya D, **Kovesdy CP**, Reyes A, Pessina E, Pujol P, James G, Oberprieler NG.Characteristics of patients with chronic kidney disease and Type 2 diabetes initiating finerenone in the USA: a multi-database, cross-sectional study. J Comp Eff Res. 2023 Aug;12(8):e230076. doi: 10.57264/cer-2023-0076. Epub 2023 Jun 30. PMID: 37387399.

Halle JL, Counts BR, Zhang Q, **Carson JA**. Short duration treadmill exercise improves physical function and skeletal muscle mitochondria protein expression after recovery from FOLFOX chemotherapy in male mice. FASEB J. 2022 Aug;36(8):e22437. doi: 10.1096/fj.202200460R. PMID: 35816153.

Cao X, Yang D, Parvathareddy J, Chu YK, Kim EJ, Fitz-Henley JN, Li X, Lukka PB, Parmar KR, Temrikar ZH, Dhole P, Adcock RS, Gabbard J, Bansal S, Lee J, Zalduondo L, Hayes E, Stabenow J, **Meibohm B, Fitzpatrick EA**, Bailey K, Campos RK, Julander JG, Rossi SL, Chung D, **Jonsson CB**, Golden JE. Efficacy of a brain- penetrant antiviral in lethal Venezuelan and eastern equine encephalitis mouse models. Sci Transl Med. 2023 Apr 12;15(691):eabl9344. doi:10.1126/scitranslmed.abl9344. Epub 2023 Apr 12. PMID: 37043558.

Wagner AS, Vogel AK, Lumsdaine SW, Phillips EK, Willems HME, **Peters BM**, Reynolds TB. Mucosal Infection with Unmasked Candida albicans Cells Impacts Disease Progression in a Host Niche-Specific Manner. Infect Immun. 2022 Dec 15;90(12):e0034222. doi: 10.1128/iai.00342-22. Epub 2022 Nov 14. PMID: 36374100; PMCID: PMC9753624.
Afolabi JM, Michael OS, Falayi OO, Kanthakumar P, Mankuzhy PD, Soni H, **Adebiyi A**. Activation of renal vascular smooth muscle TRPV4 channels by 5-hydroxytryptamine impairs kidney function in neonatal pigs. Microvasc Res. 2023 Jul;148:104516. doi: 10.1016/j.mvr.2023.104516. Epub 2023 Mar 6. PMID: 36889668; PMCID: PMC10258165.

Arif Y, Wenziger C, Hsiung JT, Edward A, Lau WL, Hanna RM, Lee Y, Obi Y, **Kovesdy CP**, Kalantar-Zadeh K, Streja E. Association of serum potassium with decline in residual kidney function in incident hemodialysis patients. Nephrol Dial Transplant. 2022 Oct 19;37(11):2234-2240. doi: 10.1093/ndt/gfac181. PMID: 35561740; PMCID: PMC9585465.

Elsherif L, Kanthakumar P, Afolabi J, Stratton AF, Ogu U, Nelson M, Mukhopadhyay A, Smeltzer MP, **Adebiyi A**, Ataga KI. Urinary angiotensinogen is associated with albuminuria in adults with sickle cell anaemia. Br J Haematol. 2023 Aug;202(3):669-673. doi: 10.1111/bjh.18862. Epub 2023 May 15. PMID:37189288.

Yamada T, Puttarajappa CM, **Kovesdy CP**, Obi Y. A Specific Target BP in Chronic Kidney Disease Remains Unclear. J Am Soc Nephrol. 2023 Jun 1;34(6):1121-1122. doi: 10.1681/ASN.0000000000000135. Epub 2023 Apr 27. PMID: 37259197; PMCID: PMC10278808.

Liu J, **Peters BM**, Yang L, Yu H, Feng D, Chen D, Xu Z. Antimicrobial Treatment on a Catheter-Related Bloodstream Infection (CRBSI) Case Due to Transition of a Multi-Drug-Resistant Ralstonia mannitolilytica from Commensal to Pathogen during Hospitalization. Antibiotics (Basel). 2022 Oct 8;11(10):1376. doi: 10.3390/antibiotics11101376. PMID: 36290034; PMCID: PMC9599016.

Almeida C, Pongilio RP, Móvio MI, Higa GSV, Resende RR, **Jiang J**, Kinjo ER, Kihara AH. Distinct Cell-specific Roles of NOX2 and MyD88 in Epileptogenesis. Front Cell Dev Biol. 2022 Jul 4;10:926776. doi: 10.3389/fcell.2022.926776. PMID: 35859905; PMCID: PMC9289522.

Kumar A, Sinha N, Kodidela S, Zhou L, **Singh UP**, Kumar S. Effect of benzo(a)pyrene on oxidative stress and inflammatory mediators in astrocytes and HIV-infected macrophages. PLoS One. 2022 Oct 14;17(10):e0275874. doi: 10.1371/journal.pone.0275874. PMID: 36240258; PMCID: PMC9565757.

Ahmed HA, Ismael S, Salman M, Devlin P, McDonald MP, **Liao FF**, Ishrat T. Direct AT2R Stimulation Slows Post-stroke Cognitive Decline in the 5XFAD Alzheimer's Disease Mice. Mol Neurobiol. 2022 Jul;59(7):4124-4140. doi: 10.1007/s12035-022-02839-x. Epub 2022 Apr 29. PMID: 35486224.

Merigeon EY, Yang D, Ihms EA, Bassit LC, **Fitzpatrick EA**, **Jonsson CB**, Schinazi RF, Block DS, Olsen HS. An ACE2-IgG4 Fc Fusion Protein Demonstrates Strong Binding to All Tested SARS-CoV-2 Variants and Reduced Lung Inflammation in Animal Models of SARS-CoV-2 and Influenza. Pathog Immun. 2022 Aug 23;7(1):104-121. doi: 10.20411/pai.v7i1.491. PMID: 36072571; PMCID: PMC9438944.

II. PRESENTATIONS GIVEN TO PROMOTE CORE USAGE:

DATE	NAME	AFFILIATION
05/01/2023	Elizabeth Fitzpatrick	National Biocontainment Laboratory/Regional Biocontainment Laboratory meeting

III. SUMMARY OF ACTIVITIES

A. Personnel (% Salary/ Effort, until 6/30/2023)

Director: Colleen Jonsson
Assistant Director: Elizabeth Fitzpatrick (13.72%)
Building Superintendent: Terry Bruckman (100%)
Assistant Building Superintendent: Ryan Griffith (100%) – salary coverage began September 6, 2022.
Supervisor (ABSL-3): Lillian Zalduondo (100%)
Chief Safety Officer: Timothy Barton (5%)
Sr. Lab Animal Care Technician: Fu Zeng (100%)
Lab Animal Care Technician: Crystal Murphy (100%)
Lab Animal Care Technician: Christy Partee (100%)
Lab Animal Care Technician: Mercedes Carter (100%)
Grants and Contracts Coordinator: Na Seung Yeon (50%) salary coverage until December 31, 2022.
Assistant Director/RBL Business Manager: Natalie Smith (50% effort, paid by the Office of Research under a separate budget) – role ended June 30, 2023.
Business Operations Manager: Brandy Fleming (100%) – salary coverage began June 27, 2023.
Financial Coordinator: Wendy Love (100%) – salary coverage until April 28, 2023.
Financial Coordinator: Tammy McCray (100%) – salary coverage began June 20, 2023.
Administrative Associate: Tempie Sydes (100%) – salary coverage began October 17, 2022.
Veterinary Technician: Stacey Barnett (85%)
Sr. Research Specialist: Jyothi Parvathareddy (100%)
Sr. Research Specialist: Surekha Surendranatha (100%) - salary coverage until December 12, 2022.
Sr. Research Specialist: Yuting Zhang (100%)
Program Manager: Dong Yang (100%)
RBL Facility Technician: Hayden Anderson (100%) – salary coverage until September 14, 2022.
RBL Facility Technician: To Be Determined - TBD (100%)

B. Oversight Committee: University of Tennessee RBL Executive Committee (UTREC)

UTREC was reorganized in Sept of 2022 and consisted of the following members:
Wesley Byerly, PhD (Associate Vice Chancellor for Research, Dept. of Anatomy and Neurobiology) *UTREC Chair*
Tim Barton, MS CIH (Director of Research Safety Affairs)
Ramesh Ray, PhD (Institutional Biosafety Officer)
Colleen Jonsson, PhD (Dept. of Microbiology, Immunology & Biochemistry)
Elizabeth Fitzpatrick, PhD (Dept. of Microbiology, Immunology & Biochemistry)
David Hamilton, DVM (Lab Animal Care Unit)
Terry Bruckman (RBL)
Lillian Zalduondo (RBL)
Dong Yang (RBL)

C. Equipment (> $10K)

Responsible cost center:	Equipment Description:	Cost:	Capitalized on:
E070165001	IVIS Spectrum Imaging System	436,365.00	11/02/2022
E070165	JANUS Integrator Platform	225,952.00	01/06/2010
E070165	Delta Vision personal DV Live Cell Imaging System	191,598.76	09/14/2009
E070165	MiSeq System	95,931.00	07/16/2018
E070165	CH Technologies BANG unit	92,690.00	05/11/2010
E070165	Minidox-M Chlorine Dioxide Gas Generator	75,158.92	09/02/2009
E070165	EnVision Multilabel Reader	69,825.00	06/11/2010
E070165	EnVision Multilabel Reader	67,620.00	01/06/2010
E070165	CH Technologies BANG unit	63,965.40	07/21/2010
E070165	Millipore Luminex 200 3.1 x Ponent	45,591.00	12/21/2009
E070165	MDT Disposable Tip Head	44,700.00	07/24/2018
E070165001	BioPROtect lll Bio-Containment Enclosure for BD	44,400.00	05/08/2009
E070165	BCU 2000 Housing System for Mice	41,350.00	02/10/2012
E070165	BCU 2000 Housing System for Mice	41,350.00	02/10/2012
E070165002	QSTUDIO 6 FLX system	38,844.78	12/20/2017
E070165	CFX96 Realtime PCR Detection System	35,900.00	11/16/2009
E070165001	Cage Mouse Bio-Containment Unit #1	30,068.21	12/10/2008
E070165001	Synergy 2 SLFA Model Plate Reader	28,630.50	03/30/2009
E070165	Synergy 2 SLFA Model Dr. Byrne	28,630.50	10/15/2009
E070165	42-Cage mouse Bio containment unit	27,098.46	09/02/2010
E070165	42-Cage mouse Bio containment unit	27,098.46	09/02/2010
E070165	42-Cage mouse Bio containment unit	27,098.46	09/02/2010
E070165002	MAGPIX with XPONENT 4.2	23,660.00	11/13/2017
E070165	Synergy HT RDR - (Miller)	23,605.00	09/18/2006

E070165	DiaSys Chemistry System Analyzer	22,696.99	04/23/2018
E070165	42-Cage Bio containment unit w/ blower and battery	22,364.50	06/19/2012
E070165002	Multiflo Fx with Peri Washer	19,472.79	09/02/2010
E070165	softWoRx Computer Server 3.7.0 (Linux)	19,163.95	01/13/2010
E070165001	Eddy Jet Automatic Plater for Spiral Spreading	18,954.00	09/12/2008
E070165	2014 POLARIS GEM TRUCK	18,192.32	01/16/2014
E070165002	Infinite M200 PRO # Monochromator	16,234.00	06/18/2014
E070165001	Ventilated Animal Transport Unit	13,812.60	05/14/2009
E070165001	Axiovert 40 cfl	11,865.00	06/22/2009
E070165	Axiovert 40 CFL	11,865.00	07/14/2009
E070165002	ULT FZ TSX60086A 115V/60HZ PMO	11,367.20	05/01/2018
E070165	Upright -86 Ultralow Freezer	11,034.00	05/05/2017
E070165002	Fastprep-24 Instrument Homogenizer	10,950.00	08/09/2013
E070165	DiaSys Hematology Analyzer	10,849.04	04/23/2018
E070165	ATI Model 2HA Digital Photometer 120V w/attachment	10,547.83	02/19/2010
E070165	Cytek Aurora Cytometer	242,138.00	11/23/2021
E070165	CTL Immunospot Analyzer	128,000.00	
E070165 E070165	Fujifilm Echo vivo system incl mouse bed and probe	375,125.00	11/22/2022
E070165	Miltenyi Biotech UltraMicroscope BLAZE	384,555.28	08/27/2023
E070165	Emulate Inc Zoe & Orb	190,815.00	09/22/2022
E070165	PerkinElmer IVIS Spectrum	449,365.00	10/28/2022
E070165	10x Genomics Inc. Chromium X	95,000.00	09/12/2022
E070165	Miltenyi Biotech MACSQuant Tyto cell sorter	434,886.00	
E070165	Yokogawa CQ1 system	328,284.00	08/30/2022
E070165	Lab Logic system X-cube Micro-CT	313,405.00	03/28/2022
E070165	AB Sciex LLC. Mass Spectrometer	470,560.92	01/19/2023
E070165	Olympic APEX (Hunt Optics&Imaging)	162,300.37	02/17/2023

D. RBL Service Contracts, FY23

Vendor	Equipment	Cost/yr.
Specialty Underwriters	Various Equipment	$44,481.00
Illumina, Inc.	MiSeq System	$41,535.36
Agilent Technologies	Various Equipment	$12,742.03
Life Technologies	Quantstudio 6 Flex	$6,407.63
Cytek	Aurora 3 Laser	$21,800.00
DiaSys Diagnostic Sys	Chemistry/Hematology Service	$3,900.03
Electronic Power Systems	UPS Battery replacement	$7,913.00
Allentown	WiCom	$2,500.00
Total costs, all service contracts		**$141,279.05**

E. Advertisement of the Core

Due to the large and ever-increasing demand for SARS-CoV-2 research by public and private institutes nationwide during the pandemic, the UT Health Science Center RBL became more recognizable. The RBL performed, and continues to perform, several promotional activities to provide awareness of RBL expertise and services. (1) Website updates: The website updates continued through FY23 and included restructuring of service pages with updated pricing, service descriptions and images, addition of new equipment and information about SARS CoV-2 specific services. It also has a new page to help clients submit a service request directly through the link on the website. (2) Personal contacts/word of mouth: The RBL director and others at UTHSC recommended the UTHSC RBL to individuals and companies around the globe bringing in numerous new clients. Additionally, new clients provided our information to others bringing in additional clients to the UTHSC RBL. (3) NIAID resource: The UTHSC RBL has a webpage on the NIAID Biocontainment Facilities Resource Website (Biocontainment Laboratory—University of Tennessee | NIH: National Institute of Allergy and Infectious Diseases) which attracted additional new customers. (4) Collaboration/contribution with local community: The UTHSC RBL became visible to many members of the local community due to its participation in regional COVID 19 activities, such as sequencing variants for the City of Memphis, interviews of Dr. Jonsson by local news media outlets, etc., resulting in new clients and greater visibility in our region.

F. Usage in FY23 By Service

FY23 usage of RBL by internal UTHSC investigators:

Department/PI	Value of Completed Services, $
Anatomy and Neurobiology	**1,521.00**
Robert W. Williams	1,521.00
CLINICAL PHARMACY & TRANSLATIONAL SCIENC	**13,288.31**
Brian Peters	2,724.64
Glen Palmer	5,087.84
Ted Cory	5,475.83
COMPARATIVE MEDICINE-GHS	**974.10**
David Hamilton	974.10
MEDICINE-NEPHROLOGY	**557.43**
Csaba Kovesdy	557.43
Microbiology, Immunology, and Biochemistry	**99,361.29**
Amber Smith	2,120.22
Colleen Jonsson	50,383.23
Elizabeth A Fitzpatrick	2,444.39
Kui Li	34,110.34
Ying Kong	9670.72
Michael Whitt	404.41
Tayebeh Pourmotabbed	228.48
ORTHOPAEDIC SURGERY	**139.20**

Hongsik Cho	139.20
PEDIATRICS-RESEARCH	**14,642.21**
Guoyun Chen	14,642.21
PHARMACEUTICAL SCIENCES	**3,848.21**
Bernd Meibohm	3,630.44
Jianxiong Jiang	195.91
Udai Singh	21.86
PHARMACOLOGY	**4,130.74**
Francesca-Fang Liao	4,130.74
PHYSIOLOGY	**17,758.80**
Gabor Tigyi	16,331.10
Modar Omar Kassan	1,427.70
Regional Biocontainment laboratory	**175.00**
	175.00
Grand Total, Internal	**156,396.26**

FY23 usage of the RBL by external clients:

External Client	Value of Completed Services, $
MICO BIOMED (Commercial)	64,272.67
Rutgers University (Academic: Fan, Simon, Welsh)	2,719.20
Amcyte Pharma (Commercial)	1,548.80
Anavex (Commercial)	13,133.21
Appili Therapeutics (Commercial)	66,084.90
BIOMED DIAGNOSTICS (Commercial)	20,453.07
FDA NCTR (Government)	6,385.56
FUJIFILM Pharmaceuticals (Commercial)	9,604.08
Harvard (Academic)	18,434.80
Healion Bio (Commercial)	75,000.00
Kansas State University (Academic)	2,472.00
Oak Ridge National Laboratory (Academic)	9,000.00
PROVECTUS (Commercial)	9,277.10
Pusan National University, S. Korea (Academic)	1,302.00
St. John's Cancer Institute (Academic)	865.20
St. Jude Children's Research Hospital (Academic)	23,689.56
University of Arkansas at Fort Smith (UAFS, Academic)	494.40
UCHS	13,905.53
University of Michigan (Academic)	15,889.88
University of North Carolina at Charlotte (Academic)	2,472.00
University of South Carolina (Academic)	4,120.00
Yale University (Academic)	610.80
Grand Total, External	**361,914.76**

G. FY23 Fee Structure

Please note that internal prices will increase by 3% each fiscal year.

The pricing structure listed below is effective as of **July 1, 2022**. A variety of veterinary procedures, and study specific services, including molecular and immunology services, are offered by the RBL to support animal studies or in vitro studies. For a custom project, please inquire with the RBL Scientific Program Manager, Dr. Dong Yang.

PER DIEM ANIMAL CHARGES:

ITEM	COST	UNIT
Mice (4 per cage)		
ABSL2 per diem, internal	$1.07	cage/day
ABSL2 per diem, commercial	$1.58	cage/day
ABSL3 per diem, internal	$1.17	cage/day
ABSL3 per diem, commercial	$3.33	cage/day
Rats (2 per cage)		
ABSL2 per diem, internal	$2.68	cage/day
ABSL2 per diem, commercial	$3.97	cage/day
ABSL3 per diem, internal	$3.43	cage/day
ABSL3 per diem, commercial	$5.08	cage/day
Hamster (1-2 per cage)		
ABSL2 per diem, internal	$2.68	cage/day
ABSL2 per diem, commercial	$3.97	cage/day
ABSL3 per diem, internal	$3.43	cage/day
ABSL3 per diem, commercial	$5.08	cage/day
Guinea Pig or Cotton Rat (1 per cage)		
ABSL2 per diem, internal	$2.68	cage/day
ABSL2 per diem, commercial	$3.97	cage/day
ABSL3 per diem, internal	$3.43	cage/day
ABSL3 per diem, commercial	$5.08	cage/day
Ferret (2 per cage)		
ABSL2 per diem, internal	$6.54	cage/day
ABSL2 per diem, commercial	$11.68	cage/day
ABSL3 per diem, internal	$7.85	cage/day
ABSL3 per diem, commercial	$15.18	cage/day

PPE-ROOM CHARGES: BSL2, BSL3 or ABSL3:
INTERNAL

ITEM	COST	UNIT
BSL-2 PPE	$5.15	per day
BSL-3/ABSL-2 PPE Fee	$10.14	per day
ABSL-3 PPE Fee	$31.53	per day
Dedicated ABSL-2 Suite-per PI	$31.53	per day
Pathogen Storage (long term)	$3.18	per day

COMMERCIAL

ITEM	COST	UNIT
BSL-2/ABSL-2 PPE Fee	$56.29	per day
BSL-3/ABSL-3 PPE Fee	$112.56	per day
BSL-3 Facility Use	$49.28	per day
Vivarium Facility Usage Fee	$63.66	per day
Sample Storage (long term)	$3.94	per day

INSTRUMENTATION

Cost estimates for instrumentation. NOTE: Costs do not include consumables, labor or PPE.

ITEM	COST	UNIT
QuantStudio 6 qPCR		
Internal	$11.26	per run
Commercial	$18.24	per run
EnVision Microplate Reader		
Internal	$11.26	per run
Commercial	$18.24	per run
Synergy 2 Microplate Reader		
Internal	$5.62	per run
Commercial	$9.12	per run
Luminex FX-200		
Internal	$11.26	per run
Commercial	$42.78	per run
MagPix		
Internal	$28.14	per run
Commercial	$56.28	per run
Illumina MiSeq System		
Internal	$118.17	per run
Commercial	$153.62	per run
MultiFlo FX		
Internal	$11.26	per run
Commercial	$28.14	per run
Janus high-throughput robot		
Internal	$90.04	per run
Commercial	$118.17	per run
BioAnalyzer		
Internal	$11.26	per run
Commercial	$42.78	per run
CLC Software		
Internal	$10.61	per run
Commercial	$13.79	per run

Bead Mill

Internal	$11.26	per run
Commercial	$28.14	per run

IVIS Spectrum Bio-Imager

Unassisted, internal	$112.55	per hour
Operator assisted, internal	$144.14	per hour
Operator assisted, commercial	$234.05	per hour

BANG (aerosol delivery device)

Setup charge, internal	$56.28	per run
Setup charge, commercial	$91.17	per run
Decon. charge, internal	$56.28	per run
Decon. charge, commercial	$91.17	per run

IN VITRO SERVICES:

Virology services

ITEM	COST	UNIT
Virus Isolation, internal	$230.22	per sample
Virus Isolation, commercial	$372.95	per sample
Virus Plaque Assay, internal (labor not included)	$53.66	per sample
Virus Plaque Assay, commer. (labor not included)	$69.75	per sample
Virus PRNT (titer reduction) Assay, internal	$848.72	5 samples
Virus PRNT (titer reduction) Assay, commercial	$1,103.34	5 samples
Viral TCID CPE Assay, internal	$56.25	96-well
Viral TCID CPE Assay, commercial	$73.12	96-well
Viral TCID HI Assay, internal	$56.25	per sample
Viral TCID HI Assay, commercial	$73.12	per sample
RNA Isolation (Qiagen-Kingfisher) internal	$30.77	per sample
RNA Isolation (Qiagen-Kingfisher) commercial	$39.25	per sample
RNA Isolation (Trizol) \qRTPCR, internal	$56.51	per sample
RNA Isolation (Trizol)/ qRTPCR, commercial	$73.46	per sample
Viral Neutralization Test, internal	$597.92	per 40 samp.
Viral Neutralization Test, commercial	$965.42	per 40 samp.
Viral Antiviral HTS Test, internal	$212.18	1 compound
Viral Antiviral HTS Test, commercial	$275.83	1 compound
Viral Antiviral HTS Test, internal	$127.31	3-7 comps.
Viral Antiviral HTS Test, commercial	$159.14	3-7 comps.
Viral Antiviral HTS Test, internal	$63.65	8 compounds
Viral Antiviral HTS Test, commercial	$82.75	8 compounds
Custom Viral Antiviral HTS Test, internal	$265.23	1 compound
Custom Viral Antiviral HTS Test, commercial	$328.88	1 compound
Custom Viral Antiviral HTS Test, internal	$180.35	3-7 comps.
Custom Viral Antiviral HTS Test, commercial	$222.79	3-7 comps.
Custom Viral Antiviral HTS Test, internal	$167.62	8 compounds
Custom Viral Antiviral HTS Test, commercial	$180.35	8 compounds

Custom SARS-CoV-2 Variant Screening and Antiviral HTS, internal	$629.12	For 4 viruses
Custom SARS-CoV-2 Variant Screening and Antiviral HTS, commercial	$824.35	For 4 viruses

Immunology services - full service multiplex bead based assay (Cytokines)

ITEM	**COST**	**UNIT**
Samples (40-80) and kit provided by PI		
Luminex		
Internal	$302.36	per plate
Commercial	$393.07	per plate
Magpix-BSL2	$330.48	per plate
Internal	$429.61	per plate
Commercial		
Magpix-BSL3 (includes PPE)	$351.88	per plate
Internal	$542.07	per plate
Commercial		

Tissue Homogenization

ITEM	**COST**	**UNIT**
BSL2		
per 40 samples		
Internal	$63.50	($6.50/tissue)
Commercial	$414.61	($9.80/tissue)
BSL3		
per 40 samples		
Internal	$275.68	($6.50/tissue)
Commercial	$470.94	($11.10/tissue)

Flow Cytometry Prep - Includes labor and materials for single cell isolation, counting and aliquoting to flow tubes - NO PPE

ITEM	**COST**	**UNIT**
INTERNAL		
Spleen	$26.52	per sample
Inguinal lymph nodes	$26.52	per sample
Lung	$58.35	per sample
Brain	$58.35	per sample
Intestine	$58.35	per sample
COMMERCIAL - $400 minimum (or 10 sample minimum)		
Spleen	$26.52	per sample
Inguinal lymph nodes	$26.52	per sample
Lung	$58.35	per sample
Brain	$58.35	per sample
Intestine	$58.35	per sample

Flow Cytometry Staining - using our flow cytometry panels (Quotes for other markers will be customized.)

Internal	$2.12	per sample
Commercial	$33.95	per sample

Flow Cytometer Run

Internal	Go to FCCS Core iLab page to sign-up for	
BSL3. Commercial	$83.51	per hour

PATHOLOGY (BSL3 Tissues Only- Limited – User should discuss with Director first.)

ITEM	COST	UNIT
Decalcification	$9.00	per specimen
Paraffin processing only (no embedding):	$2.82	cassette
Paraffin process and embedding:	$3.38	per block
First and additional unstained slides:	$2.82	per slide
Unstained slides, but levels requested*	$6.76	per slide
Recut of previously faced paraffin block	$2.82	per slide
H&E staining of cut slides	$3.94	per slide
Trichrome staining of cut slides	$20.26	per slide
PAS staining of cut slides	$16.88	per slide
Other special stains of cut slides:	TBD	per slide
Antibodies	Purchase cost unit	

CLINICAL CHEMISTRY AND HEMATOLOGY SERVICES:

ITEM	COST	UNIT
Clinical Chemistry		
Chemistry panels, internal	$26.84	per sample
Set-up Charge, internal	$24.80	per run
Chemistry panels, commercial	$49.59	per sample
Set-up charge, commercial	$32.14	per run
Hematology		
Sample analyses, internal	$15.91	per sample
Set-up charge, internal	$10.93	per run
Sample analyses, commercial	$23.71	per sample
Set-up charge, commercial	$14.20	per run

SARS-CoV-2 NEXT GENERATION SEQUENCING SERVICES:

ITEM	COST	UNIT
Variant Calling – minimum 80 samples per run		
SARS-CoV-2, internal	$77.25	per sample
SARS-CoV-2, commercial	$309.00	per sample
Deep Sequencing >400 nt – minimum 20 sample (up to 22 per run)		
SARS-CoV-2, internal	$100.94	per sample
SARS-CoV-2, commercial	$412.00	per sample

ISP/ASTM and GLP are available, but will incur additional costs.

IV: GRANTS SUPPORTED BY THE CORE, FY23

Adebiyi, Adebowale
USPHS Grant R01 DK-120595, Vascular ion channels and microcirculation in neonatal urinary tract obstruction

Fitzpatrick, Elizabeth
Emory University subcontract USPHS Grant AI-161570, Broad-spectrum therapeutics against SARS-CoV-2 3CL protease

Jonsson, Colleen
CFD Research Corp/DOD - Jonsson, Producing Biosynthetic Therapeutics from Extreme Microbiomes

FDA 75F40121C00154, Evaluation of Small Animal Models for COVID-19 and their application in Nonclinical Safety and Efficacy Studies of Investigational Therapeutics

USPHS Grant AI-142762, Center of Excellence for Encephalitic Alphavirus Therapeutics [CEEAT]

University of North Carolina subcontract USPHS Grant AI-171292, Rapidly Emerging Antiviral Drug Discovery Initiative (READDI)

University of Wisconsin subcontract USPHS Grant AI-161232-02, Accelerated discovery of cell-active SARS-CoV-2 polymerase inhibitors via molecular dynamic guided screening and optimization

Li, Kui
USPHS Grant AI-171779, Host genetic determinants regulating susceptibility/resistance to SARS-CoV-2

Peters, Brian
USPHS Grant AI-134796, Candidalysin: a key mediator of Candida vaginitis immunopathology

Palmer, Glen
USPHS Grant AI-156611, Examining the importance of folate biosynthetic enzymes in infectious fungi

USPHS Grant AI-127607-05, Broad spectrum antifungals targeting fatty acid biosynthesis

Smith, Amber
USPHS Grant AI-139088, Predictive Modeling of Influenza-Pneumococcal Coinfection

Sumida, Keiichi
USPHS Grant DK-125586, Circulating microbiome and premature mortality in hemodialysis patients

Whitt, Michael
ModernaXi - Whitt - UTRF- Development of VSV SARS CoV-2 Pseudotypes

V. BUSINESS DEVELOPMENT

A. Market Assessment

During FY23, RBL services were provided to several departments within the COM, COP and COHP, as well as external users at other academic institutions and commercial entities (refer to "RBL Users 2020 to Present" table). Throughout FY23, Dr. Jonsson continued to focus on recruiting new internal and external users for those investigators whose research programs require RBL services. In FY23, the director continued to build several service units such as mass spectrometry for PK / PD studies in containment and improved imaging for animal studies. These services can be leveraged by both academic and industry users to support the submission of new grants or contracts. In FY23, Dr. Jonsson applied for and was subsequently awarded a UC7 grant that will provide funds for preventative maintenance, replacement of aging mechanical infrastructure, general lab equipment, and annual certifications. Additionally, the grant provides funds to expand and improve our services for drug discovery and development, with a focus on drug pharmacodynamics--how and how much drug exposure impacts pathogen survival. These new services and equipment will make the RBL more competitive in FY24 and beyond for existing and new users including UTHSC researchers focused in the area of drug development.

RBL Users 2020 to Present

Company	Location	
	City	State
ADH Public Health Laboratory Arkansas Government	Little Rock	AR
Akron Biotechnology LLC	Boca Raton	FL
Amcyte Pharma Inc	Cambridge	MA
Anavex Life Sciences Corp.	New York	NY
Anivive Lifesciences	Long Beach	CA
Apex laboratories private limited	Chennai TamilNadu	India
Appili Therapeutics Inc	Halifax	Canada
Apros Therapeutics/GHDDI	San Diego	CA
Arrowhead Pharma	Pasadena	CA
Arcturus Therapeutics Inc.	San Diego	CA

AVer Information Inc.USA	Fremont	CA
Baylor University	Waco	TX
Berghealth	Framingham	MA
Biomed Diagnostics Inc.	White City	OR
BioSkryb Inc	Durham	NC
Biotia Inc	New York	NY
Brilliant Health LLC	Tucson	AZ
CFD Research Corporation	Huntsville	AL
City of Memphis	Memphis	TN
Clemson	Clemson	SC
Cleveland Diagnostics Inc	Cleveland	OH
Coral Genomics	San Francisco	CA
CytaCoat Ab	Solna	Sweden
Dabur Research Foundation	Ghaziabad	India
Dvant Pharma_Univ. of Michigan	Ypsilanti	MI
Dynamics Inc	Pittsburgh	PA
EDP Biotech	Knoxville	TN
Emory University	Atlanta	GA
Emphycorp Inc	Flemington	NJ
EsperoVax	Plymouth	MI
Eutropics Pharmaceuticals	Cambridge	MA
Farmington Pharma Development	Cheshire	CT
Farmspace Systems LLC	Alamo	TN
FDA NCTR	Jefferson	AR
Fujifilm Pharmaceuticals	Cambridge	MA
Gliknik Inc	Baltimore	MD
Hansoh Bio LLC	Rockville	MD
Harvard University	Cambridge	MA
Healion Bio	Frederick	MD
Heel	Baden-Baden	Germany
Immuneering Corp.	Cambridge	MA
IntraMont Technologies Inc	Hackensack	NJ
Johns Hopkins Bloomberg School of Public Health	Baltimore	MD
Kenall.com	Kenosha	WI
Knowbio	Durham	NC
Koru Lifescience Ltd.	Auckland	New Zealand
Leidos Inc	Reston	VA
Leinco Technologies Inc.	St. Louis	MO
Loliware	New York	NY
Lumen Catheters LLC	Manchester	CT
MiCo BioMed Co., Ltd.	Skillman	NJ
Microban Products Company	Huntersville	NC

Missouri State University	Springfield	MO
Natural MA Inc	Cochrane Alberta	Canada
Nextcea	Woburn	MA
NIH NCI	Bethesda	MD
Northeastern University	Boston	MA
Novobiotic Pharmaceuticals LLC	Cambridge	MA
Old Dominion University	Norfolk	VA
OP Innovates.LLC	Lexington	KY
Oregon State University	Corvallis	OR
ORNL	Oak Ridge	TN
Otter Products LLC	Fort Collins	CO
Path BioAnalytics Inc	Chapel Hill	NC
Penn State University	University Park	PA
PhoneSoap LLC	Provo	UT
Pliant Therapeutics Inc.	South San Francisco	CA
POLYVISION	Atlanta	GA
Poplar Health	Memphis	TN
Pressure Profile INC	Hawthorne	CA
Primus Pharmaceuticals Inc	Scottsdale	AZ
Provectus Biopharmaceuticals Inc	Knoxville	TN
Providence Saint John's Health Center	Santa Monica	CA
Quantum Innovations Inc.	Central Point	OR
Red Queen Therapeutics (Appletreepartners)	Cambridge	MA
RedHill Biopharma Ltd.	Tel-Aviv	Israel
RETROVIROX INC.	San Diego	CA
ROWPAR INC.	Scottsdale	AZ
Rutgers Robert Wood Johnson Medical School	New Brunswick	NJ
Rutgers University	New Brunswick	NJ
Shelby County government	Memphis	TN
Speed Laboratory Inc	Gwinnett County	GA
spotLESS Materials inc	State College	PA
SRL Enterprises LLC.	Jersey City	NJ
St.Jude Childrens Hospital	Memphis	TN
Synexis LLC	Lenexa	KS
TES and Associates	Long Beach	CA
The University of Alabama in Huntsville	Huntsville	AL
Tiba Bio	Cambridge	MA
UConn Health	Farmington	CT
University of Arkansas	Fayetteville	AR
University of California San Francisco (UCSF)	San Francisco	CA
University of Colorado Denver	Denver	CO
University of Kentucky	Lexington	KY
University of Louisville	Louisville	KY

University of Memphis	Memphis	TN
University of South Carolina	Columbia	SC
University of New Mexico	Albuquerque	NM
University of South Carolina	Columbia	SC
University of Toledo	Toledo	OH
UNM	Albuquerque	NM
US Biologic	Memphis	TN
UT Chat College of Medicine	Chattanooga	TN
UTHSC	Memphis	TN
UTMB	Galveston	TX
Vast Therapeutics Inc	Durham	NC
Veru Inc	Miami	FL
ViroDefense	Maryland	MD
Vironova Medical AB	Stockholm	Sweden
Vivi-Biologics	Kurnool	India
Wondfo	Willowbrook	IL
Yale University	New Haven	CT
YewSavin Inc.	Fort Collins	CO
Zoetis	Parsippany	NJ

In conjunction with Lee Ferguson, Dr. Jonsson has continued to revise the RBL website, which has been updated with new marketing materials. The website will continue to be updated throughout FY24.

The RBL has expanded its base of regional customers, including researchers at the University of Memphis, Le Bonheur Children's Hospital, St. Jude Children's Research Hospital, and the Oak Ridge National Laboratories and other commercial and academic partners located in the state of TN. Many of these entities were new customers in FY21, and many users have continually returned for additional studies throughout FY23.

The RBL also continues to work with government customers, such as the US Food and Drug Administration (FDA) and the National Cancer Institute. Likely new government clients for FY24 include the Department of Defense, the Navy, the Defense Threat Reduction Agency, the Medical CBRN Defense Consortium (MCDC), the Biomedical Advanced Research and Development Authority (BARDA), the Federal Bureau of Investigations, the National Advisory Council (NAC), the Centers for Disease Control and Prevention (CDC), and the US Department of Agriculture (USDA). Funding mechanisms offered by government agencies include contracts and grants of various types, such as IDIQ (Indefinite Delivery, Indefinite Quantity) and OTA (Other Transactional Authority) contracts. Within these opportunities, we will continue to attempt to secure contracts that use our RBL facilities for pathogen discovery, pathogen diagnostics or animal model

development. We have also recently implemented COVID-19 drug discovery as a new service.

The RBL has acquired new external academic customers in FY23 which has led to numerous collaborations, including the inclusion of the UTHSC RBL as an animal core for several external groups submitting U19 proposals for Antiviral Drug Discovery (AViDD) Centers for Pathogens of Pandemic Concern during FY22. These studies have begun and will continue to bring in new customers. Additional collaborations with PIs at other academic institutions, such as the University of Michigan (Dr. Duxin Sun) and Emory University (Dr. Ray Schinazi), have led, and will continue to lead, to RBL inclusion on new R01 and other agency proposals.

Additional future customers may include inter-institutional collaborators (“friends” in the UT System, such as Dr. Klaus Schughart) and short-term academic PI visitors to our campus. A PI may wish to send to the RBL a student and/or themselves to execute a research project or to provide direct oversight. The RBL will develop approaches to facilitate short-term visits to train scientists in new technologies or to use our specialized service units within the RBL Core. The PI may also wish to have a person trained at our RBL to facilitate execution of their experiments since most research is highly technical and requires a great deal of background and expertise in the pathogen of interest.

Large and small commercial entities continue to move towards outsourcing when a technology or service capability is expensive to maintain, either due to limited use or level of specialization relative to the overall mandate of the company. For example, a company may have an adjuvant and may desire testing it against BSL-2 and BSL-3 agents. The company may have BSL-2 facilities, but it would not be profitable for the company to devote resources to building BSL-3 capacity. Similarly, for drug discovery, many small biotech companies have one lead compound, and in order to build their patent portfolio, they will seek services to define the use of their compound against an array of pathogens. Opportunities likely exist to partner with biotechnology to create a larger group effort that neither partner could manage alone. For example, most larger companies would rather the drug discovery aspects of a project be brought to the preclinical phase or to phase 1 prior to acquisition by licensing agreements. Companies may wish to partner under a right of first refusal for inventions discovered at the RBL.

State of Tennessee agencies, such as hospitals and public health laboratories, are likely to continue to use services that are provided by the RBL, such as the SARS CoV-2 variant sequencing performed for City of Memphis in FY21-FY22. These services include, but are not limited to, the growth of additional viruses and bacteria for identification (e.g., via sequencing, SNPs) from general population surveys, to developing new methods for isolating organisms for detection, or to providing a testing ground for new concepts in multiplexing pathogen detection arrays. In general, the RBL will seek to provide state-of-the-art technologies to facilitate public health in our state. The RBL can provide support for environmental surveys

for human and animal outbreaks of pathogens, and storage and tracking of select agents in order to provide the state with the ability to create panels for disease diagnosis and detection. This capacity is particularly important given that these labs are typically not allowed to store specimens after they are identified, if they are select agents.

B. Competitive Analysis

There are two national and 11 regional biocontainment facilities in the US. Because the RBL grants from the National Institute of Allergy and Infectious Diseases (NIAID) were used to build the facilities but did not supply any operational budget for the RBLs, it has become necessary for the UTHSC RBL, and all other RBLs, to identify several approaches for generating revenue to offset the considerable operational costs to staff and to maintain these facilities. The approaches include attracting federally-funded academic researchers, or private sector researchers, to perform their work in the RBL facilities, as well as contract, fee-for-service research conducted by RBL staff. There are a number of issues that have made it difficult to attract research activities to the UTHSC RBL:

1. Each of the RBLs are under the same financial pressures, and they can be in direct competition with each other for attracting research (e.g., the University of Alabama, Birmingham and the University of Louisville are direct competitors of the UTHSC RBL).
2. There are numerous other containment facilities around the country that are also competing for users/projects. Many of these facilities are located at academic institutions, and others are either commercial (e.g., Battelle) or are government-funded (e.g., Lawrence Livermore National Lab, and United States Army Medical Research Institute of Infectious Diseases, USAMRIID) operations. It is especially difficult to compete with large commercial and governmental laboratories because they are very well-staffed with research teams with dedicated expertise, and they have a wide array of core research facilities. Therefore, it is to our advantage to understand what other the RBLs and BSL-3 labs have to offer and to then focus on our unique strengths or areas that are not widely available. For example, host-pathogen systems biology (i.e., through ISHPS) is one of the areas that focuses on UTHSC's unique strengths.
3. Since the RBL was constructed, there has been a paucity of recruitment for researchers whose research programs require BSL-3/ABSL-3 containment laboratory space, and the university has failed to retain several funded researchers whose work required BSL-3/ABSL-3 containment.
4. Lack of dedicated project coordinator (i.e., "salesperson") with a virology background. Consulting with customers who want to use our services is essentially a full-time job. Our customers often need to be educated in the techniques we use, and then, most often, our standard procedures have to be customized to fit the client's particular project goals. No two projects are identical. Once a study design is agreed upon, quotes must then be generated

and research service agreements (RSAs) initiated within the university, which are highly customized for each client. These activities are time-consuming and we have lost clients when we cannot respond quickly enough.

Overall, external, academic (outside university) customers will typically be principal investigators who have been awarded a government grant or contract who do not have BSL-3 or ABSL-3 facilities, and/or have access to the specialized equipment managed locally at their institution.

C. Marketing Plans to Obtain New Business

For each of the "units" areas of service at the UTHSC RBL, we need to understand the value proposition to win "business". Each of the units within the RBL should, and will be, described with a snapshot of current capability, gaps and value proposition that explains:

- how our core capability and capacity solve customers' problems or improves their situation (relevancy)
- explains how our core capability and capacity delivers specific benefits (quantified value)
- tells the ideal customer why they should work with us and not with the competition (unique differentiation)

Overall value proposition

Relevancy:

The RBL is the only facility available to UTHSC or to external users in the Memphis area on a collaborative or fee-for-service basis that has the appropriate engineering controls, facilities and resources for BSL-3/ABSL-3 research. Agents that may cause serious or lethal disease through the inhalation route of exposure will benefit from the type of engineering controls, resources and facilities that the UTHSC RBL offers. As an academic, not for profit entity, our services cannot make a profit. This provides commercial partners with a low-cost alternative to a corporate research organization or CRO.

Unique differentiation:

The availability of unique in vitro assays and in vivo small animal models will deliver added value for customers. The RBL has developed a new full-service menu to support animal studies, from experimental design, to animal procurement, to a wide array of animal services, and after-life endpoints. The RBL will stand up a wide inventory of techniques in virology, bacteriology and immunology, with a focus on emerging infectious diseases and select agents, which will be an important discriminator with our competition.

Small Animal Model-Pathogen Evaluation Unit

Government and commercial clients will seek service partners that can provide a wide arrange of services. We have and will continue to position ourselves to

support clients in efficacy testing studies that provide them with critical capability that sets their studies apart and helps them evaluate their product fast. For example, we will help customers evaluate small molecules prior to embarking onto an efficacy study, so that they have the best information available on compound formulation, route of administration and animal model.

Pathogen and Molecular Discovery Unit

Relevancy:

The high throughput robotic instrumentation currently located in the BSL-3 is not widely available nationwide. Our goal will be to have highly trained staff that provide the highest quality of service in the shortest time for the lowest price. The RBL will provide services to improve assays to be ready for high throughput screening (HTS), offering highly qualified staff, reproducible results and a documented track record in this area advertised in new marketing materials.

To support this unit, we offer the Perkin-Elmer Janus HTS robots, an Envision multi-modal plate reader (Synergy 2), chemical libraries procured through partnerships and PI-based material transfer agreements and siRNA libraries.

Based on current vivarium staffing, the UTHSC could provide: two full-service animal studies every month with downstream in vitro analyses which can take up to eight weeks - Target: 10-12 studies per year. This is up from 8-10 studies in FY21.

The brand strategy is the long-term plan for the development of the “RBL” as a successful brand with the overall goal of being recognized as a collaborative unit and a center of excellence for conducting studies that lead to greater biological understanding of pathogenic organisms and approaches for evaluation of antivirals, therapeutics and vaccines. This is the major purpose of our brand.

To move forward in FY23, the core plans to utilize a mass promotion platform and to create promotional campaigns to achieve the following three aims on a regular basis. The first aim is to keep existing clients informed about new services, or updated prices, to increase the return rate, measured using a customer database. The second aim is to introduce the RBL services to potential new clients with targeted email campaigns customized for the potential client. Finally, the third aim is to increase visibility of the RBL to both internal and external customers (regional and national) with an email campaign containing general information that may include some of our “success” stories, highlighting our facility’s contributions to the COVID pandemic and to advertise our expertise and services.

VI. Budget

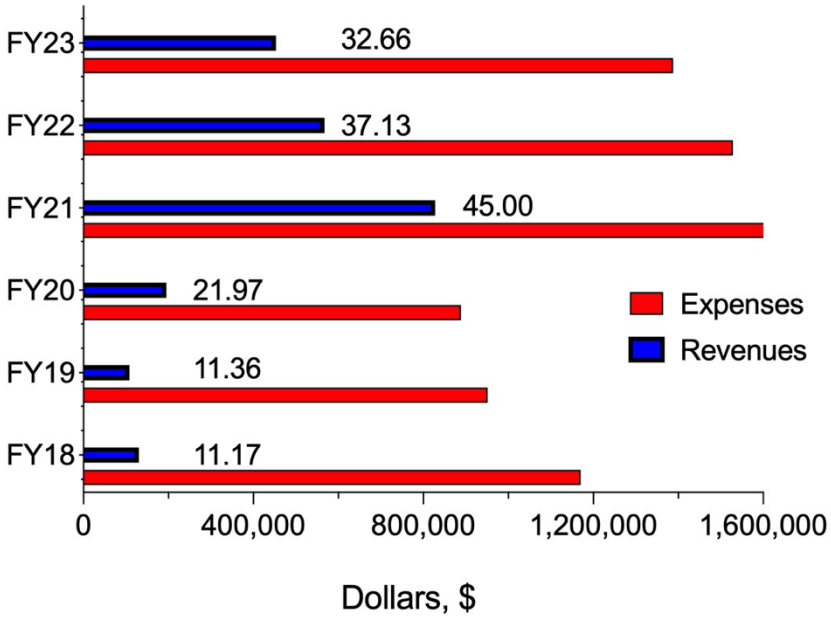
RBL – FY2023 Core Activities

FY2023	DEBITS	CREDITS
Salaries	772,022	
Supplies	340,782	
Service Contracts	128,777	
Equipment (> $5,000)	16,292	
Other Expenses*	130,163	
TOTAL EXPENSES	***1,388,036***	
FY23 Internal Recoveries		**453,318**
FY23 External Recoveries		**0**
TOTAL CREDITS		***453,318***
Income / (Subsidy)**	**(934,718)**	
FY23 State Appropriation	**906,516**	
Net Income/ (Subsidy)***	**(28,202)**	

*Other expenses consist of the following categories: Media/Communications, Travel, Maintenance/Repairs, Memberships, Copier Rental, and Registration Fees.

**Subsidy, % before State Appropriation 68%
***Subsidy, % after State appropriation 2%

VI. Historical Revenues and Expenses, FY17-FY23



Expenses (red bars) and revenues (blue bars) are shown for each FY since FY18, when Dr. Jonsson was appointed the RBL Director. The numbers beside the blue bar indicate the percentage of total expenses covered by the revenues that are generated by service fees. The state appropriation/budget subsidy allocated to the core is not reflected in this figure.

Medicinal Chemistry Core (MedChem) Institutional Research Core Facility Analysis Report – FY23

Written by Jiawang Liu, PhD; Natalie Smith, MS; and Tiffany Seagroves, PhD

1. Relative to a specific core's mission, is the designation as an "institutional core" appropriate?

The MedChem Core's designation as an institutional core is appropriate since it served six UTHSC laboratories across five departments and three colleges (COM, CON, and COP), and three external users located in South Korea (Pusan National University, PNU), New York (Kodikaz Therapeutic Solutions), and Louisiana (Louisiana Cancer Research Consortium).

2. Does the core pass the multi-departmental, multi-investigator litmus test?

Yes. In FY23, this core processed custom synthesis projects and performed analytical services for six unique laboratories across five departments and three colleges (COM, CON, and COP). The top five users of the core, based on the percentage of service fees invoiced for completed services were: 1) Dr. Il-Ho Jang (PNU, external, 30.4%), 2) Dr. Gabor Tigyi (Physiology, COM, 25.1%), 3) Dr. Yaguang Xi (Louisiana State University, external, 14.8%), 4) Dr. Qi Zhao (Preventive Medicine, COM, 14.0%), and 5) Dr. Kirk Hevener (Pharmaceutical Sciences, COP, 5.2%). The other users accounted for 10.5% of core invoices.

3. Is there sufficient intra- and inter-departmental use and if not, why?

Yes. Six unique laboratories were served across five departments and three colleges. Current internal use is almost evenly divided among the COM, CON, and COP.

4. Can the services for the core be outsourced more economically?

No. The services available through an academic core facility are more economical than use of commercial vendors.

5. Are there unaccounted benefits beyond fiscal consideration to warrant continued institutional underwriting? (e.g., grants funded through investigator use, publications, etc.)?

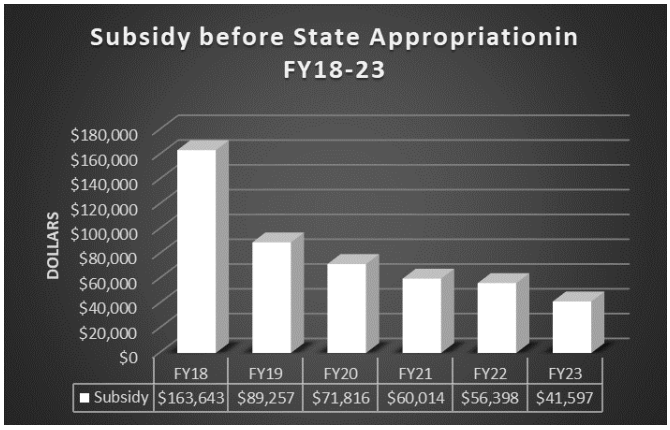
Yes. **1)** The core director's salary (35%) was partially offset in FY23 by three awarded NIH RO1 projects and one awarded NIH U19 project that require core services. **2)** The director participated in submission of an NIH R61 proposal as multi-PI (15% effort) in FY23, and the grant was awarded in August of 2023. **3)** The director participated in preparation of two other NIH grant applications as either co-Investigator or multi-PI in FY23; of these, one NIH RO1 grant and one NIH STTR/SBIR grant were under review at the time of this report. **4)** The director provided seven letters of support for new grant applications on behalf of six unique investigators. **5)** The core supported 19 publications, including one with the director as a co-author, and 6 grants.

6. Is the core currently self-sufficient or is it subsidized by the institution?

In FY23, the core was subsidized by the institution. Overall, FY23 ended with a net subsidy required of $35,761 (45%).

Accomplishments in FY23

- The institutional subsidy required to operate the core after initial budget appropriations has decreased each FY since the core was established.



- In FY23, the core hired a new staff member, Mr. Yijiang Jia, supported by federal funding.
- In FY23, the core supported three NIH RO1 awards and one NIH U19 award; for these awards, the director was listed as co-investigator and there was dedicated salary support.
- In FY23, the director participated in the preparation of three NIH proposals as either a compensated co-Investigator, or as a multi-PI. One NIH R61 proposal was awarded. Thus, core director's salary will be offset in FY24 by a total of three awarded NIH RO1 projects, one NIH U19 project, and one NIH R61 project.

Financial Overview – FY23:

TOTALS	FY18	FY19	FY20	FY21	FY22	FY23
Revenues	13,833	30,181	13,730	36,370	15,545	39,187
Expenses	(92,725)	(119,438)	(85,546)	(96,384)	(71,943)	(80,784)
Income (Subsidy)	1,108	(89,257)	(71,816)	(60,014)	(56,398)	(41,597)
Other Costs	84,752	0	0	0	0	0
Income (Subsidy)	(163,643)	(89,257)	(71,816)	(60,014)	(56,398)	(41,597)
State Appropriation	0	0	0	26,070	6,941	5,846
Net Income (Subsidy)	(163,643)	(89,257)	(71,816)	(33,944)	(49,457)	(35,751)
Subsidy, % before State Appropriation	---	75%	84%	62%	78%	52%
Subsidy, % after State Appropriation	92.2%	75%	84%	35%	69%	45%

7. Suggested outcomes: It is recommended that MedChem should continue to operate as an institutional core facility.

Medicinal Chemistry (MedChem) Institutional Core Facility
Summary of Institutional Core Activities for FY23

Written by Jiawang Liu, PhD; Natalie Smith, MS; and Tiffany Seagroves, PhD

I. PUBLICATIONS (Journal publication dates: July 1, 2022 to June 30, 2023)
Full-length published articles (UTHSC investigators are indicated in bold; the core staff are underlined)

Banerjee S, Lee S, Norman DD, **Tigyi GJ**. Designing Dual Inhibitors of Autotaxin-LPAR GPCR Axis. Molecules. 2022 Aug 26;27(17):5487. doi:10.3390/molecules27175487. PMID: 36080255; PMCID: PMC9458164.

Yu Y, Li W, **Jiang J**. TRPC channels as emerging targets for seizure disorders.Trends Pharmacol Sci. 2022 Sep;43(9):787-798. doi: 10.1016/j.tips.2022.06.007.Epub 2022 Jul 12. PMID: 35840362; PMCID: PMC9378536.

Almeida C, Pongilio RP, Móvio MI, Higa GSV, Resende RR, **Jiang J**, Kinjo ER, Kihara AH. Distinct Cell-specific Roles of NOX2 and MyD88 in Epileptogenesis. Front Cell Dev Biol. 2022 Jul 4;10:926776. doi: 10.3389/fcell.2022.926776. PMID:35859905; PMCID: PMC9289522.

Hou R, Yu Y, **Jiang J**. Prostaglandin E2 in neuroblastoma: Targeting synthesis or signaling? Biomed Pharmacother. 2022 Dec;156:113966. doi:10.1016/j.biopha.2022.113966. Epub 2022 Nov 3. PMID: 36411643; PMCID:PMC9682161.

Zhao Q, Khedkar SV, Johnson KC. Weight Loss Interventions and Skeletal Health in Persons with Diabetes. Curr Osteoporos Rep. 2022 Oct;20(5):240-248. doi:10.1007/s11914-022-00744-9. Epub 2022 Aug 30. PMID: 36040543; PMCID: PMC9522834.

Mitachi K, Mingle D, Effah W, Sánchez-Ruiz A, **Hevener KE**, Narayanan R, Clemons WM Jr, Sarabia F, Kurosu M. Concise Synthesis of Tunicamycin V and Discovery of a Cytostatic DPAGT1 Inhibitor. Angew Chem Int Ed Engl. 2022 Aug1;61(31):e202203225. doi: 10.1002/anie.202203225. Epub 2022 Jun 10. PMID:35594368; PMCID: PMC9329268.

Jiang J, Yu Y. Pharmacologically targeting transient receptor potential channels for seizures and epilepsy: Emerging preclinical evidence of druggability. Pharmacol Ther. 2023 Apr;244:108384. doi:10.1016/j.pharmthera.2023.108384. Epub 2023 Mar 16. PMID: 36933703; PMCID:PMC10124570.

Liu H, Lin X, Gong R, Shen H, Qu Z, **Zhao Q**, Shen J, Xiao H, Deng H. Identification and Functional Characterization of Metabolites for Skeletal Muscle Mass in Early Postmenopausal Chinese Women. J Gerontol A Biol Sci Med Sci. 2022 Dec

29;77(12):2346-2355. doi: 10.1093/gerona/glac075. PMID: 35352111;PMCID: PMC9799191.

Hussey MR, Enquobahrie DA, Loftus CT, MacDonald JW, Bammler TK, Paquette AG, Marsit CJ, Szpiro AA, Kaufman JD, LeWinn KZ, Bush NR, Tylavsky F, **Zhao Q**, Karr CJ, Sathyanarayana S. Associations of prenatal exposure to NO_2 and near roadway residence with placental gene expression. Placenta. 2023Jul;138:75-82. doi: 10.1016/j.placenta.2023.05.004. Epub 2023 May 14. PMID:37216796; PMCID: PMC10349584.

Gu M, Yu Y, Xue M, **Jiang J**, Cai J. The discovery of cyclic γ-AA peptides as the promising ligands targeting EP2. Bioorg Med Chem Lett. 2023 May 1;87:129255.doi: 10.1016/j.bmcl.2023.129255. Epub 2023 Mar 23. PMID: 36965536; PMCID:PMC10141659.

Norseeda K, Bin Aziz Pavel F, Rutherford JT, Meer HN, Dureja C, Hurdle JG, **Hevener KE**, Sun D. Synthesis and evaluation of phenylimidazole FabK inhibitors as new Anti-C. Difficile agents. Bioorg Med Chem. 2023 Jun 6;88-89:117330. doi:10.1016/j.bmc.2023.117330. Epub 2023 May 16. PMID: 37224699.

Hu Z, Han L, **Liu J**, Fowke JH, Han JC, Kakhniashvili D, LeWinn KZ, Bush NR, Mason WA, **Zhao Q**. Prenatal metabolomic profiles mediate the effect of maternal obesity on early childhood growth trajectories and obesity risk: the Conditions Affecting Neurocognitive Development and Learning in Early Childhood (CANDLE)Study. Am J Clin Nutr. 2022 Nov;116(5):1343-1353. doi: 10.1093/ajcn/nqac244.Epub 2023 Feb 10. PMID: 36055779; PMCID: PMC9630879.

Guo H, Zhang W, Wang J, Zhao G, Wang Y, Zhu BM, Dong P, Watari H, Wang B, LiW, **Tigyi G**, Yue J. Cryptotanshinone inhibits ovarian tumor growth and metastasis by degrading c-Myc and attenuating the FAK signaling pathway. Front Cell DevBiol. 2022 Sep 28;10:959518. doi: 10.3389/fcell.2022.959518. PMID: 36247016;PMCID: PMC9554091.

Su KJ, Chen XY, Gong R, **Zhao Q**, Hu SD, Feng MC, Li Y, Lin X, Zhang YH, Greenbaum J, Tian Q, Shen H, Xiao HM, Shen J, Deng HW. Systematic metabolomic studies identified adult adiposity biomarkers with acetyl glycine associated with fat loss in vivo. Front Mol Biosci. 2023 Apr 14;10:1166333. doi:10.3389/fmolb.2023.1166333. PMID: 37122566; PMCID: PMC10141311.

Miao J, Regan J, Cai C, **Palmer GE**, Williams DL, Kruppa MD, Peters BM. Glycogen Metabolism in Candida albicans Impacts Fitness and Virulence during Vulvovaginal and Invasive Candidiasis. mBio. 2023 Apr 25;14(2):e0004623. doi:10.1128/mbio.00046-23. Epub 2023 Feb 22. PMID: 36840583; PMCID: PMC10127583.

Kruger L, Yue G, Paquette A, Sathyanarayana S, Enquobahrie DA, Bammler TK, MacDonald J, **Zhao Q**, Prasad B. An optimized proteomics-based approach to estimate

blood contamination and cellular heterogeneity of frozen placental tissue. Placenta. 2023 Jan;131:111-118. doi: 10.1016/j.placenta.2022.12.007.Epub 2022 Dec 23. PMID: 36584637; PMCID: PMC9912121.

Barrett ES, Workman T, Hazlehurst MF, Kauderer S, Loftus C, Kannan K, Robinson M, Smith AK, Smith R**, Zhao Q**, LeWinn KZ, Sathyanarayana S, Bush NR. Prenatal polycyclic aromatic hydrocarbon (PAH) exposure in relation to placental corticotropin releasing hormone (pCRH) in the CANDLE pregnancy cohort. Front Endocrinol (Lausanne). 2022 Nov 11;13:1011689. doi: 10.3389/fendo.2022.1011689.PMID: 36440232; PMCID: PMC9691680.

Yasmen N, Sluter MN, Yu Y, **Jiang J**. Ganaxolone for management of seizures associated with CDKL5 deficiency disorder. Trends Pharmacol Sci. 2023Feb;44(2):128-129. doi: 10.1016/j.tips.2022.11.007. Epub 2022 Dec 12. PMID:36517284; PMCID: PMC10031766.

Sluter MN, Bhuniya R, Yuan X, Ramaraju A, Chen Y, Yu Y, Parmar KR, Temrikar ZH, Srivastava A, Meibohm B, **Jiang J**, Yang CY. Novel, Brain-Permeable, Cross-Species Benzothiazole Inhibitors of Microsomal Prostaglandin E Synthase-1(mPGES-1) Dampen Neuroinflammation In Vitro and In Vivo. ACS Pharmacol Transl Sci. 2023 Mar 21;6(4):587-599. doi: 10.1021/acsptsci.2c00241.PMID: 37082746; PMCID: PMC10111624.

II. PRESENTATIONS GIVEN TO PROMOTE CORE USAGE

02/21/2023: Internal Advisory Board Meeting, “Five-Year Performance Review of the MedChem Core.”

III. SUMMARY OF ACTIVITIES

A. Personnel

Director: Jiawang Liu, PhD (100% effort)

B. Oversight Committee (Internal Advisory Board)

The following faculty were members of the FY23 Medicinal Chemistry Internal Advisory Board:

Wei Li, PhD (Pharmaceutical Sciences, COP), *CHAIR*
Bernd Meibohm, PhD (Pharmaceutical Sciences, COP)
Duane Miller, PhD (Pharmaceutical Sciences, COP)
Ramesh Narayanan, PhD (Pathology, COM)
Gabor Tigyi, PhD (Physiology, COM)

C. Equipment

Equipment currently maintained in the core facility (all functional):

Equipment:	Cost:	Funding Source:	Purchase Date:
Flash column system	$52,857	Office of Research	10/01/2017
Microwave Reactor	$19,967	Office of Research	10/01/2017
Rotation Evaporator	$5,000	Office of Research	08/01/2020
Labconco Freeze Dry System	$2,000	Office of Research	08/01/2020
-80 °C Ultra-Low Freezer	$8,653	Office of Research	10/12/2020
Janus High Throughput Robot	NA	Office of Research	04/20/2023

D. Service Contracts

No service contracts were purchased in FY23 for equipment maintenance.

E. Usage Volume

Usage Volumes, FY23, for invoiced completed projects

By PI Name (Department):	Total Service Fees:	Percentage of Internal Use:
Gabor Tigyi (Physiology)	$9,849.38	25.1%
Glen Palmer (Clinical Pharmacy & Translational Science)	$900.32	2.3%
Jianxiong Jiang (Pharmaceutical Sciences)	$1,575.58	4.0%
Keesha Roach (Community and Population Health)	$1,350.60	3.4%
Kirk Hevener (Pharmaceutical Sciences)	$2,037.00	5.2%
Il-Ho Jang (Pusan National University)	$11,895.16	30.4%
Lei Feng (Kodikaz Therapeutic Solutions)	$303.92	0.8%
Qi Zhao (Preventive Medicine)	$5,470.84	14.0%
Yaguang Xi (Louisiana Cancer Research Consortium)	$5,804.32	14.8%
TOTAL INVOICED, FY23	**$39,187**	100.00%

Revenues by Department, FY23

Department	Total Charges	Percentage of Total Internal Use
COM		
Physiology	$9,849.38	25.1%
Preventive Medicine	$5,470.84	14.0%
CON		
Community and Population Health	$1,350.60	3.4%
COP		
Clinical Pharmacy and Translational Science	$900.32	2.3%
Pharmaceutical Sciences	$3,612.58	9.2%
External		
Pusan National University	$11,895.16	30.4%
Kodikaz Therapeutic Solutions	$303.92	0.8%
Louisiana Cancer Research Consortium	$5,804.32	14.8%
Total	**$39,187**	100.0%

F. FY23 Service Fee Structure

Fees for services were developed by the director based on a market-based comparison of peer academic institutions and placement in the bottom-half to the bottom-third tier relative to peer academic institutions.

i.) Core Support Services

Service Code	Service Description	Price, $
P010	Support letter	No charge
P020	Experimental design/outline	No charge
P030	Chemical structure figure and synthetic route scheme	No charge
P040	3D Protein and ligand images	No charge

ii.) Research Strategy Assistance

Service Code	Service Description	Price, $
R010	Literature search for compounds	No charge
R020	Literature search for targets or pathways	No charge
R030	Oral literature search report	No charge

R040	Well-written, literature search report provided in Word (Font: Arial; 12; Page size; Letter)	$56.28/page
R050	Synthetic route design	$22.51/reaction
R060	Drug screening method determination	$112.56/method

iii.) Small Molecule Synthesis

Service Code	Service Description	Price, $
S010	Reaction (10 – 500 mg)	$33.76/hour *
S014	Reaction (0.5 – 1.0 gram)	$33.76/hour *
S020	General workup (10 – 500 mg)	$135.06/step
S024	General workup (0.5 – 1.0 gram)	$225.11/step
S030	Column chromatography (10 – 500 mg)	$135.06/step
S034	Column chromatography (0.5 – 1.0 gram)	$225.11/step

* The maximum charge for a reaction is $270.08 (8 hours).

iv.) Instrumental Analysis services:

Service Code	Service Description	Price, $
S040	^{1}H and ^{13}C NMR	$45.02/sample
S050	MS (ESI) or LC/MS	$45.02/sample
S055	HPMS	$45.02/sample
S060	Melting point	No Charge
S070	Specific rotation	No Charge

Service fee calculation examples:

A typical 5-step synthesis project (0.5-1 gram):
[$33.76/hour x 6 hours (mean reaction time for one reaction) + $225.11/step x 2 steps + $45.02/analytical assay x 2 assays = $742.8/step] x 5 steps = $3,714 + costs of starting materials and special reagents.

A typical 5-step synthesis project (20-50 mg):
[$33.76/hour x 6 hours (mean reaction time for one reaction) + $135.06/step x 2 steps + $45.02/analytical assay x 2 assays = $562.7/step] x 5 steps = $2,813.5 + costs of starting materials and special reagents.

Note: The example service fee for a 5-step synthesis protocol does not include the costs of starting materials, anhydrous solvents, or any special reagents. Users must pay for these costs before synthesis services are initiated. A list of common solvents and regular reagents that are included in service fees is provided to core customers prior to initiation of services.

v.) Write-ups for Reports, Publications, and other Purposes

Service Code	Service Description	Price, $
W010	Write-up for publication(s), including supporting information (Times New Roman, 11; Double spacing; Letter)	$112.56/page
W020	Compound identity and purity report	No charge
W030	NMR and MS spectrum copy	No charge

vi.) Chemical Mailing and Processing Services

Service Code	Service Description	Price, $
M010	Product handling and delivery fee	No charge (internal) $56.28 (domestic) $225.11 (intl.)
M020	Starting material quotation	No charge
M030	Chemical storage and processing	No charge

In addition to these fee-for-service options, the following services are provided to UTHSC investigators at no charge:

1) Face-to-face initial consultation with investigators on needs related to their grant applications and/or proposed experimental design. Extended consultations incur an hourly service fee.
2) Seminars and workshops provided to campus in order to advertise the services and expertise offered by the core.

IV. GRANTS SUPPORTED BY THE CORE, FY233

A. Current Grants and Contracts that Supported the Core in FY23

Grants that provided salary coverage for the Director, FY23
Quarles, L. Darryl
USPHS NIH Grant DK-121132, Optimization of Novel Small Molecules to Antagonize FGF-23

Zhao, Qi & Shen, Hui
USPHS NIH Grant AG-061917, Identification of Metabolomic Profiles for Sarcopenia Traits in Older Whites and Blacks (10% effort for Dr. Liu)

Zhao, Qi & Johnson, Karen
USPHS NIH Grant AG-068232, Intensive Lifestyle Intervention, Metabolomics, and Risk of Frailty Fracture in Overweight or Obese Patients with Type 2 Diabetes. (10% effort for Dr. Liu)

Zhao, Qi
NIH/NIDDK 1R01DK134937-01, Prenatal Longitudinal Metabolomics Profiling for Early Childhood Growth Trajectories and Obesity Risk in a US Biracial Birth Cohort (5% effort for Dr. Liu)

Deng, Hong-Wen (Tulane University Medical School, External),
NIH 2U19 AG055373-06A1, Comprehensive metabolomics study of osteoporosis (15% effort for Dr. Liu)

Grants Supported by the Core Facility (for Services in FY23):

Tigyi, Gabor
University of Maryland Subcontract to USPHS AI-150574, Intercollaborative Radiation Countermeasure (INTERACT) Consortium for Advanced Development of Medical Countermeasures to Mitigate/Treat Acute and Delayed Radiation Syndromes

Zhao, Qi
USPHS Grant AG-068232, Intensive Lifestyle Intervention, Metabolomics, and Risk of Frailty Fracture in Overweight or Obese Patients with Type 2 Diabetes

Tulane University Subaward to USPHS AG-055373, Trans-omics Integration of Multi-omics Studies for Osteoporosis

Jiang, Jianxiong
USPHS Grant NS-100947, Inflammatory regulation of neurotrophin signaling in epileptogenesis

Hevener, Kirk
Department of Defense Grant W81XWH2010296, Development and evaluation of inhibitors of the C. difficile enzyme, FabK, as microbiome-sparing antibacterials

Palmer, Glen
USPHS Grant AI-156611, Examining the importance of folate biosynthetic enzymes in infectious fungi

Roach, Keesha
USPHS Grant HL-153210, Contributions of biopsychosocial factors in sickle cell disease pain

B. Newly Awarded Grants in FY23
Jiang, Jianxiong & Liu, Jiawang
NIH/NINDS 1R61NS130199-01A1, EP2 Antagonists for Ischemic Stroke (15% effort for Dr. Liu)

C. Letters of Support that were Provided for Grant Applications:

Seven letters of support were written in support of grant applications on behalf of four internal investigators, Drs. Brian Peters, Jianxiong Jiang (2 applications), Kirk Hevener, Ying Yu, and Zhousheng Xiao, and one external investigator, Dr. Yaguang Xi (Louisiana State University).

D. MedChem Pending Grant Applications in FY23

- **Jianxiong Jiang** (Pharmaceutical Sciences, COP), NIH, "Targeting EP2 in neuroblastoma". ***Under-review*** (includes 15% effort for core director)
- **Zhousheng Xiao** (Medicine, COM) "Advancing Small Molecule FGF-23 Antagonists to Treat Disorders of FGF-23 Excess". ***Under-review***

V. BUSINESS DEVELOPMENT

A. Market Assessment

The MedChem Core is defined as an institutional core based on its service to faculty in all four colleges and multiple departments within UTHSC. The potential customers for our user base include UTHSC, other UT campuses, the University of Memphis, the VA, LeBonheur Children's Hospital, and other commercial and academic partners in the Memphis metropolitan area. During its first six fiscal years of operations (FY18-FY23), the core has provided services to 35 UTHSC investigators, 6 external investigators, 2 pharmaceutical companies (GTx and Kodikaz) and a Korean institute, Pusan National University (PNU). Based on Director Dr. Liu's expertise and achievements in medicinal chemistry and analytical chemistry, it is also likely that, over time, more external users will begin to use our core at UTHSC.

Development of New Core Services
In FY20-FY21, the core established a mature small-molecule quantitative analysis platform based on LC-MS/MS techniques. These services were developed to serve researchers who could not have their needs met through instrumentation housed in the Proteomics and Metabolomics Core (PMC), which also included the Metabolic Phenotyping Mass Spectrometry (MPMS) unit. However, the MPMS

unit closed at the end of FY23. The MedChem Core purchased HPLC/UPLC columns (including an analytical chiral column) and essential small equipment (<$3,000), such as an Eppendorf micro centrifuge, a 24-well evaporator manifold, and a Buchi V-300 vacuum pump. In FY21, the core also purchased a -80 degree freezer to stock cell and plasma samples provided by investigators for analysis.

Small Molecule Quantitative Analysis Service Milestones

1. In FY19, the core performed the first metabolite analysis case to detect one metabolite in cell suspensions. (Dr. Ying Kong, COM)
2. In FY20, the core completed quantitation of three metabolites in various yeast cells. (Dr. Glen Palmer, COP)
3. In late FY20, the core started a long-term project with Dr. Qi Zhao (COM) to analyze 30 metabolites in frozen human plasma, which will provide an estimated >$10,000 in core recoveries per year during FY21-24.
4. In FY21, the core finished a purity analysis project on a drug candidate in aqueous formulation. (Leonard Lothstein, Pathology, COM)
5. In FY21, the core completed the stability analysis of FGF-23 antagonists. (Zhousheng Xiao, Medicine, COM)
6. In FY21, the core performed a pharmacokinetic study of a drug candidate. (Tauheed Ishrat, Anatomy and Neurobiology, COM)
7. In FY22, the core completed the stability assay service for 9 antifungal drugs. (Dr. Glen Palmer, COP)
8. In FY23, the core completed the stability assay service for the drug candidate, Amgen-35. (Dr. Gabor Tigyi, Physiology, COM)

Thus, the core is now capable of providing a complete LC-MS/MS-based quantitative analysis platform, including small-molecule quantitation, purity and stability analysis, and pharmacokinetic analysis.

Since FY23, the core has provided the services of bio-assays and drug screening.

New Bio-Assay Service Milestones

1. In FY23, the core completed a 50-sample ELISA analysis for Dr. Keesha Roach (Community and Population Health, CON)
2. In FY23, the core completed an aliquot service for 5,000 plasma samples (Dr. Qi Zhao, Preventive Medicine, COM)

B. Competitive Analysis

The Medicinal Chemistry Core is essential to the campus to support drug discovery efforts and all basic, pre-clinical, clinical and translational research that impacts human disease and treatment. The core plays a key role in providing the chemistry platform to support faculty members' external grant submissions. In the first five FY of operation, the core has assisted UTHSC investigators with multiple grant submissions, resulting in 4 awarded NIH RO1 grants, 1 awarded NIH U19 grant, and 1 awarded NIH R61 grant. The core is also critical for the successful

hiring of faculty interested in Precision Medicine and Translational Medicine. The MedChem Core offers value-added services that include the scientific expertise and breadth of training of the director, quick turnaround time, and state-of-the-art instrumentation that most core facilities in the United States have not yet adopted.

C. Marketing Plans to Obtain New Business

A primary focus of the Medicinal Chemistry Core in FY24 will be to expand the advertisement of core services to the UTHSC campus, throughout the Memphis Medical Center and throughout the University of Tennessee system. The core director has presented in the Hot Topics in Research seminar series, locally advertised on the campus. The core also participated in the annual Office of Research "Research Resource Fair" last held in September of 2023, and in special technology seminars focused on advances in drug discovery and development. These activities will be supported by updating the core website by the Office of Research to include publications and grants supported by the core, and the new metabolite service. To maintain expertise and to remain current in evolving medicinal chemistry technologies, the director will attend regional and national meetings, such as conferences sponsored by the American Chemical Society and the American Association for Cancer Research. Attendance at those meetings will also be a venue for advertisement of the Medicinal Chemistry Core at the regional/national levels since the core facility will be advertised in all posters or oral presentations made by the director. The MedChem Core will also be advertised at annual meetings of the Southeastern Association of Shared Resources (SEASR) since UTHSC is a recurring institutional sponsor of this meeting.

D. Forecasted Volumes for New Business

The subsidy before any state appropriation of $5,846 in FY23 was $41,597, which is 26% lower than the subsidy required to operate in FY22 ($56,398). Based upon the current core performance year to date as posted in iLab (Q1, FY24), the core predicts more than 50% increase in revenues in FY24 over FY23, suggesting that the net subsidy will decrease again in FY24.

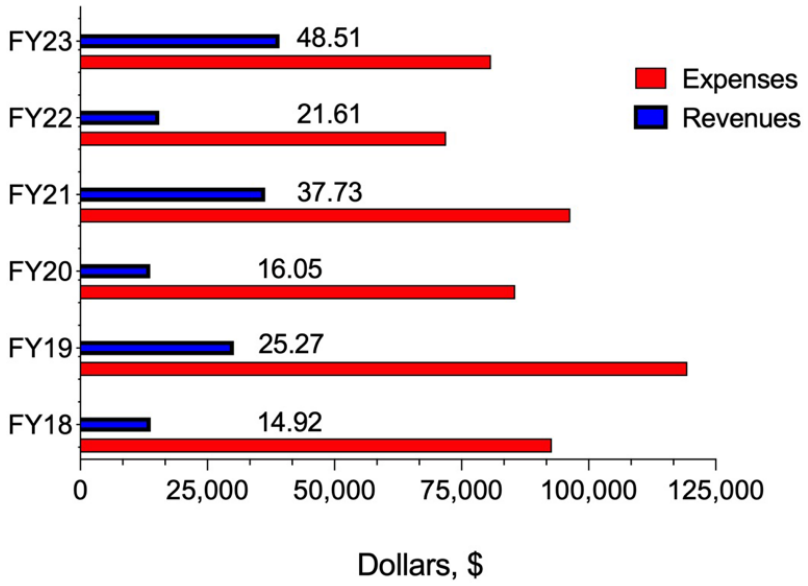
VI. Actual Budget – FY23: (July 1, 2022 to June 30, 2023)
MEDCHEM – FY2023 Core Activities

	DEBITS	CREDITS
Salaries	66,955*	
Supplies	13,829	
Service Contracts	0	
Equipment (> $5,000)	0	
Other Expenses	0	
TOTAL EXPENSES	***80,784***	
FY23 Internal Recoveries		21,184
FY23 External Recoveries		18,003
TOTAL CREDITS		***39,187***
Income / (Subsidy)	(41,597)	
State Appropriation	5,846	
Net Income / (Subsidy)	**(35,751)**	

*A portion of Dr. Jiawang Liu's salary was paid from Dr. Jianxiong Jiang's grant (15%) and Dr. Qi Zhao's grants (35%).

Subsidy, % before state appropriation 52%
Subsidy, % after state appropriation 45%

VII: Historical Revenues and Expenses, FY18-FY23



Expenses (red bars) and revenues (blue bars) are shown for each FY since FY18. The numbers beside the blue bar indicate the percentage of total expenses covered by the revenues that are generated by service fees. The state appropriation/budget subsidy allocated to the core is not reflected in this figure.

Molecular Resource Center of Excellence (MRC) Institutional Research Core Facility Analysis Report- FY23

Written by William Taylor, PhD; Zoe Brookover, Natalie Smith, MS; and Tiffany Seagroves, PhD

1. Relative to a specific core's mission, is the designation as an "institutional core" appropriate?

The MRC core designation as an institutional core is appropriate since it served 65 total users (64 internal and 1 external) across 17 departments and four colleges.

2. Does the core pass the multi-departmental, multi-investigator litmus test?

Yes. In FY23, this core processed 9,502 service units for four colleges (COM, COP, COHP, and COD). The MRC also served one external user from the University of Memphis. The internal departments with the largest number of unique users were Pharmacology and Genetics, Genomics, and Informatics (GGI), each with 9 users, and Physiology, with 7 users. The top five users accounted for 61.26% of total core service revenues for work completed in FY23. These investigators were: 1) Robert Williams (CGI, COM, 16.56%), 2) Jonathan Jaggar (Physiology, COM, 15.03%), 3) Hao Chen (Pharmacology, COM, 13.06%), 4) Ramesh Narayanan (Medicine, COM, 8.66%), and 5) Radhakrishna Rao (Physiology, COM, 7.98%). The remaining core users accounted for the other 38.74%.

3. Is there sufficient intra- and inter-departmental use and if not, why?

Yes. There were 64 unique internal users who were served across 17 departments and four colleges at UTHSC.

4. Can the services for the core be outsourced more economically?

Yes and No. For services other than NGS projects, the MRC offers the most competitive pricing. However, frequently, NGS services can be outsourced at deep discounts from commercial vendors that offer high-throughput sample processing versus the medium-throughput platform available at the MRC. However, specialized projects or those that require in-depth, optimization or troubleshooting have had more success when processed in-house at the MRC. The MRC continues to complete NGS services locally at the MRC, primarily those investigators with turnaround time constraints, or who have data sharing privacy concerns since several vendors ship samples to Asia for processing. In Q4 of FY2022, the MRC entered into an agreement to trade the NextSeq500 instrument for a NextSeq2000 instrument. The changes in instrumentation, which greatly increased throughput did reduce the pricing of NGS services in FY23, however, in-house project costs still exceed commercial vendor pricing. The latest competitor to Illumina's NGS market share that has a rapid adoption rate by core facilities is the Aviti sequencer sold by Element Biosciences, which offers the most price-competitive sequencing to the Illumina platform, ~35% less expensive than Illumina. Acquisition of the Aviti instrument in FY24 is a high priority need for the MRC to remain competitive on pricing for NGS, while generating the same data quality as produced on the Illumina platform.

5. Are there unaccounted benefits beyond fiscal consideration to warrant continued institutional underwriting (e.g., grants funded through investigator use, publications, etc.)?
Yes. In FY23, core activities led to 151 PubMed-indexed publications. Seventy-one extramural grants and contract awards were supported by the MRC. In addition, Dr. Taylor provided expert consultation for over 75 proposed projects. Dr. Taylor and the MRC staff provided hands-on training in molecular technologies to >20 new core users, primarily new students, residents and/or postdocs. Additionally, the MRC provided support letters for 10 investigators for a total of 10 total grant proposals.

6. Is the core currently self-sufficient, or is it subsidized by the institution?
Yes, the core is currently self-sufficient. In FY23 the core was subsidized by the THEC appropriation as a state-funded Center of Excellence. FY23 ended with a net income of $4,995, to be rolled over into the FY24 budget allocated by THEC.

Accomplishments this past year:
- The MRC director provided >75 experimental design consultations for clients.
- The MRC core supported 151 publications, and 71 grants and contracts.
- The MRC negotiated deep discounts to IlluminaNextSeq2000 reagents and kits, providing an ~30% discount for NGS projects in Q4 of FY23 through FY24.

MRC – FY2023 Core Analysis

TOTALS	FY17	FY18	FY19	FY20	FY21	FY22	FY23
Revenues	408,427	264,401	267,645	153,950	167,409	204,424	137,326
Expenses	1,033,779	853,184	850,757	801,773	854,536	844,129	(820,661)
Income (Subsidy)	(625,352)	(588,783)	(583,112)	(647,823)	(687,127)	(639,705)	(683,335)
Other Costs*	100,651	0	0	0	0	0	0
Income (Subsidy)	(726,003)	(588,783)	(583,112)	(647,823)	(687,127)	(639,705)	(683,335)
THEC Appropriation*	602,887	620,121	632,516	696,094	696,098	673,793	688,330
Net Income (Subsidy)	(123,116)	31,338	49,404	48,271	8,971	34,088	4,995
Subsidy, % after THEC Appropriation	10.8%	--	--	--	--	--	--

*Includes rollover of THEC appropriation from prior FY.

7. Suggested outcomes:

It is recommended that the MRC continue as an institutional core.

Molecular Resource Center of Excellence (MRC) Core
Summary of Institutional Core Activities for FY23
(July 1, 2022- June 30, 2023)

Written by William Taylor, PhD; Natalie Smith, MS; and Tiffany Seagroves, PhD

I. A. PUBLICATIONS (Full-length published articles: Journal publication dates: July 1, 2022 to June 30, 2023; UTHSC investigators invoiced are bolded; core director is underlined).

Bou Sleiman M, Roy S, Gao AW, Sadler MC, von Alvensleben GVG, Li H, Sen S, Harrison DE, Nelson JF, Strong R, Miller RA, Kutalik Z, **Williams RW**, Auwerx J.Sex- and age-dependent genetics of longevity in a heterogeneous mouse population. Science. 2022 Sep 30;377(6614): eabo3191. doi:10.1126/science.abo3191. Epub 2022 Sep 30. PMID: 36173858; PMCID: PMC9905652.

Karki R, Lee S, Mall R, Pandian N, Wang Y, Sharma BR, Malireddi RS, Yang D, Trifkovic S, Steele JA, Connelly JP, Vishwanath G, Sasikala M, Reddy DN, Vogel P, Pruett-Miller SM, Webby R, **Jonsson CB**, Kanneganti TD. ZBP1-dependent inflammatory cell death, PANoptosis, and cytokine storm disrupt IFN therapeutic efficacy during coronavirus infection. Sci Immunol. 2022 Aug 26;7(74): eabo6294.doi: 10.1126/sciimmunol.abo6294. Epub 2022 Aug 26. PMID: 35587515; PMCID: PMC9161373.

Earley CJ, **Jones BC**, Ferré S. Brain-iron deficiency models of restless legs syndrome. Exp Neurol. 2022 Oct; 356:114158. doi: 10.1016/j.expneurol.2022.114158.Epub 2022 Jun 30. PMID: 35779614; PMCID: PMC9357217.

Thiyagarajan T, Ponnusamy S, Hwang DJ, He Y, Asemota S, Young KL, Johnson DL, Bocharova V, Zhou W, Jain AK, Petricoin EF, Yin Z, Pfeffer LM, Miller DD, **Narayanan R**. Inhibiting androgen receptor splice variants with cysteine-selective irreversible covalent inhibitors to treat prostate cancer. Proc Natl Acad Sci U S A. 2023 Jan 3;120(1):e2211832120. doi: 10.1073/pnas.2211832120.Epub 2022 Dec 28. PMID: 36577061; PMCID: PMC9910435.

Alway SE, Paez HG, Pitzer CR, Ferrandi PJ, **Khan MM**, **Mohamed JS**, Carson JA, Deschenes MR. Mitochondria transplant therapy improves regeneration and restoration of injured skeletal muscle. J Cachexia Sarcopenia Muscle. 2023Feb;14(1):493-507. doi: 10.1002/jcsm.13153. Epub 2023 Jan 5. PMID: 36604839; PMCID: PMC9891964.

McDaniels JM, Shetty AC, **Kuscu C**, Kuscu C, Bardhi E, Rousselle T, Drachenberg C, Talwar M, Eason JD, Muthukumar T, Maluf DG, Mas VR. Single nuclei transcriptomics delineates complex immune and kidney cell interactions contributing to kidney allograft fibrosis. Kidney Int. 2023Jun;103(6):1077-1092. doi: 10.1016/j.kint.2023.02.018. Epub 2023 Feb 28. PMID:36863444; PMCID: PMC10200746.

Miao Y, Konno Y, Wang B, Zhu L, Zhai T, Ihira K, Kobayashi N, Watari H, JinX, **Yue J**, Dong P, Fang M. Integrated multi-omics analyses and functional validation reveal TTK as a novel

EMT activator for endometrial cancer. J TranslMed. 2023 Feb 25;21(1):151. doi: 10.1186/s12967-023-03998-8. PMID: 36829176; PMCID: PMC9960418.

Chen X, Chen L, Lin G, Wang Z, Kodali MC, Li M, Chen H, Lebovitz SG, OrtylTC, Li L, Ismael S, Singh P, **Malik KU**, Ishrat T, Zhou FM, Zheng W, **Liao FF**. White matter damage as a consequence of vascular dysfunction in a spontaneous mouse model of chronic mild chronic hypoperfusion with eNOS deficiency. Mol Psychiatry. 2022 Nov;27(11):4754-4769. doi: 10.1038/s41380-022-01701-9. Epub2022 Aug 10. PMID: 35948662; PMCID: PMC9734049.

Johnson GA, Tian Y, **Ashbrook DG**, Cofer GP, Cook JJ, Gee JC, Hall A, HornburgK, Kaczorowski CC, Qi Y, Yeh FC, Wang N, White LE, **Williams RW**. Merged magnetic resonance and light sheet microscopy of the whole mouse brain. Proc Natl Acad Sci U S A. 2023 Apr 25;120(17):e2218617120. doi: 10.1073/pnas.2218617120. Epub2023 Apr 17. Erratum in: Proc Natl Acad Sci U S A. 2023 Jun20;120(25):e2308718120. PMID: 37068254; PMCID: PMC10151475.

Radic M, Muller S. LL-37, a Multi-Faceted Amphipathic Peptide Involved in NETosis. Cells. 2022 Aug 8;11(15):2463. doi: 10.3390/cells11152463. PMID:35954305; PMCID: PMC9368159.

Pervaiz N, Kathuria I, Aithabathula RV, **Singla B**. Matricellular proteins in atherosclerosis development. Matrix Biol. 2023 Jun;120:1-23. doi:10.1016/j.matbio.2023.04.003. Epub 2023 Apr 20. PMID: 37086928; PMCID:PMC10225360.

Bohm MS, Sipe LM, Pye ME, Davis MJ, Pierre JF, **Makowski L**. The role of obesity and bariatric surgery-induced weight loss in breast cancer. Cancer Metastasis Rev. 2022 Sep;41(3):673-695. doi: 10.1007/s10555-022-10050-6. Epub2022 Jul 23. PMID: 35870055; PMCID: PMC9470652.

Laribee RN, Boucher AB, Madireddy S, Pfeffer LM. The STAT3-Regulated Autophagy Pathway in Glioblastoma. Pharmaceuticals (Basel). 2023 Apr29;16(5):671. doi: 10.3390/ph16050671. PMID: 37242454; PMCID: PMC10223172.

de Jong TV, **Chen H**, Brashear WA, Kochan KJ, Hillhouse AE, Zhu Y, Dhande IS, Hudson EA, Sumlut MH, Smith ML, Kalbfleisch TS, Doris PA. mRatBN7.2: familiar and unfamiliar features of a new rat genome reference assembly. Physiol Genomics. 2022 Jul 1;54(7):251-260. doi: 10.1152/physiolgenomics.00017.2022.Epub 2022 May 11. PMID: 35543507; PMCID: PMC9236863.

Park F. The heart is where AAV9 lies. Physiol Genomics. 2022 Aug1;54(8):316-318. doi: 10.1152/physiolgenomics.00102.2022. Epub 2022 Jul 11.PMID: 35816650.

Yu Y, **Li W**, Jiang J. TRPC channels as emerging targets for seizure disorders. Trends Pharmacol Sci. 2022 Sep;43(9):787-798. doi:10.1016/j.tips.2022.06.007. Epub 2022 Jul 12. PMID: 35840362; PMCID: PMC9378536.

Marathe SJ, Snider MA, Flores-Torres AS, Dubin PJ, **Samarasinghe AE**. Human matters in asthma: Considering the microbiome in pulmonary health. Front Pharmacol. 2022 Dec 2;13:1020133. doi: 10.3389/fphar.2022.1020133. PMID:36532717; PMCID: PMC9755222.

Patel PS, Castelow C, Patel DS, Bhattacharya SK, **Kuscu C**, Kuscu C, **Makowski L**, Eason JD, Bajwa A. Mitochondrial Role in Oncogenesis and Potential Chemotherapeutic Strategy of Mitochondrial Infusion in Breast Cancer. Int J Mol Sci. 2022 Oct 27;23(21):12993. doi: 10.3390/ijms232112993. PMID: 36361782; PMCID: PMC9658440.

Manley A, Meshkat BI, **Jablonski MM**, Hollingsworth TJ. Cellular and Molecular Mechanisms of Pathogenesis Underlying Inherited Retinal Dystrophies. Biomolecules. 2023 Feb 1;13(2):271. doi: 10.3390/biom13020271. PMID: 36830640; PMCID: PMC9953031.

Bahouth SW, Nooh MM, **Mancarella S**. Involvement of SAP97 anchored multiprotein complexes in regulating cardiorenal signaling and trafficking networks. Biochem Pharmacol. 2023 Feb;208:115406. doi:10.1016/j.bcp.2022.115406. Epub 2022 Dec 31. PMID: 36596415.

Butler MG, Victor AK, **Reiter LT**. Autonomic nervous system dysfunction in Prader-Willi syndrome. Clin Auton Res. 2023 Jun;33(3):281-286. doi:10.1007/s10286-022-00909-7. Epub 2022 Dec 14. PMID: 36515769.

Shoraka S, **Samarasinghe AE**, Ghaemi A, Mohebbi SR. Host mitochondria: more than an organelle in SARS-CoV-2 infection. Front Cell Infect Microbiol. 2023 Aug25;13:1228275. doi: 10.3389/fcimb.2023.1228275. PMID: 37692170; PMCID: PMC10485703.

Albadari N, **Li W**. Survivin Small Molecules Inhibitors: Recent Advances and Challenges. Molecules. 2023 Feb 1;28(3):1376. doi: 10.3390/molecules28031376.PMID: 36771042; PMCID: PMC9919791.

Kumar S, **Singla B**, Singh AK, Thomas-Gooch SM, Zhi K, Singh UP. Hepatic, Extrahepatic and Extracellular Vesicle Cytochrome P450 2E1 in Alcohol and Acetaminophen-Mediated Adverse Interactions and Potential Treatment Options. Cells. 2022 Aug 23;11(17):2620. doi: 10.3390/cells11172620. PMID: 36078027; PMCID: PMC9454765.

Mitachi K, Mingle D, Effah W, Sánchez-Ruiz A, **Hevener KE**, **Narayanan R**, Clemons WM Jr, Sarabia F, Kurosu M. Concise Synthesis of Tunicamycin V and Discovery of a Cytostatic DPAGT1 Inhibitor. Angew Chem Int Ed Engl. 2022 Aug1;61(31):e202203225. doi: 10.1002/anie.202203225. Epub 2022 Jun 10. PMID:35594368; PMCID: PMC9329268.

Silva V, **Radic M**. COVID-19 Pathology Sheds Further Light on Balance between Neutrophil Proteases and Their Inhibitors. Biomolecules. 2022 Dec 30;13(1):82.doi: 10.3390/biom13010082. PMID: 36671467; PMCID: PMC9855895.

Starlard-Davenport A, Gu Q, Pace BS. Targeting Genetic Modifiers of HBG Gene Expression in Sickle Cell Disease: The miRNA Option. Mol Diagn Ther. 2022Sep;26(5):497-509. doi: 10.1007/s40291-022-00589-z. Epub 2022 May 12. PMID:35553407; PMCID: PMC9098152.

Ding Y, Chen J, Li S, Wren JD, Bajpai AK, Wang J, Tanaka T, Rice HC, Hays FA, **Lu L**, Zhang XA. EWI2 and its relatives in Tetraspanin-enriched membrane domains regulate malignancy. Oncogene. 2023 Mar;42(12):861-868. doi:10.1038/s41388-023-02623-8. Epub 2023 Feb 14. PMID: 36788350.

Allen M, Varga S, **Heck DH**. Respiratory rhythms of the predictive mind. Psychol Rev. 2023 Jul;130(4):1066-1080. doi: 10.1037/rev0000391. Epub 2022 Aug18. PMID: 35980689.

Cai X, Allison MA, Ambale-Venkatesh B, Jorgensen NW, Lima JAC, Muse ED, McClelland RL, Shea S, **Lebeche D**. Resistin and risks of incident heart failure subtypes and cardiac fibrosis: the Multi-Ethnic Study of Atherosclerosis. ESC Heart Fail. 2022 Oct;9(5):3452-3460. doi: 10.1002/ehf2.14064. Epub 2022 Jul 20.PMID: 35860859; PMCID: PMC9715803.

Pitzer CR, Paez HG, **Alway SE**. The Contribution of Tumor Derived Exosomes to Cancer Cachexia. Cells. 2023 Jan 12;12(2):292. doi: 10.3390/cells12020292. PMID:36672227; PMCID: PMC9856599.

Khan MM, Paez HG, Pitzer CR, **Alway SE**. The Therapeutic Potential of Mitochondria Transplantation Therapy in Neurodegenerative and Neurovascula rDisorders. Curr Neuropharmacol. 2023;21(5):1100-1116. doi:10.2174/1570159X05666220908100545. PMID: 36089791.

Temrikar ZH, Golden JE, **Jonsson CB**, Meibohm B. Clinical and Translational Pharmacology Considerations for Anti-infectives Approved Under the FDA Animal Rule. Clin Pharmacokinet. 2023 Jul;62(7):943-953. doi:10.1007/s40262-023-01267-x. Epub 2023 Jun 16. PMID: 37326917; PMCID: PMC10471120.

Heck DH, Varga S. "The great mixing machine": multisensory integration and brain-breath coupling in the cerebral cortex. Pflugers Arch. 2023Jan;475(1):5-11. doi: 10.1007/s00424-022-02738-z. Epub 2022 Jul 29. PMID:35904636; PMCID: PMC10163438.

Vaithianathan T, Schneider EH, **Bukiya AN**, **Dopico A**M. Cholesterol and PIP_2 Modulation of BK-Ca Channels. Adv Exp Med Biol. 2023; 1422:217-243. doi: 10.1007/978-3-031-21547-6_8. PMID: 36988883.

Slayden A, Mysiewicz S, North K, **Dopico A**, **Bukiya A**. Cerebrovascular Effects of Alcohol Combined with Tetrahydrocannabinol. Cannabis Cannabinoid Res. 2022Sep 15. doi: 10.1089/can.2021.0234. PMID: 36108317.

Heck DH, Fox MB, Correia Chapman B, McAfee SS, Liu Y. Cerebellar control of thalamocortical circuits for cognitive function: A review of pathways and a proposed mechanism. Front Syst Neurosci. 2023 Mar 30;17:1126508. doi:10.3389/fnsys.2023.1126508. PMID: 37064161; PMCID: PMC10097962.

Goorha S, Victor AK, **Reiter LT**. Culturing and Neuronal Differentiation of Human Dental Pulp Stem Cells. Curr Protoc. 2022 Nov;2(11):e600. doi:10.1002/cpz1.600. PMID: 36420818; PMCID: PMC10274300.

Radic MZ, Zouali M. Editorial: SARS-CoV-2 variants, B lymphocytes, and autoreactivity. Front Immunol. 2023 Jan 10;13:1125732. doi:10.3389/fimmu.2022.1125732. PMID: 36703988; PMCID: PMC9872959.

Deng S, Krutilina RI, Hartman KL, Chen H, Parke DN, Wang R, Mahmud F, Ma D, Lukka PB, Meibohm B, **Seagroves TN**, Miller DD, **Li W**. Colchicine-Binding SiteAgent CH-2-77 as a Potent Tubulin Inhibitor Suppressing Triple-Negative Breast Cancer. Mol Cancer Ther. 2022

Jul 5;21(7):1103-1114. doi:10.1158/1535-7163.MCT-21-0899. PMID: 35499388; PMCID: PMC9256790.

Freda PJ, **Ghosh A**, Zhang E, Luo T, Chitre AS, Polesskaya O, St Pierre CL, Gao J, Martin CD, Chen H, Garcia-Martinez AG, Wang T, Han W, Ishiwari K, Meyer P, Lamparelli A, King CP, Palmer AA, Li R, Moore JH. Automated quantitative trait locus analysis (AutoQTL). BioData Min. 2023 Apr 10;16(1):14. doi:10.1186/s13040-023-00331-3. PMID: 37038201; PMCID: PMC10088184.

Paez HG, Pitzer CR, **Alway SE**. Age-Related Dysfunction in Proteostasis and Cellular Quality Control in the Development of Sarcopenia. Cells. 2023 Jan7;12(2):249. doi: 10.3390/cells12020249. PMID: 36672183; PMCID: PMC9856405.

Taylor MK, Williams EP, Xue Y, Jenjaroenpun P, Wongsurawat T, Smith AP, Smith AM, Parvathareddy J, Kong Y, Vogel P, Cao X, Reichard W, Spruill-Harrell B, **Samarasinghe AE**, Nookaew I, **Fitzpatrick EA**, Smith MD, Aranha M, Smith JC, **Jonsson CB**. Dissecting Phenotype from Genotype with Clinical Isolates of SARS-CoV-2 First Wave Variants. Viruses. 2023 Feb 23;15(3):611. doi:10.3390/v15030611. PMID: 36992320; PMCID: PMC10059853.

Dacheux MA, Norman DD, **Tigyi GJ**, Lee SC. Emerging roles of lysophosphatidic acid receptor subtype 5 (LPAR5) in inflammatory diseases and cancer. Pharmacol Ther. 2023 May;245:108414. doi: 10.1016/j.pharmthera.2023.108414. Epub 2023 Apr13. PMID: 37061203; PMCID: PMC10290275.

Bukiya AN, Rosenhouse-Dantsker A. From Crosstalk to Synergism: The Combined Effect of Cholesterol and $PI(4,5)P_2$ on Inwardly Rectifying Potassium Channels. Adv Exp Med Biol. 2023;1422:169-191. doi: 10.1007/978-3-031-21547-6_6.PMID: 36988881.

Adams A, Murphy QM, Dougherty OP, Sawyer AM, Bai F, Edholm CJ, Williams EP, Allen LJS, **Jonsson CB**. Data-driven models for replication kinetics of Orthohantavirus infections. Math Biosci. 2022 Jul;349:108834. doi:10.1016/j.mbs.2022.108834. Epub 2022 May 19. PMID: 35598641.

Albadari N, Xie Y, Liu T, Wang R, Gu L, Zhou M, Wu Z, **Li W**. Synthesis and biological evaluation of dual MDM2/XIAP inhibitors based on the tetrahydroquinoline scaffold. Eur J Med Chem. 2023 Jul 5;255:115423. doi:10.1016/j.ejmech.2023.115423. Epub 2023 Apr 26. PMID: 37130471; PMCID: PMC10246915.

Rakib A, Mandal M, Showkat A, Kiran S, Mazumdar S, **Singla B**, Bajwa A, Kumar S, Park F, Singh UP. Piceatannol induces regulatory T cells and modulates the inflammatory response and adipogenesis. Biomed Pharmacother. 2023 May;161:114514. doi: 10.1016/j.biopha.2023.114514. Epub 2023 Mar 13. PMID:36921534; PMCID: PMC10071559.

Huang X, Li L, Zhou S, Kong D, Luo J, **Lu L**, Xu HM, Wang X. Multi-omics analysis reveals expression complexity and functional diversity of mouse kinome. Proteomics. 2022 Nov;22(22):e2200120. doi: 10.1002/pmic.202200120. Epub 2022 Jul26. PMID: 35856475.

Si L, Bai H, Oh CY, Jiang A, Hong F, Zhang T, Ye Y, Jordan TX, Logue J, McGrath M, Belgur C, Calderon K, Nurani A, Cao W, Carlson KE, Prantil-Baun R, Gygi SP, Yang D, **Jonsson**

CB, tenOever BR, Frieman M, Ingber DE. Self-assembling short immunostimulatory duplex RNAs with broad-spectrum antiviral activity. Mol Ther Nucleic Acids. 2022 Sep 13;29:923-940. doi: 10.1016/j.omtn.2022.08.031.Epub 2022 Aug 24. PMID: 36032397; PMCID: PMC9398551.

Hollingsworth TJ, Wang X, Simpson RN, White WA, **Williams RW**, **Jablonski MM**. Current Advancements in Mouse Models of Retinal Disease. Adv Exp Med Biol.2023;1415:371-376. doi: 10.1007/978-3-031-27681-1_54. PMID: 37440059.

Musicante M, Kim HH, Chen Y, Liao F, Bhattacharya SK, **Lu L**, Sun Y. Regulation of endothelial nitric oxide synthase in cardiac remodeling. Int J Cardiol. 2022 Oct 1;364:96-101. doi: 10.1016/j.ijcard.2022.05.013. Epub 2022 May30. PMID: 35654172.

Shukla PK, Rao RG, Meena AS, Giorgianni F, Lee SC, Raju P, Shashikanth N, Shekhar C, Beranova S, Balazs L, **Tigyi G**, **Gosain A**, **Rao R**. Paneth cell dysfunction in radiation injury and radio-mitigation by human α-defensin 5. Front Immunol. 2023 Aug 10;14:1174140. doi: 10.3389/fimmu.2023.1174140. PMID:37638013; PMCID: PMC10448521.

Swanson M, Yun J, Collier DM, Seif C, Yang CY, Regner KR, **Park F**. Identification of cell division cycle protein 20 in various forms of acute and chronic kidney injury in mice. Am J Physiol Renal Physiol. 2023 Aug1;325(2):F248-F261. doi: 10.1152/ajprenal.00302.2022. Epub 2023 Jun 22. PMID:37348027.

Smith A, Cao X, Gu Q, Kubi Amos-Abanyie E, Tolley EA, Vidal G, Lyn-Cook B, **Starlard-Davenport A**. Characterization of the Metabolome of Breast Tissues from Non-Hispanic Black and Non-Hispanic White Women Reveals Correlations between Microbial Dysbiosis and Enhanced Lipid Metabolism Pathways in Triple-Negative Breast Tumors. Cancers (Basel). 2022 Aug 23;14(17):4075. doi:10.3390/cancers14174075. PMID: 36077608; PMCID: PMC9454857.

Lamanilao GG, Dogan M, Patel PS, Azim S, Patel DS, Bhattacharya SK, Eason JD, **Kuscu C**, Kuscu C, Bajwa A. Key hepatoprotective roles of mitochondria in liver regeneration. Am J Physiol Gastrointest Liver Physiol. 2023 Mar1;324(3):G207-G218. doi: 10.1152/ajpgi.00220.2022. Epub 2023 Jan 17. PMID:36648139; PMCID: PMC9988520.

Myers LK, Ouyang YX, Patel JR, Odens HH, Woo-Rasberry V, Park J, **Yi AK**, Rosloniec EF, Brand DD, Stuart JM, Kang AH. Role of Citrullinated Collagen in Autoimmune Arthritis. Int J Mol Sci. 2022 Aug 30;23(17):9833. doi:10.3390/ijms23179833. PMID: 36077232; PMCID: PMC9456437.

Li K, Wang T, Li R, Xue F, Zeng G, Zhang J, Ma Y, Feng L, Kang YJ. Dose-specific efficacy of adipose-derived mesenchymal stem cells in septic mice. Stem Cell Res Ther. 2023 Feb 19;14(1):32. doi: 10.1186/s13287-023-03253-3. PMID:36804962; PMCID: PMC9940377.

Krutilina RI, Hartman KL, Oluwalana D, Playa HC, Parke DN, Chen H, MillerDD, **Li W**, **Seagroves TN**. Sabizabulin, a Potent Orally Bioavailable Colchicine Binding Site Agent, Suppresses HER2+ Breast Cancer and Metastasis. Cancers(Basel). 2022 Oct 29;14(21):5336. doi: 10.3390/cancers14215336. PMID: 36358755;PMCID: PMC9658816.

Li M, Li L, Asemota S, Kakhniashvili D, **Narayanan R**, Wang X, **Liao FF**. Reciprocal interplay between OTULIN-LUBAC determines genotoxic and inflammatory NF-κB signal responses. Proc Natl Acad Sci U S A. 2022 Aug16;119(33):e2123097119. doi: 10.1073/pnas.2123097119. Epub 2022 Aug 8. PMID:35939695; PMCID: PMC9388121.

Guo H, Zhang W, Wang J, Zhao G, Wang Y, Zhu BM, Dong P, Watari H, Wang B, LiW, **Tigyi G**, **Yue J**. Cryptotanshinone inhibits ovarian tumor growth and metastasis by degrading c-Myc and attenuating the FAK signaling pathway. Front Cell Dev Biol. 2022 Sep 28;10:959518. doi: 10.3389/fcell.2022.959518. PMID: 36247016; PMCID: PMC9554091.

Sun Y, Fowke JH, Liang X, **Mozhui K**, Sen S, Bao W, Liu B, Snetselaar LG, Wallace RB, Shadyab AH, Saquib N, Cheng TD, Johnson KC. Changes in Dietary Intake of Methionine, Folate/Folic Acid and Vitamin B12 and Survival in Postmenopausal Women with Breast Cancer: A Prospective Cohort Study. Nutrients.2022 Nov 10;14(22):4747. doi: 10.3390/nu14224747. PMID: 36432434; PMCID: PMC9699275.

Schneider EH, Fitzgerald AC, Ponnapula SS, **Dopico AM**, **Bukiya AN**. Differential distribution of cholesterol pools across arteries under high-cholesterol diet. Biochim Biophys Acta Mol Cell Biol Lipids. 2022Dec;1867(12):159235. doi: 10.1016/j.bbalip.2022.159235. Epub 2022 Sep 13. PMID:36113825.

Gabriel DBK, Liley AE, Franks HT, Minnes GL, Tutaj M, Dwinell MR, de JongTV, Williams RW, **Mulligan MK**, **Chen H**, Simon NW. Divergent risky decision-making and impulsivity behaviors in Lewis rat substrains with low genetic difference. Behav Neurosci. 2023 Aug;137(4):254-267. doi: 10.1037/bne0000557. Epub 2023 Apr27. PMID: 37104777.

Meena AS, Shukla PK, Rao R, Canelas C, Pierre JF, **Rao R**. TRPV6 deficiency attenuates stress and corticosterone-mediated exacerbation of alcohol-induced gut barrier dysfunction and systemic inflammation. Front Immunol. 2023 Jan31;14:1093584. doi: 10.3389/fimmu.2023.1093584. PMID: 36817471; PMCID: PMC9929865.

Meade RK, Long JE, Jinich A, Rhee KY, **Ashbrook DG**, **Williams RW**, Sassetti CM, Smith CM. Genome-wide screen identifies host loci that modulate M. tuberculosis fitness in immunodivergent mice. bioRxiv [Preprint]. 2023 Mar6:2023.03.05.528534. doi: 10.1101/2023.03.05.528534. Update in: G3 (Bethesda).2023 Jul 05;: PMID: 36945430; PMCID: PMC10028809.

Yu Z, Zhan J, Dong W, **Lu L**, **Jablonski MM**, Aleya L, Chen J, Zhang P, Chen H, Gu W. Potential Similarities in Sex Difference in Key Genes and Their Expression, Network, EQTL and Pathways between COVID-19 and Chronic Kidney Disease Based on Mouse Model. J Pers Med. 2022 Jul 21;12(7):1190. doi:10.3390/jpm12071190. PMID: 35887687; PMCID: PMC9323909.

Xu F, Ziebarth JD, Goeminne LJ, Gao J, Williams EG, **Quarles LD**, **Makowski L**, Cui Y, **Williams RW**, Auwerx J, **Lu L**. Gene network based analysis identifies a coexpression module involved in regulating plasma lipids with high-fat diet response. J Nutr Biochem. 2023 Sep;119:109398. doi:10.1016/j.jnutbio.2023.109398. Epub 2023 Jun 10. PMID: 37302664.

Merigeon EY, Yang D, Ihms EA, Bassit LC, **Fitzpatrick EA**, **Jonsson CB**, Schinazi RF, Block DS, Olsen HS. An ACE2-IgG4 Fc Fusion Protein Demonstrates Strong Binding to All Tested SARS-CoV-2 Variants and Reduced Lung Inflammation in Animal Models of SARS-CoV-2 and Influenza. Pathog Immun. 2022 Aug23;7(1):104-121. doi: 10.20411/pai.v7i1.491. PMID: 36072571; PMCID: PMC9438944.

Redei EE, Udell ME, Solberg Woods LC, **Chen H**. The Wistar Kyoto Rat: A Model of Depression Traits. Curr Neuropharmacol. 2023;21(9):1884-1905. doi:10.2174/1570159X21666221129120902. PMID: 36453495.

Noël A, **Ashbrook DG**, Xu F, Cormier SA, **Lu L**, O'Callaghan JP, Menon SK, Zhao W, Penn AL, **Jones BC**. Genomic Basis for Individual Differences in Susceptibility to the Neurotoxic Effects of Diesel Exhaust. Int J Mol Sci. 2022 Oct18;23(20):12461. doi: 10.3390/ijms232012461. PMID: 36293318; PMCID: PMC9603950.

Kruger L, Lapehn S, Paquette A, Singh DK, MacDonald J, Bammler TK, Enquobahrie DA, Zhao Q, **Mozhui K**, Sathyanarayana S, Prasad B. Characterization of Xenobiotic and Steroid Disposition Potential of Human Placental Tissue and Cell Lines (BeWo, JEG-3, JAR, and HTR-8/SVneo) by Quantitative Proteomics. Drug Metab Dispos. 2023 Aug;51(8):1053-1063. doi: 10.1124/dmd.123.001345. Epub 2023May 10. PMID: 37164652; PMCID: PMC10353074.

Halle JL, Counts BR, Paez HG, Baumfalk DR, Zhang Q, **Mohamed JS**, Glazer ES, Puppa MJ, Smuder AJ, **Alway SE**, Carson JA. Recovery from FOLFOX chemotherapy-induced systemic and skeletal muscle metabolic dysfunction in mice. Am J Physiol Endocrinol Metab. 2023 Aug 1;325(2):E132-E151. doi: 10.1152/ajpendo.00096.2023.Epub 2023 Jun 28. PMID: 37378624; PMCID: PMC10393342.

Liu T, Gu L, Wu Z, Albadari N, **Li W**, Zhou M. MYCN mRNA degradation and cancer suppression by a selective small-molecule inhibitor in MYCN-amplified neuroblastoma. Front Oncol. 2022 Nov 24;12:1058726. doi:10.3389/fonc.2022.1058726. PMID: 36505784; PMCID: PMC9730801.

Zhong M, Wang Y, Lin G, **Liao FF**, Zhou FM. Dopamine-independent development and maintenance of mouse striatal medium spiny neuron dendritic spines. Neurobiol Dis. 2023 Jun 1;181:106096. doi: 10.1016/j.nbd.2023.106096. Epub 2023Mar 29. PMID: 37001611.

Mozhui K, O'Callaghan JP, **Ashbrook DG**, Prins P, Zhao W, **Lu L**, **Jones BC**. Epigenetic analysis in a murine genetic model of Gulf War illness. FrontToxicol. 2023 Jun 14;5:1162749. doi: 10.3389/ftox.2023.1162749. PMID: 37389175; PMCID: PMC10300436.

Hu H, Mady Traore MD, Li R, Yuan H, He M, Wen B, Gao W, **Jonsson CB**, **Fitzpatrick EA**, Sun D. Optimization of the Prodrug Moiety of Remdesivir to Improve Lung Exposure/Selectivity and Enhance Anti-SARS-CoV-2 Activity. J Med Chem. 2022 Sep 22;65(18):12044-12054. doi: 10.1021/acs.jmedchem.2c00758. Epub2022 Sep 7. PMID: 36070561.

Ahmed HA, Ismael S, Salman M, Devlin P, McDonald MP, **Liao FF**, Ishrat T. Direct AT2R Stimulation Slows Post-stroke Cognitive Decline in the 5XFAD Alzheimer's Disease Mice. Mol

Neurobiol. 2022 Jul;59(7):4124-4140. doi:10.1007/s12035-022-02839-x. Epub 2022 Apr 29. PMID: 35486224.

Tunctan B, Senol SP, Temiz-Resitoglu M, Yilmaz DE, Guden DS, Bahceli O, Horat MF, Sahan-Firat S, Sari AN, Falck JR, Anugu RR, **Malik KU**. Activation of GPR75 Signaling Pathway Contributes to the Effect of a 20-HETE Mimetic,5,14-HEDGE, to Prevent Hypotensive and Tachycardic Responses to Lipopolysaccharide in a Rat Model of Septic Shock. J Cardiovasc Pharmacol. 2022Aug 1;80(2):276-293. doi: 10.1097/FJC.0000000000001265. PMID: 35323151.

Zhao S, Martin-Vicente A, Colabardini AC, Pereira Silva L, Rinker DC, **Fortwendel JR**, Goldman GH, Gibbons JG. Genomic and Molecular Identification of Genes Contributing to the Caspofung in Paradoxical Effect in Aspergillus fumigatus. Microbiol Spectr. 2022 Oct 26;10(5):e0051922. doi:10.1128/spectrum.00519-22. Epub 2022 Sep 12. PMID: 36094204; PMCID: PMC9603777.

Du EY, Ortega BK, Ninoyu Y, **Williams RW**, Cofer GP, Cook JJ, Hornburg KJ, Qi Y, Johnson GA, Friedman RA. Volumetric analysis of the aging auditory pathway using high resolution magnetic resonance histology. Front Aging Neurosci. 2022 Nov 10;14:1034073. doi: 10.3389/fnagi.2022.1034073. PMID: 36437998; PMCID: PMC9691338.

Maksimov MO, Wu C, **Ashbrook DG**, Villani F, Colonna V, Mousavi N, Ma N, **Lu L**, Pritchard JK, Goren A, Wi**lliams RW**, Palmer AA, Gymrek M. A novel quantitative trait locus implicates Msh3 in the propensity for genome-wide short tandem repeat expansions in mice. Genome Res. 2023 May;33(5):689-702. doi:10.1101/gr.277576.122. Epub 2023 May 1. PMID: 37127331; PMCID: PMC10317118.

Raghavan S, Brishti MA, **Collier DM**, Leo MD. Hypoxia induces purinergic receptor signaling to disrupt endothelial barrier function. Front Physiol. 2022Nov 21;13:1049698. doi: 10.3389/fphys.2022.1049698. PMID: 36479340; PMCID: PMC9720161.

Victor AK, Hedgecock T, Donaldson M, Johnson D, Rand CM, Weese-Mayer DE, **Reiter LT**. Analysis and comparisons of gene expression changes in patient-derived neurons from ROHHAD, CCHS, and PWS. Front Pediatr. 2023 May10;11:1090084. doi: 10.3389/fped.2023.1090084. PMID: 37234859; PMCID: PMC10206321.

Pérez-Cantero A, Martin-Vicente A, Guarro J, **Fortwendel JR**, Capilla J. Analysis of the cyp51 genes contribution to azole resistance in Aspergillus section Nigri with the CRISPR-Cas9 technique. Antimicrob Agents Chemother. 2023 May 1;65(5):e01996-20. doi:10.1128/AAC.01996-20. Epub 2021 Mar 8. PMID: 33685892; PMCID: PMC8092891.

Romero LO, Caires R, Kaitlyn Victor A, Ramirez J, Sierra-Valdez FJ, Walsh P, Truong V, Lee J, Mayor U, **Reiter LT**, Vásquez V, **Cordero-Morales JF**. Linoleic acid improves PIEZO2 dysfunction in a mouse model of Angelman Syndrome. Nat Commun. 2023 Mar 1;14(1):1167. doi: 10.1038/s41467-023-36818-0. PMID: 36859399; PMCID: PMC9977963.

Lewit RA, Kotagal M, Duron VP, Falcone RA, Fortenberry LC, Greene HM, Leonard JC, Makoroff K, Midura D, Moody S, Ramaiah V, Gosain A, Slidell MB. Association of Economic Recession and Social Distancing With Pediatric Non-accidental Trauma During COVID-19. J

Surg Res. 2022 Aug;276:110-119. doi:10.1016/j.jss.2022.02.038. Epub 2022 Feb 24. PMID: 35339779; PMCID: PMC8866081.

Jia Y, Gao MD, Liu YF, **Lu L**, Chen G, Chen Y. Genetic dissection of glutathione S-transferase omega-1: identification of novel downstream targets and Alzheimer's disease pathways. Neural Regen Res. 2022 Nov;17(11):2452-2458.doi: 10.4103/1673-5374.339004. PMID: 35535896; PMCID: PMC9120681.

Bhatti FU, Jeong YH, Kim DG, **Yi AK**, Brand DD, Hasty KA, Cho H. Characterization of Non-Invasively Induced Post-Traumatic Osteoarthritis in Mice. Antioxidants (Basel). 2022 Sep 9;11(9):1783. doi: 10.3390/antiox11091783.PMID: 36139857; PMCID: PMC9495497.

Caires R, Garrud TAC, Romero LO, Fernández-Peña C, Vásquez V, **Jaggar JH**, **Cordero-Morales JF**. Genetic- and diet-induced ω-3 fatty acid enrichment enhances TRPV4-mediated vasodilation in mice. Cell Rep. 2022 Sep 6;40(10):111306. doi:10.1016/j.celrep.2022.111306. PMID: 36070688; PMCID: PMC9498980.

Al-Aqtash R, Ross MS, **Collier DM**. Extracellular histone proteins activate P2XR7 channel current. J Gen Physiol. 2023 Jul 3;155(7):e202213317. doi:10.1085/jgp.202213317. Epub 2023 May 18. PMID: 37199689; PMCID: PMC10200710.

M, Hafeez BB, Mandil H, Daria D, Pingili AK, Kumari S, Sikander M, Kashyap VK, Chen GY, Anning E, Tripathi MK, Khan S, Behrman S, Yallapu MM, Jaggi M, **Makowski L**, Chauhan SC. Reprogramming of pancreatic adenocarcinoma immunosurveillance by a microbial probiotic siderophore. Commun Biol. 2022 Nov4;5(1):1181. doi: 10.1038/s42003-022-04102-4. PMID: 36333531; PMCID: PMC9636404.

Afolabi JM, Kanthakumar P, Williams JD, Kumar R, Soni H, **Adebiyi A**. Post-injury Inhibition of Endothelin-1 Dependent Renal Vasoregulation Mitigates Rhabdomyolysis-Induced Acute Kidney Injury. Function (Oxf). 2023 May4;4(4):zqad022. doi: 10.1093/function/zqad022. PMID: 37342410; PMCID: PMC10278989.

Gropler MRF, Lipshultz SE, Wilkinson JD, **Towbin JA**, Colan SD, Canter CE, Lavine KJ, Simpson KE. Pediatric and adult dilated cardiomyopathy are distinguished by distinct biomarker profiles. Pediatr Res. 2022Jul;92(1):206-215. doi: 10.1038/s41390-021-01698-x. Epub 2021 Aug 17. PMID:34404929.

Nichols JH, Williams EP, Parvathareddy J, Cao X, Kong Y, **Fitzpatrick E**, Webby RJ, **Jonsson CB**. Upper Respiratory Infection Drives Clinical Signs and Inflammatory Responses Following Heterologous Challenge of SARS-CoV-2 Variants of Concern in K18 Mice. Viruses. 2023 Apr 11;15(4):946. doi: 10.3390/v15040946.PMID: 37112926; PMCID: PMC10144791.

Orgil BO, Munkhsaikhan U, Pierre JF, Li N, Xu F, Alberson NR, Johnson JN, Wetzel GT, Boukens BJD, Lu L, **Towbin JA**, Purevjav E. The TMEM43 S358Lmutation affects cardiac, small intestine, and metabolic homeostasis in a knock-in mouse model. Am J Physiol Heart Circ Physiol. 2023 Jun 1;324(6):H866-H880.doi: 10.1152/ajpheart.00712.2022. Epub 2023 Apr 21. PMID: 37083466; PMCID: PMC10190833.

Mysiewicz S, North KC, Moreira L Jr, Odum SJ, **Bukiya AN**, **Dopico AM**. Interspecies and regional variability of alcohol action on large cerebral arteries: regulation by KCNMB1 proteins. Am J Physiol Regul Integr Comp Physiol.2023 Apr 1;324(4):R480-R496. doi: 10.1152/ajpregu.00103.2022. Epub 2023 Jan 30. PMID: 36717168; PMCID: PMC10027090.

Kim S, Samanta K, Nguyen BT, Mata-Robles S, Richer L, Yoon JY, **Gomes-Solecki M**. A portable immunosensor provides sensitive and rapid detection of Borrelia burgdorferi antigen in spiked blood. Sci Rep. 2023 May 9;13(1):7546.doi: 10.1038/s41598-023-34108-9. PMID: 37161039; PMCID: PMC10170079.

Kim S, Kim YE, **Kim IH**. Simultaneous analysis of social behaviors and neural responses in mice using round social arena system. STAR Protoc. 2022 Dec16;3(4):101722. doi: 10.1016/j.xpro.2022.101722. Epub 2022 Sep 24. PMID:36153733; PMCID: PMC9513260.

Staszko SM, Boughter JD Jr, **Fletcher M**L. The impact of familiarity on cortical taste coding. Curr Biol. 2022 Nov 21;32(22):4914-4924.e4. doi:10.1016/j.cub.2022.09.053. Epub 2022 Oct 18. PMID: 36261035; PMCID: PMC9691541.

Deng S, Banerjee S, Chen H, Pochampally S, Wang Y, Yun MK, White SW, Parmar K, Meibohm B, Hartman KL, Wu Z, Miller DD, **Li W**. SB226, an inhibitor of tubulin polymerization, inhibits paclitaxel-resistant melanoma growth and spontaneous metastasis. Cancer Lett. 2023 Feb 28;555:216046. doi:10.1016/j.canlet.2022.216046. Epub 2022 Dec 31. PMID: 36596380; PMCID: PMC10321023.

Franks H, Wang R, Li M, Wang B, Wildmann A, Ortyl T, O'Brien S, Young D, **Liao FF**, **Sakata K**. Heat shock factor HSF1 regulates BDNF gene promoters upon acute stress in the hippocampus, together with pCREB. J Neurochem. 2023Apr;165(2):131-148. doi: 10.1111/jnc.15707. Epub 2022 Nov 17. PMID: 36227087; PMCID: PMC10097844.

Fowler S, Wang T, Munro D, Kumar A, Chitre AS, Hollingsworth TJ, Garcia Martinez A, St Pierre CL, Bimschleger H, Gao J, Cheng R, Mohammadi P, Chen H, Palmer AA, Polesskaya O, **Jablonski MM**. Genome-wide association study finds multiple loci associated with intraocular pressure in HS rats. Front Genet. 2023 Jan 30;13:1029058. doi: 10.3389/fgene.2022.1029058. PMID: 36793389; PMCID:PMC9922724.

Singla B, Aithbathula RV, Pervaiz N, Kathuria I, Swanson M, Ekuban FA, Ahn W, **Park F**, Gyamfi M, Cherian-Shaw M, Singh UP, Kumar S. CD47 Activation byThrombospondin-1 in Lymphatic Endothelial Cells Suppresses Lymphangiogenesis and Promotes Atherosclerosis. Arterioscler Thromb Vasc Biol. 2023Jul;43(7):1234-1250. doi: 10.1161/ATVBAHA.122.318904. Epub 2023 Jun 1. PMID:37259865; PMCID: PMC10281185.

Norseeda K, Bin Aziz Pavel F, Rutherford JT, Meer HN, Dureja C, Hurdle JG, **Hevener KE**, Sun D. Synthesis and evaluation of phenylimidazole FabK inhibitors as new Anti-C. Difficile agents. Bioorg Med Chem. 2023 Jun 6;88-89:117330. doi:10.1016/j.bmc.2023.117330. Epub 2023 May 16. PMID: 37224699.

Souza ACO, Ge W, Wiederhold NP, Rybak JM, **Fortwendel JR**, Rogers PD. hapE and hmg1 Mutations Are Drivers of cyp51A-Independent Pan-Triazole Resistance in an Aspergillus

fumigatus Clinical Isolate. Microbiol Spectr. 2023 Jun 15;11(3):e0518822. doi: 10.1128/spectrum.05188-22. Epub 2023May 4. PMID: 37140376; PMCID: PMC10269825.

Dwyer AR, Perez Kerkvliet C, Truong TH, Hagen KM, Krutilina RI, Parke DN, Oakley RH, Liddle C, Cidlowski JA, **Seagroves TN**, Lange CA. Glucocorticoid Receptors Drive Breast Cancer Cell Migration and Metabolic Reprogramming via PDK4. Endocrinology. 2023 Jun 6;164(7):bqad083. doi: 10.1210/endocr/bqad083.Erratum in: Endocrinology. 2023 Jun 26;164(8): PMID: 37224504; PMCID:PMC10251300.

Wang X, Bajpai AK, Gu Q, **Ashbrook DG**, **Starlard-Davenport A**, **Lu L**. Weighted gene co-expression network analysis identifies key hub genes and pathways in acute myeloid leukemia. Front Genet. 2023 Feb 27;14:1009462. doi:10.3389/fgene.2023.1009462. PMID: 36923792; PMCID: PMC10008864.

Fanous MS, Afolabi JM, Michael OS, Falayi OO, Iwhiwhu SA, **Adebiyi A**. Transdermal Measurement of Glomerular Filtration Rate in Mechanically Ventilated Piglets. J Vis Exp. 2022 Sep 13;(187):10.3791/64413. doi: 10.3791/64413. PMID:36190295; PMCID: PMC9835146.

Bajpai AK, Gu Q, Orgil BO, Xu F, Torres-Rojas C, Zhao W, Chen C, **Starlard-Davenport A**, **Jones B**, **Lebeche D**, **Towbin JA**, Purevjav E, Lu L, Zhang W. Cardiac copper content and its relationship with heart physiology: Insights based on quantitative genetic and functional analyses using BXD family mice. Front Cardiovasc Med. 2023 Feb 2;10:1089963. doi: 10.3389/fcvm.2023.1089963. PMID:36818345; PMCID: PMC9931904.

Kumar R, Soni H, Afolabi JM, Kanthakumar P, Mankuzhy PD, Iwhiwhu SA, **Adebiyi A**. Induction of reactive oxygen species by mechanical stretch drives endothelin production in neonatal pig renal epithelial cells. Redox Biol. 2022 Jul 4;55:102394. doi: 10.1016/j.redox.2022.102394. Epub ahead of print. PMID:35841629; PMCID: PMC9289874.

Heo SC, Keum BR, Seo EJ, Yoon J, Jeong S, **Tigyi GJ**, Norman D, Jang IH, Kim HJ. Lysophosphatidic acid induces proliferation and osteogenic differentiation of human dental pulp stem cell through lysophosphatidic acid receptor3/extracellular signal-regulated kinase signaling axis. J Dent Sci. 2023Jul;18(3):1219-1226. doi: 10.1016/j.jds.2023.01.029. Epub 2023 Feb 9. PMID:37404649; PMCID: PMC10316439.

Afolabi JM, Michael OS, Falayi OO, Kanthakumar P, Mankuzhy PD, Soni H, **Adebiyi A**. Activation of renal vascular smooth muscle TRPV4 channels by 5-hydroxytryptamine impairs kidney function in neonatal pigs. Microvasc Res.2023 Jul;148:104516. doi: 10.1016/j.mvr.2023.104516. Epub 2023 Mar 6. PMID:36889668; PMCID: PMC10258165.

Pochampally S, Hartman KL, Wang R, Wang J, Yun MK, Parmar K, Park H, Meibohm B, White SW, **Li W**, Miller DD. Design, Synthesis, and Biological Evaluation of Pyrimidine Dihydroquinoxalinone Derivatives as Tubulin Colchicine Site-Binding Agents That Displayed Potent Anticancer Activity Both In Vitro and In Vivo. ACS Pharmacol Transl Sci. 2023 Mar 22;6(4):526-545. doi:10.1021/acsptsci.2c00108. PMID: 37082747; PMCID: PMC10111625.

Kim YE, Kim S, **Kim IH**. Neural circuit-specific gene manipulation in mouse brain in vivo using split-intein-mediated split-Cre system. STAR Protoc.2022 Nov 3;3(4):101807. doi: 10.1016/j.xpro.2022.101807. PMID: 36386891; PMCID: PMC9641071.

Liu Y, McAfee SS, Van Der Heijden ME, Dhamala M, Sillitoe RV, **Heck DH**. Causal Evidence for a Role of Cerebellar Lobulus Simplex in Prefrontal-Hippocampal Interaction in Spatial Working Memory Decision-Making. Cerebellum. 2022 Oct;21(5):762-775. doi: 10.1007/s12311-022-01383-7. Epub 2022 Feb 26. PMID:35218525; PMCID: PMC10230449.

Ruisanchez É, Janovicz A, Panta RC, Kiss L, Párkányi A, Straky Z, Korda D, Liliom K, **Tigyi G**, Benyó Z. Enhancement of Sphingomyelinase-Induced Endothelial Nitric Oxide Synthase-Mediated Vasorelaxation in a Murine Model of Type 2 Diabetes. Int J Mol Sci. 2023 May 6;24(9):8375. doi: 10.3390/ijms24098375. PMID:37176081; PMCID: PMC10179569.

Hu H, Cai J, Qi D, Li B, Yu L, Wang C, Bajpai AK, Huang X, Zhang X, **Lu L**, Liu J, Zheng F. Identification of Potential Biomarkers for Group I Pulmonary Hypertension Based on Machine Learning and Bioinformatics Analysis. Int J MolSci. 2023 Apr 28;24(9):8050. doi: 10.3390/ijms24098050. PMID: 37175757; PMCID: PMC10178909.

Miao J, Regan J, Cai C, Palmer GE, Williams DL, Kruppa MD, **Peters BM**. Glycogen Metabolism in Candida albicans Impacts Fitness and Virulence during Vulvovaginal and Invasive Candidiasis. mBio. 2023 Apr 25;14(2):e0004623. doi:10.1128/mbio.00046-23. Epub 2023 Feb 22. PMID: 36840583; PMCID: PMC10127583.

Bhattarai RS, Bariwal J, Kumar V, Hao C, Deng S, **Li W**, Mahato RI. pH-sensitive nanomedicine of novel tubulin polymerization inhibitor for lung metastatic melanoma. J Control Release. 2022 Oct;350:569-583. doi:10.1016/j.jconrel.2022.08.023. Epub 2022 Sep 2. PMID: 36037976; PMCID: PMC10322201.

Slayden AV, Dyer CL, Ma D, Li W, **Bukiya AN**, **Parrill AL**, **Dopico AM**. Discovery of agonist-antagonist pairs for the modulation of Ca2+ and voltage-gated K+ channels of large conductance that contain beta 1subunits. Bioorg Med Chem. 2022 Aug 15;68:116876. doi:10.1016/j.bmc.2022.116876. Epub 2022 Jun 13. PMID: 35716586; PMCID: PMC10464842.

Dutta SR, Singh P, **Malik KU**. Ovariectomy Via 12/15-lipoxygenase Augments Angiotensin II-Induced Hypertension and Its Pathogenesis in Female Mice. Hypertension. 2023 Jun;80(6):1245-1257. doi: 10.1161/HYPERTENSIONAHA.122.20836.Epub 2023 Apr 6. PMID: 37021560; PMCID: PMC10191208.

Chitre AS, Polesskaya O, Munro D, Cheng R, Mohammadi P, Holl K, Gao J, Bimschleger H, Martinez AG, George AM, Gileta AF, Han W, Horvath A, Hughson A, Ishiwari K, King CP, Lamparelli A, Versaggi CL, Martin CD, St Pierre CL, Tripi JA, Richards JB, Wang T, **Chen H**, Flagel SB, Meyer P, Robinson TE, Solberg Woods LC, Palmer AA. An exponential increase in QTL detection with an increased sample size. Genetics. 2023 May 26;224(2):iyad054. doi: 10.1093/genetics/iyad054.Erratum in: Genetics. 2023 May 18: PMID: 36974931; PMCID: PMC10213487.

Madadi Y, Sun J, **Chen H**, **Williams R**, Yousefi S. Detecting retinal neural and stromal cell classes and ganglion cell subtypes based on transcriptome data with deep transfer learning. Bioinformatics. 2022 Sep 15;38(18):4321-4329. doi:10.1093/bioinformatics/btac514. PMID: 35876552; PMCID: PMC9991888.

Orgil BO, Xu F, Munkhsaikhan U, Alberson NR, Bajpai AK, Johnson JN, Sun Y, **Towbin JA**, **Lu L**, Purevjav E. Echocardiography phenotyping in murine genetic reference population of BXD strains reveals significant QTLs associated with cardiac function and morphology. Physiol Genomics. 2023 Feb 1;55(2):51-66. doi:10.1152/physiolgenomics.00120.2022. Epub 2022 Dec 19. PMID: 36534598; PMCID:PMC9902221.

Azim S, Zubair H, Rousselle T, McDaniels JM, Shetty AC, **Kuscu C**, Kuscu C, Talwar M, Eason JD, Maluf DG, Mas VR. Single-cell RNA sequencing reveals peripheral blood mononuclear immune cell landscape associated with operation a ltolerance in a kidney transplant recipient. Am J Transplant. 2023Sep;23(9):1434-1445. doi: 10.1016/j.ajt.2023.04.035. Epub 2023 May 16. PMID:37201755.

Lee J, **Cox JV**, Ouellette SP. The Unique N-Terminal Domain of Chlamydial Bactofilin Mediates Its Membrane Localization and Ring-Forming Properties. J Bacteriol. 2023 Jun 27;205(6):e0009223. doi: 10.1128/jb.00092-23. Epub 2023 May16. PMID: 37191556; PMCID: PMC10294636.

Khan F, Anelo OM, Sadiq Q, Effah W, Price G, Johnson DL, Ponnusamy S, Grimes B, Morrison ML, Fowke JH, Hayes DN, **Narayanan R**. Racial Differences in Androgen Receptor (AR) and AR Splice Variants (AR-SVs) Expression in Treatment-Naïve Androgen-Dependent Prostate Cancer. Biomedicines. 2023 Feb 21;11(3):648.doi: 10.3390/biomedicines11030648. PMID: 36979627; PMCID: PMC10044992.

Munro D, Wang T, Chitre AS, Polesskaya O, Ehsan N, Gao J, Gusev A, Woods LCS, Saba LM, **Chen H**, Palmer AA, Mohammadi P. The regulatory landscape of multiple brain regions in outbred heterogeneous stock rats. Nucleic Acids Res.2022 Oct 28;50(19):10882-10895. doi: 10.1093/nar/gkac912. PMID: 36263809; PMCID:PMC9638908.

Swanson ML, Regner KR, Moore BM 2nd, **Park F**. Cannabinoid Type 2 Receptor Activation Reduces the Progression of Kidney Fibrosis Using a Mouse Model of Unilateral Ureteral Obstruction. Cannabis Cannabinoid Res. 2022Dec;7(6):790-803. doi: 10.1089/can.2021.0127. Epub 2022 Feb 23. PMID: 35196117.

Bagchi P, Boukli NM, Browner N, Daria D, Griffiths L, Mesa TE, Phipps J, Pitre A, Schafer J, Somasundaram T, **Seagroves TN**. Connect, Collaborate, and Succeed: The Ninth Annual Meeting of the Southeastern Association of Shared Resources (SEASR) Nashville, TN, USA, June 8-10, 2022. J Biomol Tech. 2023 Feb21;34(1):3fc1f5fe.283433d3. doi: 10.7171/3fc1f5fe.283433d3. PMID: 37089872;PMCID: PMC10121240.

Ouellette SP, Fisher-Marvin LA, Harpring M, Lee J, Rucks EA, **Cox JV**. Localized cardiolipin synthesis is required for the assembly of MreB during the polarized cell division of Chlamydia trachomatis. PLoS Pathog. 2022 Sep12;18(9):e1010836. doi: 10.1371/journal.ppat.1010836. PMID: 36095021; PMCID:PMC9499288.

Mishra NK, Shrinath P, **Rao R**, Shukla PK. Sex-Specific Whole-Transcriptome Analysis in the Cerebral Cortex of FAE Offspring. Cells. 2023 Jan 15;12(2):328.doi: 10.3390/cells12020328. PMID: 36672262; PMCID: PMC9856965.

Huang X, Bajpai AK, Sun J, Xu F, **Lu L**, Yousefi S. A new gene-scoring method for uncovering novel glaucoma-related genes using non-negative matrix factorization based on RNA-seq data. Front Genet. 2023 Jun 12;14:1204909. doi:10.3389/fgene.2023.1204909. PMID: 37377596; PMCID: PMC10292752.

Cao X, Yang D, Parvathareddy J, Chu YK, Kim EJ, Fitz-Henley JN, Li X, Lukka PB, Parmar KR, Temrikar ZH, Dhole P, Adcock RS, Gabbard J, Bansal S, Lee J, Zalduondo L, Hayes E, Stabenow J, Meibohm B, **Fitzpatrick EA**, Bailey K, Campos RK, Julander JG, Rossi SL, Chung D, **Jonsson CB**, Golden JE. Efficacy of a brain-penetrant antiviral in lethal Venezuelan and eastern equine encephalitis mouse models. Sci Transl Med. 2023 Apr 12;15(691):eabl9344. doi:10.1126/scitranslmed.abl9344. Epub 2023 Apr 12. PMID: 37043558.

Vannier E, Richer LM, Dinh DM, Brisson D, Ostfeld RS, **Gomes-Solecki M**. Deployment of a Reservoir-Targeted Vaccine Against Borrelia burgdorferi Reduces the Prevalence of Babesia microti Coinfection in Ixodes scapularis Ticks. J Infect Dis. 2023 May 12;227(10):1127-1131. doi: 10.1093/infdis/jiac462. PMID:36416014; PMCID: PMC10175066.

Baker JA, Brettin JT, **Mulligan MK**, Hamre KM. Effects of Genetics and Sex on Acute Gene Expression Changes in the Hippocampus Following Neonatal Ethanol Exposure in BXD Recombinant Inbred Mouse Strains. Brain Sci. 2022 Nov29;12(12):1634. doi: 10.3390/brainsci12121634. PMID: 36552094; PMCID:PMC9776411.

Wang Q, Qi H, Wu Y, Yu L, Bouchareb R, Li S, Lassén E, Casalena G, StadlerK, Ebefors K, Yi Z, Shi S, Salem F, Gordon R, **Lu L**, **Williams RW**, Duffield J, Zhang W, Itan Y, Böttinger E, Daehn I. Genetic susceptibility to diabetic kidney disease is linked to promoter variants of XOR. Nat Metab. 2023 Apr;5(4):607-625.doi: 10.1038/s42255-023-00776-0. Epub 2023 Apr 6. PMID: 37024752.

Gu Q, Palani CD, Smith A, Li B, Amos-Abanyie EK, Ogu U, **Lu L**, Pace BS, **Starlard-Davenport A**. MicroRNA29B induces fetal hemoglobin via inhibition of the HBG repressor protein MYB in vitro and in humanized sickle cell mice. Front Med (Lausanne). 2022 Nov 25;9:1043686. doi:10.3389/fmed.2022.1043686. PMID: 36507536; PMCID: PMC9732025.

Borooah S, Chekuri A, Pachauri S, Sahu B, Vorochikhina M, Suk JJ, Bartsch DU, Chavali VRM, **Jablonski MM**, Ayyagari R. A Novel Mouse Model for Late-Onset Retinal Degeneration (L-ORD) Develops RPE Abnormalities Due to the Loss of C1qtnf5/Ctrp5. Adv Exp Med Biol. 2023;1415:335-340. doi:10.1007/978-3-031-27681-1_48. PMID: 37440053.

Elsherif L, Kanthakumar P, Afolabi J, Stratton AF, Ogu U, Nelson M,Mukhopadhyay A, Smeltzer MP, **Adebiyi A**, Ataga KI. Urinary angiotensinogen is associated with albuminuria in adults with sickle cell anaemia. Br J Haematol.2023 Aug;202(3):669-673. doi: 10.1111/bjh.18862. Epub 2023 May 15. PMID:37189288.

Mysiewicz SC, Hawks SM, **Bukiya AN**, **Dopico AM**. Differential Functional Contribution of BK Channel Subunits to Aldosterone-Induced Channel Activation in Vascular Smooth Muscle and Eventual Cerebral Artery Dilation. Int J Mol Sci.2023 May 12;24(10):8704. doi: 10.3390/ijms24108704. PMID: 37240049; PMCID: PMC10218309.

Samanta K, Azevedo JF, Nair N, Kundu S, **Gomes-Solecki M**. Infected Ixodesscapularis Nymphs Maintained in Prolonged Questing under Optimal Environmental Conditions for One Year Can Transmit Borrelia burgdorferi (Borreliella genusnovum) to Uninfected Hosts. Microbiol Spectr. 2022 Aug 31;10(4):e0137722.doi: 10.1128/spectrum.01377-22. Epub 2022 Jul 11. PMID: 35862961; PMCID: PMC9431577.

Sipe LM, Chaib M, Korba EB, Jo H, Lovely MC, Counts BR, Tanveer U, Holt JR, Clements JC, John NA, Daria D, Marion TN, Bohm MS, Sekhri R, Pingili AK, Teng B, Carson JA, Hayes DN, Davis MJ, Cook KL, Pierre JF, **Makowski L**. Response to immune checkpoint blockade improved in pre-clinical model of breast cancer after bariatric surgery. Elife. 2022 Jul 1;11:e79143. doi: 10.7554/eLife.79143. PMID:35775614; PMCID: PMC9342954.

Finkel TH, **Radic M**. Chimeric receptors broaden the therapeutic landscape for autoimmune disease. Nat Rev Rheumatol. 2023 Jun;19(6):327-328. doi:10.1038/s41584-023-00968-8. PMID: 37118507.

Gage GA, Muench MA, Jee C, Kearns DN, **Chen H**, Tunstall BJ. Intermittent-access operant alcohol self-administration promotes binge-like drinking and drinking despite negative consequences in male and female heterogeneous stock rats. Neuropharmacology. 2023 Sep 1;235:109564. doi:10.1016/j.neuropharm.2023.109564. Epub 2023 May 5. PMID: 37149215; PMCID:PMC10247413.

Meombe Mbolle A, Thapa S, **Bukiya AN**, Jiang H. High-resolution imaging in studies of alcohol effect on prenatal development. Adv Drug Alcohol Res.2023;3:10790. doi: 10.3389/adar.2023.10790. Epub 2023 Feb 1. PMID: 37593366;PMCID: PMC10433240.

Hwang DJ, He Y, Ponnusamy S, Thiyagarajan T, Mohler ML, **Narayanan R**, Miller DD. Metabolism-Guided Selective Androgen Receptor Antagonists: Design, Synthesis, and Biological Evaluation for Activity against Enzalutamide-Resistant Prostate Cancer. J Med Chem. 2023 Mar 9;66(5):3372-3392. doi:10.1021/acs.jmedchem.2c01858. Epub 2023 Feb 24. PMID: 36825758; PMCID:PMC10243532.

Hu W, Liu J, Hu Y, Xu Q, Deng T, Wei M, **Lu L**, Mi J, Bergquist J, Xu F, TianG. Transcriptome-wide association study reveals cholesterol metabolism gene Lplis a key regulator of cognitive dysfunction. Front Mol Neurosci. 2022 Dec15;15:1044022. doi: 10.3389/fnmol.2022.1044022. PMID: 36590920; PMCID:PMC9798092.

Radic M, Randolph B. Autologous Anti-CD19 CAR T Cells as Therapy for Systemic Lupus Erythematosus. Transplant Cell Ther. 2023 Jan;29(1):3-4. doi:10.1016/j.jtct.2022.12.003. PMID: 36608961.

Baker JA, **Mulligan MK**, Hamre KM. Effects of genetics and sex on adolescent behaviors following neonatal ethanol exposure in BXD recombinant inbred strains. Front Neurosci. 2023 Jul 26;17:1197292. doi: 10.3389/fnins.2023.1197292. PMID:37564365; PMCID: PMC10410115.

B. Top five users (based on $204,424, the value of completed services for FY22)

User:	Invoiced	% of Total
Robert Williams	$27,085	16.56
Jonathan Jaggar	$20,833	15.03
Hao Chen	$18,103	13.06
Ramesh Narayanan	$12,008	8.66
Radhakrishna Rao	$11,063	7.98

II. PRESENTATIONS GIVEN TO PROMOTE CORE USAGE AND LETTERS OF SUPPORT

The MRC conducted laboratory tours and information sessions for prospective faculty. The director also provided >75 consultations with clients during this time. Additionally, the MRC provided 10 support letters for investigators for grant applications.

III. SUMMARY OF ACTIVITIES

A. FY23 Personnel

Executive Director: Tiffany Seagroves (6.92%)
Director: William Taylor (100% effort)
Research Specialist: Zoe Brookover (100% effort)
Assistant Director (Core Business): Natalie Smith (50% effort)

B. FY23 Internal Advisory Board (IAB)

Hao Chen (Pharmacology, COM)
Lu Lu (Genetics, Genomics and Informatics, COM)
Lawrence Reiter (Neurology, COM)
Ramesh Narayanan (Medicine, COM), *IAB CHAIR*

C. Major Equipment (>$5,000)

Equipment	MRC Cost	Funding source; Year purchased
Ion Torrent Proton sequencer and server	$87,149	MRC/CITG cost-share, $174,298, 2013
Ion Torrent PGM sequencer	$49,635	MRC/CITG cost-share, $99,270, 2013
Affymetrix Scanner	$41,483	MRC/CITG cost-share $80,000, 2010
Fluidigm BioMark qPCR system	$41,484	MRC/ARRA funds/VCR, cost-share, $203,149, 2010
ABI 3130XL Genetic Analyzer	$131,483	MRC, 2001
Nanodrop Spectrophotometer	$7,153	MRC, 2003
Zeiss Axiphot Microscope	$43,631	Gift, 1993
Genepix 4000B Microarray Scanner	$55,265	MRC, 2001

Qiacube Robot	$14,900	MRC, 2007
LightCycler 480 qPCR instruments (2)	$39,900	MRC, 2007
Agilent Bioanalyzer (2)	$20,717	MRC/CITG2002
Light Cycler 480 384-well block	$7,500	MRC, 2014
Nanodrop 8 sample Spectrophotometer	$20,000	MRC,2007
Spectramax M2e Microplate Reader	$41,123	MRC,2007
Eppendorf EPmotion Robot	$35,500	MRC,2009
Dell Precision T7500 workstation for Partek Software	$10,570	MRC,2011
SWT Dual Xeon Server for Partek Flow Software	$8,359	MRC,2014
Illumina NextSeq500	$202,000	VC Research, 2016
Hamilton Robotics Starlet robot	$100,000	VC Research, 2017
Formulatrix Mantis, automated liquid handler	$45,964	MRC, 2023
Ilumina NextSeq 2000 sequencer	$148,209	MRC, 2022/2023

D. Service Contracts FY23

Specialty Underwriters:	**Cost:**
Ion One Touch 2.0 System (2 units)	$4,679
Ion Proton sequencer	$17,546
SpectraMax M2E plate reader	$3,943
Qiagen Qiacube	$1,621
Roche LightCycler 480 (2 units)	$8,311
SU total:	**$36,100**

Life Tech/Affymetrix (OEM):	**Cost:**
Microarray scanner	$35,900

Illumina (OEM):	
NextSeq2000	$19,603

Hamilton Robotics (OEM):	
Starlet Liquid handling robot	$10,809

Agilent Technologies	$53,724

Total, Service Contracts: $156,136

E. Advertisement of core
MRC participated in the provided tours for prospective and current faculty, and sponsored several seminars from vendors.

F. Usage Volumes

FY23 Services:
Affymetrix Microarrays: 18 chips, 1 investigator
Next generation sequencing (Proton/PGM) sequencing Runs: 6 runs for 2 investigators
Agilent Bioanalyzer: 211 chips for 29 UTHSC investigators
Next Generation sequencing Illumina (NextSeq) sequencing: 6 runs for 2 internal investigators; plus 120 libraries for 2 investigators
GeneWiz/Azenta sequencing: 3,315 samples for 35 investigators
LC480 qPCR instruments: 142 runs for 10 UTHSC investigators
Transnetyx: 4,610 samples for 41 UTHSC investigators
Qbit fluorometer: 354 samples for 7 investigators
Qiacube robot: 477 runs for 8 investigators

Affymetrix Microarrays

Year	Usage
FY23*	18*
FY22	45
FY22	185
FY20	146

*Processing only; Service to be sunsetted in February of 2024

Next-Generation Sequencing, library preps

Year	Usage
FY23	120
FY22	35
FY21	54
FY20	5

Next-Generation Sequencing, runs

Year	Proton PGM or NextSeq
FY23	6
FY22	7
FY21	6
FY20	36

Agilent Bioanalyzer, samples

Year	Usage
FY23	211
FY22	262
FY21	184
FY20	174

GeneWiz/Azenta dropbox (External Sanger sequencing vendor), samples

Year	Usage
FY23	3,315
FY22	2,527
FY21	919
FY20	525

QiaCube automated nucleic acid preparation, samples

Year	Usage
FY23	477
FY22	707
FY21	556
FY20	276

Roche LC480 quantitative PCR, runs

Year	Usage
FY23*	142
FY22	290
FY21	337
FY20	299

Transnetyx genotyping, samples

Year	Usage
FY23	4,610
FY22	3,088
FY21	3,649
FY20	3,992

Total MRC Recoveries, All Services

FY period:	Total Credits:
FY23	$137,326
FY22	$204,424
FY21	$167,408
FY20	$160,241
FY19	$247,732
FY18	$264,401
FY17	$429,816

H. FY23 service fee structure

Next-generation sequencing (NGS):

NGS library preparation:

Library prep, DNA-seq:	$62.00/sample*
Library prep, RNA-seq:	$82.00/sample*

*Discounts of ~30% were offered to Illumina reagent customers

NGS runs (run only, does not include library preparation):

Proton P1 chip platform:	$705.54 chip (~80M reads)
Illumina NextSeq 2000 instrument:	
P1 300 cycle chip (100M reads)	$1,400
P2 200 cycle chip (400M reads)	$2,900
P3 200 cycle chip (1.2 billion reads)	$5,000

Other sizes are available for P2 and P3 chips, inquire for pricing.

Affymetrix microarrays**:

Gene ST 2.0:	$368.97
Clariom S array:	$220.97
Clariom S array w/ pico amplification:	$229.97
Clariom D array:	$348.97
Clariom D array w/ pico amplification:	$357.97
miRNA 4.0:	$404.97
Processing fee, user provides array(s):	$103.97/ sample

Agilent Bioanalyzer:

High Sensitivity DNA:	$63.18
RNA Nano:	$41.79
RNA Pico:	$47.76
Small RNA:	$59.71
DNA 1000:	$41.79

qPCR services, Roche LC480 platform:

qPCR run fee**	$11.60/plate

** requested, but unused time will also be billed

UPL probe:	$8.24/aliquot

UPL probes are discontinued and not supported as of December 31, 2020. We have limited stock while supplies last.

Reagents and disposables for qPCR: Cost of reagent, plus 10% markup

QiaCube automated nucleic acid preparation:

RNA prep with onboard DNAse treatment:	$12.73 /sample
DNA prep:	$7.43 /sample

Qubit fluorometric quantitation: $1.00/sample

Covaris ultrasonicator: $5.15/tube

Services provided by external vendors (SAMPLES MUST BE DROPPED OFF BY 2PM CST):

Transnetyx, genotyping: set by vendor contract
Dropbox kiosk available at MRC
GeneWiz/Azenta, Sanger sequencing: set by vendor contract
Dropbox/shipping services available at MRC

Prices may change throughout the year, please inquire with business manager about current pricing levels.

Services available at no recharge:

Eppendorf liquid handling robot (costs of disposables only), fluorescent microscope (using DAPI, red or green fluorophores), Nanodrop, Spectra Max M2e 96-well plate reader.

External users, surcharge rate:

"Friends of UTHSC" *: 10%
*Customers who are active collaborators with, or who have recently published with UTHSC faculty. The "friends" rate is offered at the discretion of the MRC executive director.

External, academic: 20%

External, Non-academic **: 50%
** Unless otherwise pre-negotiated with the Office of Research

IV. GRANTS AND CONTRACTS SUPPORTED BY THE CORE, FY23

Adebiyi, Adebowale
USPHS Grant R01 DK-120595, Vascular ion channels and microcirculation in neonatal urinary tract obstruction

USPHS Grant HL-151735, Control of microvascular function by ion channels

Ashbrook, David
USPHS Grant AG-075813, The interaction effects of genetic variants, age, diet, sex and mitochondrial copy number on Alzheimer's disease, aging-phenotypes and longevity

Bukiya, Anna
USPHS Grant AA-029673, Fetal cerebral arteries and prenatal alcohol exposure

Chen, Hao
USPHS Grant DA-048017, Reduced complexity mapping of oxycodone self-administration and stress responsiveness in rats

UCSD subaward to USPHS Grant DA-037844, System genetics of menthol and nicotine addiction

Boston University subaward to USPHS Grant DA-055299, Systems genetics of premorbid risk and cocaine use traits in a rat reduced complexity cross

Collier, Daniel
USPHS Grant HL-133451, Trauma Induced Endothelial Cell Ca2+ Signaling

Cordero-Morales, Julio
USPHS Grant GM-125629, The Role of Bioactive Lipids in Transient Receptor Potential Channels Gating

Cox, John
NSF Grant MCB-1817578, Mechanism of Polarized Budding in Chlamydia

University of Nebraska Subcontract Award to USPHS Grant GM-124798, Polarized Chlamydial Cell Division in the Absence of FtsZ

Davenport, Athena S
USPHS Grant DK-144641, MicroRNA-based epigenetic approach to induce fetal hemoglobin

Dopico, Alejandro
USPHS Grant HL-147315, Regulation of arterial diameter through specific sensing of endogenous steroids and novel nonsteroidal analogs by BK channel subunits.

USPHS Grant HL-148941, Cholesterol regulation of smooth muscle BK channel proteins and consequent control of cerebral artery diameter

Fortwendel, Jarrod
USPHS Grant AI-143197, Non-cyp51A-mutation Mediated Triazole Resistance in Aspergillus fumigatus

USPHS Grant AI-158442, Unlocking the cidal activity of echinocandins against Aspergillus fumigatus

Freeman, Kevin
USPHS Grant CA-216394, Dissecting the contribution of the transcriptional regulators of SNS fate to neuroblastoma oncogenesis

Gangaraju, Raja Shekhar
USPHS Grant NS-127924, Regulation of Mesenchymal Stem Cell Secretome for Treatment of Microglia Damage in Traumatic Brain Injury

Gomes-Solecki, Maria
University of Iowa-Subcontract to USPHS Grant AI-139267, Field trial and modeling of transmission-blocking vaccine to prevent Lyme disease

Gosain, Ankush
USPHS Grant DK-125047, Dysbiosis in Hirschsprung Associated Enterocolitis Pathogenesis

Heck, Detlef
USPHS Grant MH112143, Neuronal mechanisms of cerebellar cognitive function

Hevener, Kirk
Department of Defense Grant W81XWH2010296, Development and evaluation of inhibitors of the C. difficile enzyme, FabK, as microbiome-sparing antibacterials

Jablonski, Monica
USPHS Grant EY-029950, Novel Extended Release Glaucoma Therapy for Once Daily Dosing

Jaggar, Jonathan
USPHS Grant HL-133256, Blood pressure regulation by smooth muscle cell ion channels

USPHS Grant HL-155180, PKD proteins in endothelial cells

USPHS Grant HL-158846, SK3 channel trafficking in endothelial cells

USPHS Grant HL-166411, Chloride channels in endothelial cells

Johnson, Rajasingh
USPHS Grant HL-141345, scaRNA Modified Induced Pluripotent Stem Cell-Derived Cardiomyocytes or Exosomes Therapy for Chronic Ischemic Cardiomyopathy Patients

Jonsson, Colleen
USPHS Grant AI-142762, Center of Excellence for Encephalitic Alphavirus Therapeutics [CEEAT]

FDA Grant 75F40121C00154, Evaluation of Small Animal Models for COVID-19 and their application in Nonclinical Safety and Efficacy Studies of Investigational Therapeutics

CFD Research Corp/Department of Defense, Producing Biosynthetic Therapeutics from Extreme Microbiomes

Khan, Mohammad Moshahid
USPHS Grant NS-114616, Examining Progression of a Neurodegenerative Disorder

USPHS Grant AG-075597, Development of a novel gene therapy for the treatment of tauopathy

University of Rio Grande Valley subaward to Alzheimer's Foundation, LncRNA Malat1 as a potential therapeutic target for Alzheimer's Disease

Kim, Il Hwan
USPHS Grant MH-117429, Genes, Neural Circuits and Behavior

USPHS Grant MH-117429, Losing specificity: the role of the locus coeruleus in age-related distractibility

Laribee, Ronald
USPHS Grant CA-233028, Endolysosomal-nuclear communication mediated through V-ATPase and NHE9 dependent epigenetic signaling

USPHS Grant GM-138393, Mechanisms of cell signaling regulation by the Ccr4-Not complex

Lebeche, Djamel
USPHS Grant DK-111417, A Novel Role for DLK1 in Fibrotic Remodeling

Li, Kui
USPHS Grant AI-171779, Host genetic determinants regulating susceptibility/resistance to SARS-CoV-2

Li, Wei
Sponsored research grant by Veru Inc., Veru-111 & Analogs

Department of Defense Grant W81XWH2010011, Discovery of Orally Bioavailable Tubulin Inhibitors to Overcome Taxane Resistance in Metastatic Breast Cancer

Liao, Francesca-Fang
USPHS Grant AG-058467, Novel mechanistic link between metabolic changes and dementia potential role of miRNA21

USPHS Grant NS-120327, Blood-brain-barrier and white matter mechanisms underlying dementia

Makowski (Hayes), Liza
USPHS Grant CA-262112, Determining susceptibility loci in triple negative breast cancer using a novel pre-clinical model

USPHS Grant CA-253329, Role of microbial-modulated bile acid receptor signaling in breast cancer

Malik, Kafait
USPHS Grant HL-019134, Angiotensins, Prostaglandins, Adrenergic Interactions

Mancarella, Salvatore
USPHS Grant HL-153638, Defining the roles of Orai3 channel in cardiomyocytes and cardiomyopathy.

Miranda (Krum), Susan
Sarcoma Foundation of America, Analysis of Cancer Health Disparities in Osteosarcoma by scRNA-seq

Mozhui, Khyobeni
USPHS Grant AG-066625, Functional genetic analysis of epigenetic age acceleration and the regulatory landscape of the methylome

Narayanan, Ramesh
Department of Defense Grant W81XWH2110055, Androgen Receptor-Targeted Treatment for Therapeutically Challenging Breast Cancer

Nowak Jr, Thaddeus S
USPHS Grant NS-113957, Genetics of stroke vulnerability in C57BL/6 mouse substrains

Palmer, Glen
USPHS Grant AI-156611, Examining the importance of folate biosynthetic enzymes in infectious fungi

USPHS Grant AI-127607, Broad spectrum antifungals targeting fatty acid biosynthesis

Quarles, Leigh (Darryl)
USPHS Grant DK-120567, Genetic and Environmental Determinants of GPRC6A Regulation of Energy Metabolism Using Genetically Engineered Mice and Systems Biology.

USPHS Grant DK-121132, Optimization of Novel Small Molecules to Antagonize FGF-23

Radic, Marko
Triumvira Immunologies, Sponsored Research Agreement, Evaluation of Anti-CD19 TAC-T cell Efficacy in SLE Patient Cell Cultures

Rao, Radhakrishna
USPHS Grant DK-055532, Intestinal Mucosal Protection by Epidermal Growth Factor

USPHS Grant AA-029270, Defining the Role of Intestinal Calcium Channels in Alcoholic Liver Damage

USPHS Grant AI-170019, Radiation-Induced Paneth Cell Dysfunction

Reiter, Lawrence
USPHS Grant NS-115776, The role of UBE3A in gliopathic seizures.

Foundation for Prader-Willi Research, Analysis of Delayed Neural Development in PWS DPSC Derived Neurons

Sakata, Kazuko
USPHS Grant NS-101703, Heat shock factor HSF1 regulation of promoter-specific BDNF transcription

Seagroves, Tiffany
Department of Defense Grant W81XWH2010019, Discovery of Orally Bioavailable Tubulin Inhibitors to Overcome Taxane Resistance in Metastatic Breast Cancer (Partnering PI)

Sharp, Burt
USPHS Grant DA-053672, Genetics of oxycodone intake in a hybrid rat diversity panel

Sumida, Keiichi
USPHS Grant DK-125586, Circulating microbiome and premature mortality in hemodialysis patients

Tavalin, Steven
USPHS Grant MH-130678, Actions of proline at receptors and synapses

USPHS Grant AG-065813, Amyloid precursor protein control of NMDA receptor signaling

Tigyi, Gabor
USPHS Grant CA-092160, Anticancer Strategies Targeting the Autotaxin-LPA Receptor Axis

Towbin, Jeffrey Allen
USPHS Grant HL-151438, Discovery of modifier genes in cardiomyopathy

Yi, Ae-Kyung
USPHS Grant AR-069010, Inhibitory Receptors and Autoimmune Arthritis

V. BUSINESS DEVELOPMENT

A. Market Assessment

The MRC provides state of the art molecular and genomics resources and facilities for users on the UTHSC campus, external academic institutions, and commercial vendors. The MRC is staffed to provide expertise to aid investigators from start to finish in answering their research questions. The typical experiment flows from experimental design to the isolation of nucleic acids to next-generation sequencing (NGS), ending with downstream data analyses through referral to the Molecular Bioinformatics (mBIO) core. Additional services include robotic DNA/RNA isolation, microarrays offered by Affymetrix, real time qPCR, and all forms of NGS services. NGS services include whole genome, whole exome, whole transcriptome, ChIP-seq, targeted sequencing and de novo genome assembly, among other applications. For all services, the MRC director and staff are available locally and on demand to answer questions and to provide technical support.

Overall, recoveries generated by the MRC for services completed in FY23 decreased relative to FY22 levels, primarily due to loss of pass-through charges for NGS services through the Novogene blanket contract with the MRC that was discontinued. In addition, MRC investigators continue to consult with MRC for experimental design, but select commercial vendors for completing NGS experiments despite recent efforts to reduce in-house pricing of Illumina NGS services. Decisions about which service provider to choose to perform NGS experiments are primarily price driven. The MRC cannot currently compete on price because we do not house an ultra-high throughput instrument on campus.

Since FY17, the core has lost NGS business from several PIs who are based in the GGI department (particularly for DNA-seq applications) to other academic cores or commercial providers (like Hudson Alpha, GeneWiz or BGI). These vendors use the Illumina NovaSeq or X10 platforms; the higher throughput of these instruments reduces the per sample price significantly. MRC can effectively compete with commercial vendors on turnaround time since our instruments are not currently used to full capacity. However, investigators tend to choose lower price over faster turnaround time due to extramural funding constraints. The purchase of a NextSeq 2000, an instrument with significantly higher throughput than the NextSeq 500 led to return of some customers from GGI and Pharmacology back to the MRC in FY23 and early FY24. It is unclear at this time if additional customers will choose MRC over external vendors for NGS while we are offering discounted in-house rates (through FY24).

The MRC offers a few pieces of equipment for campus use without recharge that may not otherwise be available in individual labs, including the Nanodrop Spectrophotometer, the Spectramax M2e plate reader, the Covaris S2 sonicator, the Genepix microarray scanner, and the Eppendorf EPmotion robot. These pieces of equipment are used predominantly by UTHSC investigators but are used occasionally by other local labs (University of Memphis, or Rhodes).

Overall, our user base in FY23 included 64 unique internal investigators from UTHSC and 1 external user from the University of Memphis. The MRC processed over 9,500 service units for these researchers.

Competitive Analysis

The MRC is one of two academic genomics shared resource facilities in the Memphis area. The other core, located at St. Jude Children's Research Hospital, does not take outside samples. In addition, many commercial services offer large-scale NGS services and can provide competitive pricing due to economy of scale (GeneWiz, South Plainfield, NJ; BGI, Beijing, China, Novagene, Davis, CA, and HudsonAlpha, Birmingham, AL). However, the *value-added of the MRC* is direct personal interaction and the ability of the MRC to assist in troubleshooting protocols, services that these organizations do not provide. In addition, the MRC provides enhanced data security, and a direct pipeline to feed raw data generated in the MRC for downstream analysis by the Molecular Bioinformatics (mBIO) Core, which is located adjacent to the MRC in TSRB Suite 110.

Marketing Plans to Obtain New Business

We will continue to encourage our clients to tell their collaborators and colleagues about our services; many of our external clients have resulted from such interactions. To showcase the MRC, the core will continue to participate in several campus-wide activities, such as attending new faculty orientation sessions, organizing vendor seminars, and providing presentations to postdoctoral fellows and graduate students. It should be noted that duplication of genomics resources in other departments as part of faculty recruitment packages (including sequencers provided in startup packages that are to be managed by individual faculty and that will not be located in recharge centers) pose a direct threat to the continued demand for NGS technologies.

Forecasted Volumes for New Business

The university has also recruited new research faculty, many using genomic techniques, so this effort is expected to increase campus utilization of the MRC. Increased core usage by new faculty and existing faculty in-house may also lead to increased external usage as users recommend the MRC to external investigators because of collaborations with other institutions. Although total support from grants and contracts for the UTHSC campus increased significantly from FY21 to FY22 (~$126M to $134M), there is typically a significant lag time between the award of funds and the generation of samples for genomic profiling by research laboratories.

There have been no available sources of institutional funds outside of the recurring THEC allocation, primarily set aside for operational expenses, for upgrades of MRC equipment purchases in several years. Therefore, the purchase of any new genomics instruments

requested by faculty through the MRC IAB, such as the 10X Genomics single cell sequencing platform, the Oxford Nanopore PromethION long-read sequencer, or the Nanostring GeoMx spatial genomics system, have not been feasible to date. To be price competitive and to maintain MRC business, it will also be essential to invest in NGS instrumentation that offers a lower per sample price point for sequencing, such as the Element Biosciences Aviti sequencer.

Overall, MRC revenues in FY24 are expected to increase over FY23 levels, as research activities continue to increase after the adaptation to the COVID-19 pandemic, and in response to increased extramural awards. In addition, we will be more aggressive in billing for partial project completion rather than waiting all samples in a large volume project to be completed. We will sunset microarray services in February of 2024, which will reduce maintenance agreement costs by ~$27,000, but this change is not expected to impact revenues since very few microarrays have been processed since 2022.

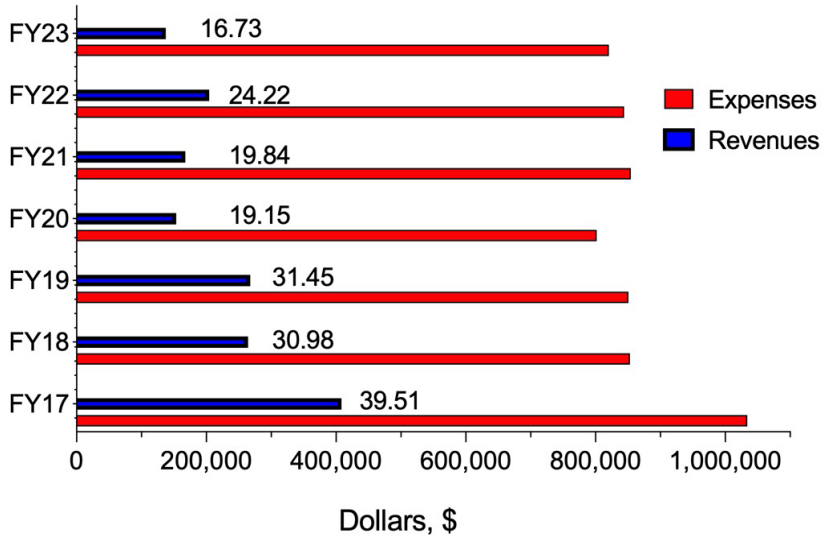
VI. Budget-
MRC – FY2023 Core Activities

FY2023	DEBITS	CREDITS
Salaries	400,858	
Supplies	237,058	
Service Contracts	104,138	
Equipment (> $5,000)	66,034	
Other Expenses*	12,573	
TOTAL EXPENSES	***820,661***	
FY23 Internal Recoveries		137,276
FY23 External Recoveries		50
TOTAL CREDITS		***137,326***
Income / (Subsidy)	(683,335)	
THEC Appropriation	688,330	
Carryover THEC Appropriation	0	
Net Income / (Subsidy)	**4,995**	

*Other expenses consist of the following categories: Media/Communications, Travel, Maintenance/Repairs, Memberships, Copier Rental, and Registration fees.

Subsidy, % after THEC Appropriation N/A

VII. Historical trends in revenues and expenses, FY17-FY23



Red bars indicate expenses and blue bars indicate revenues generated from service fees. The number beside the blue bar indicates the percentage of expenses covered by revenues. Overall, operating expenses for the MRC have remained stable since FY18. The drop in total operating expenses from FY17 to FY18 resulted from the elimination of two staff positions in the MRC. Although operating expenses have been similar since FY18, core revenues have dropped from a peak of >$400,000 in FY17 to $137,326 in FY23. The three primary reasons for these decreases are increasing external competition from commercial vendors who offer NGS services, the lack of demand for microarray services and decreased use of instrumentation at the MRC (such as the QiaCube and qPCR instruments). Funds from THEC allocated to the core for operations are not reflected in this figure.

Molecular Bioinformatics Core (mBIO) Institutional Research Core Facility Analysis Report- FY23

Written by Daniel Johnson, PhD; Natalie Smith, MS; and Tiffany Seagroves, PhD

1. Relative to a specific core's mission, is the designation as an "institutional core" appropriate?

The mBIO Core designation as an institutional core is appropriate since it served 58 unique UTHSC researchers across 16 departments, 1 UTK investigator and 4 colleges (COM, COP, COD and CGHS).

2. Does the core pass the multi-departmental, multi-investigator litmus test?

Yes. In FY23, this core processed 557 analysis requests including 68 hours of custom data mining or custom scripting on behalf of 59 unique users across 16 departments and four colleges (COM, COP, CON, and CGHS). The top five users, based on the percentage of invoices for FY22, were: 1) Ramesh Narayanan (COM, 19.36%), 2) Jeremiah Johnson (UTK, Microbiology, 5.77%), 3) Salvatore Mancarella (COM, 4.97 %), 4) Ronald Laribee (COM, 4.85%), and 5) Maria Gomes-Solecki (COM, 3.94%). The other users accounted for 61.11% of total core revenues.

3. Is there sufficient intra- and inter-departmental use and if not, why?

Yes, 59 researchers were served across 16 departments and 4 colleges at UTHSC and one UTK researcher was served.

4. Can the services for the core be outsourced more economically?

No. The internal prices are very competitive relative to other similar academic cores (UTHSC is in the bottom quartile), or to commercial vendors.

5. Are there unaccounted benefits beyond fiscal consideration to warrant continued institutional underwriting (e.g. grants funded through investigator use, publications, etc.)?

Yes. In FY23, core activities led to 96 total PubMed-indexed publications, three of which were co-authored by Dr. Johnson, 17 letters of support provided for grant applications, and pending grant applications that included Dr. Johnson as a paid co-PI. The core supported 37 active grants and contracts. In addition, Dr. Johnson provided workshops and seminars related to bioinformatics that were well- attended. As of November of 2023, Dr. Johnson is a paid co-PI on two awarded grants.

6. Is the core currently self-sufficient or is it subsidized by the institution?

In FY23, the core was subsidized by the institution. The net subsidy after the state appropriation was zero.

Accomplishments this past year:

- The mBIO core was well-received in its eighth year of operation as the inaugural institutional molecular bioinformatics core on the UTHSC campus.

- Dr. Johnson was included as an author on three publications, and he supported multiple grant applications. He currently receives salary support from two new awards for grant applications supported in FY23.

- The mBIO interfaces well with the Molecular Resource Center (MRC) and Proteomics and Metabolomics (PMC) institutional cores, maintaining a streamlined, collaborative and "one-stop shop" approach to support genomics and proteomics experiments from experimental design to data analysis. The mBIO also actively participates in joint staffing sessions with the Biostats, Epidemiology, and Research Design (BERD) clinic referrals to the mBIO core, when appropriate.

- Dr. Johnson was an invited speaker at the Arkansas Bioinformatics COVID-19 AI meeting. Dr. Johnson also attended the MidSouth Computational Biology and Bioinformatics Society (MCBIOS) meeting. Dr. Johnson represented the mBIO and MRC Cores at the UTHSC Research Fair.

Financial Overview – FY23:

TOTALS	FY17	FY18	FY19	FY20	FY21	FY22	FY23
Revenues	30,006	30,046	16,661	15,784	17,241	15,847	24,119
Expenses	(134,902)	(132,520)	(163,119)	(156,125)	(111,321)	(159,347)	(120,391)
Income (Subsidy)	(104,896)	(102,474)	(146,458)	(140,341)	(94,080)	(143,500)	(96,272)
Other Costs	0	0	0	0	0	0	0
Income (Subsidy)	(104,896)	(102,474)	(146,458)	(140,341)	(94,080)	(143,500)	(96,272)
State Appropriation	68,495	62,302	121,971	123,980	150,538	191,580	163,189
Net Income (Subsidy)	(36,401)	(40,172)	(24,487)	(16,361)	56,458	48,080	66,917
Subsidy, % before State Appropriation	77%	77%	89%	89%	85%	90%	80%
Subsidy, % after State Appropriation	27%	30%	15%	10%	--	--	--

7. Suggested outcomes:

It is recommended that mBIO continue as an institutional core.

Molecular Bioinformatics (mBIO) Institutional Core Facility
Summary of Institutional Core Activities for FY 2023
(July 1, 2022- June 30, 2023)

Written by Daniel Johnson, PhD; Natalie Smith, MS; and Tiffany Seagroves, PhD

I. PUBLICATIONS (Journal publication dates: July 1, 2022 to June 30, 2023)
Full-length published articles (UTHSC faculty investigators are indicated in bold; the core director is underlined)

Hindi SM, Petrany MJ, Greenfeld E, Focke LC, Cramer AAW, **Whitt MA**, Khairallah RJ, Ward CW, Chamberlain JS, Podbilewicz B, Prasad V, Millay DP. Enveloped viruses pseudotyped with mammalian myogenic cell fusogens target skeletal muscle for gene delivery. Cell. 2023 May 11;186(10):2062-2077. e17. doi:10. 1016/j. cell. 2023. 03. 033. Epub 2023 Apr 18. PMID: 37075755.

Blanco DB, Chapman NM, Raynor JL, Xu C, Su W, Kc A, **Li W**, Lim SA, SchattgenS, Shi H, Risch I, Sun Y, Dhungana Y, Kim Y, Wei J, Rankin S, Neale G, Thomas PG, Yang K, Chi H. PTEN directs developmental and metabolic signaling for innate-like T cell fate and tissue homeostasis. Nat Cell Biol. 2022Nov;24(11):1642-1654. doi: 10. 1038/s41556-022-01011-w. Epub 2022 Oct 27. PMID:36302969; PMCID: PMC10080469.

McDaniels JM, Shetty AC, **Kuscu C**, Kuscu C, Bardhi E, Rousselle T, Drachenberg C, Talwar M, Eason JD, Muthukumar T, Maluf DG, Mas VR. Single nuclei transcriptomics delineates complex immune and kidney cell interactions contributing to kidney allograft fibrosis. Kidney Int. 2023Jun;103(6):1077-1092. doi: 10. 1016/j. kint. 2023. 02. 018. Epub 2023 Feb 28. PMID:36863444; PMCID: PMC10200746.

Thiyagarajan T, Ponnusamy S, Hwang DJ, He Y, Asemota S, Young KL, Johnson DL, Bocharova V, Zhou W, Jain AK, Petricoin EF, Yin Z, Pfeffer LM, Miller DD, **Narayanan R**. Inhibiting androgen receptor splice variants with cysteine-selective irreversible covalent inhibitors to treat prostate cancer. Proc Natl Acad Sci U S A. 2023 Jan 3;120(1):e2211832120. doi: 10. 1073/pnas. 2211832120. Epub 2022 Dec 28. PMID: 36577061; PMCID: PMC9910435.

Farokhnia M, Rentsch CT, Chuong V, McGinn MA, Elvig SK, Douglass EA, Gonzalez LA, Sanfilippo JE, Marchette RCN, **Tunstall BJ**, Fiellin DA, Koob GF, Justice AC, Leggio L, Vendruscolo LF. Spironolactone as a potential new pharmacotherapy for alcohol use disorder: convergent evidence from rodent and human studies. Mol Psychiatry. 2022 Nov;27(11):4642-4652. doi: 10. 1038/s41380-022-01736-y. Epub2022 Sep 20. PMID: 36123420; PMCID: PMC10231646.

Miao Y, Konno Y, Wang B, Zhu L, Zhai T, Ihira K, Kobayashi N, Watari H, JinX, **Yue J**, Dong P, Fang M. Integrated multi-omics analyses and functional validation reveal TTK

as a novel EMT activator for endometrial cancer. J Transl Med. 2023 Feb 25;21(1):151. doi: 10. 1186/s12967-023-03998-8. PMID: 36829176; PMCID: PMC9960418.

Pervaiz N, Kathuria I, Aithabathula RV, **Singla B**. Matricellular proteins in atherosclerosis development. Matrix Biol. 2023 Jun;120:1-23. doi:10. 1016/j. matbio. 2023. 04. 003. Epub 2023 Apr 20. PMID: 37086928; PMCID: PMC10225360.

Kim JY, Silvaroli JA, Martinez GV, Bisunke B, Luna Ramirez AV, Jayne LA, Feng MJHH, Girotra B, Acosta Martinez SM, Vermillion CR, Karel IZ, Ferrell N, Weisleder N, Chung S, Christman JW, Brooks CR, Madhavan SM, Hoyt KR, Cianciolo RE, Satoskar AA, Zepeda-Orozco D, Sullivan JC, Davidson AJ**, Bajwa A**, Pabla NS. Zinc finger protein 24-dependent transcription factor SOX9 up-regulation protects tubular epithelial cells during acute kidney injury. Kidney Int. 2023Jun;103(6):1093-1104. doi: 10. 1016/j. kint. 2023. 02. 026. Epub 2023 Mar 13. PMID:36921719; PMCID: PMC10200760.

Paranjpe V, Galor A, Grambergs R, **Mandal N**. The role of sphingolipids in meibomian gland dysfunction and ocular surface inflammation. Ocul Surf. 2022Oct;26:100-110 doi: 10. 1016/j. jtos. 2022. 07. 006 Epub 2022 Aug 13. PMID:35973562; PMCID: PMC10259413.

Patel PS, Castelow C, Patel DS, Bhattacharya SK, Kuscu C, Kuscu C, **Makowski L**, Eason JD, **Bajwa A**. Mitochondrial Role in Oncogenesis and Potential Chemotherapeutic Strategy of Mitochondrial Infusion in Breast Cancer. Int J MolSci. 2022 Oct 27;23(21):12993. doi: 10. 3390/ijms232112993. PMID: 36361782; PMCID: PMC9658440.

Hori RT, **Moshahid Khan M**, Xiao J, Hargrove PW, Moss T, LeDoux MS. Behavioral and molecular effects of Ubtf knockout and knockdown in mice. Brain Res. 2022Oct 15;1793:148053. doi: 10. 1016/j. brain res. 2022. 148053. Epub 2022 Aug 13. PMID:35973608.

Mamidi MK, Huang J, Honjo K, Li R, Tabengwa EM, Neeli I, Randall NL, Ponnuchetty MV, **Radic M**, Leu CM, Davis RS. FCRL1 immunoregulation in B cell development and malignancy. Front Immunol. 2023 Sep 25;14:1251127. doi:10. 3389/fimmu. 2023. 1251127. PMID: 37822931; PMCID: PMC10562807.

Manley A, Meshkat BI, **Jablonski MM**, Hollingsworth TJ. Cellular and Molecular Mechanisms of Pathogenesis Underlying Inherited Retinal Dystrophies. Biomolecules. 2023 Feb 1;13(2):271. doi: 10. 3390/biom13020271. PMID: 36830640; PMCID: PMC9953031.

Almeida C, Pongilio RP, Móvio MI, Higa GSV, Resende RR, **Jiang J**, Kinjo ER, Kihara AH. Distinct Cell-specific Roles of NOX2 and MyD88 in Epileptogenesis. Front Cell Dev Biol. 2022 Jul 4;10:926776. doi: 10. 3389/fcell. 2022. 926776. PMID:35859905; PMCID: PMC9289522.

Kumar S, **Singla B**, Singh AK, Thomas-Gooch SM, Zhi K, **Singh UP**. Hepatic, Extrahepatic and Extracellular Vesicle Cytochrome P450 2E1 in Alcohol and Acetaminophen-Mediated Adverse Interactions and Potential Treatment Options. Cells. 2022 Aug 23;11(17):2620. doi: 10. 3390/cells11172620. PMID: 36078027; PMCID: PMC9454765.

Sluter MN, Li Q, Yasmen N, Chen Y, Li L, Hou R, Yu Y, **Yang CY**, Meibohm B, **Jiang J**. The inducible prostaglandin E synthase (mPGES-1) in neuroinflammatory disorders. Exp Biol Med (Maywood). 2023 May;248(9):811-819. doi:10. 1177/15353702231179926. Epub 2023 Jul 29. PMID: 37515545; PMCID: PMC10468642.

Mitachi K, Mingle D, Effah W, Sánchez-Ruiz A, **Hevener KE**, **Narayanan R,** Clemons WM Jr, Sarabia F, **Kurosu M**. Concise Synthesis of Tunicamycin V and Discovery of a Cytostatic DPAGT1 Inhibitor. Angew Chem Int Ed Engl. 2022 Aug1;61(31):e202203225. doi: 10. 1002/anie. 202203225. Epub 2022 Jun 10. PMID:35594368; PMCID: PMC9329268.

Bahouth SW, Nooh MM, **Mancarella S**. Involvement of SAP97 anchored multiprotein complexes in regulating cardiorenal signaling and trafficking networks. Biochem Pharmacol. 2023 Feb;208:115406. doi:10. 1016/j. bcp. 2022. 115406. Epub 2022 Dec 31. PMID: 36596415.

Kumar A, Sinha N, Kodidela S, Zhou L, **Singh UP**, Kumar S. Effect of benzo(a)pyrene on oxidative stress and inflammatory mediators in astrocytes and HIV-infected macrophages. PLoS One. 2022 Oct 14;17(10):e0275874. doi:10. 1371/journal. pone. 0275874. PMID: 36240258; PMCID: PMC9565757.

Gao Y, Sharma T, **Cui Y**. Addressing the Challenge of Biomedical Data Inequality: An Artificial Intelligence Perspective. Annu Rev Biomed Data Sci. 2023 Aug 10;6:153-171. doi: 10. 1146/annurev-biodatasci-020722-020704. Epub 2023Apr 27. PMID: 37104653; PMCID: PMC10529864.

Li L, Chen Y, Sluter MN, Hou R, Hao J, Wu Y, Chen GY, Yu Y, **Jiang J**. Ablation of Siglec-E augments brain inflammation and ischemic injury. J Neuroinflammation. 2022 Jul 20;19(1):191. doi: 10.1186/s12974-022-02556-1. PMID:35858866; PMCID: PMC9301848.

Himbert C, Warby CA, Gigic B, Ose J, Lin T, Viskochil R, Peoples AR, Ashworth A, Schrotz-King P, Scaife CL, Cohan JN, Jedrzkiewicz J, Schirmacher P, Grady WM, Cohen SA, Krane M, Figueiredo JC, Toriola AT, Siegel EM, **Shibata D**, Round JL, Huang LC, Li CI, Schneider M, Ulrich A, Hardikar S, Ulrich CM. Associations of Individual and Combined Physical Activity and Body Mass Index Groups with Proinflammatory Biomarkers among Colorectal Cancer Patients. Cancer Epidemiol Biomarkers Prev. 2022 Dec 5;31(12):2148-2156 doi:10. 1158/1055-9965. EPI-22-0681. PMID: 36099423; PMCID: PMC9729421.

Sanchez V, Galor A, Jensen K, Mondal K, **Mandal N**. Relationships between ocular surface sphingomyelinases, Meibum and Tear Sphingolipids, and clinical parameters of meibomian gland dysfunction. Ocul Surf. 2022 Jul;25:101-107. doi:10. 1016/j. jtos. 2022. 06. 003. Epub 2022 Jun 14. PMID: 35714913.

Qiu J, Li Q, Li J, Zhou F, Sang P, Xia Z, Wang W, Wang L, Yu Y, **Jiang J**. Complementary roles of EP2 and EP4 receptors in malignant glioma. Br JPharmacol. 2023 Oct;180(20):2623-2640. doi: 10. 1111/bph. 16148. Epub 2023 Jun 28. PMID: 37232020; PMCID: PMC10524591.

Rakib A, Mandal M, Showkat A, Kiran S, Mazumdar S, **Singla B**, **Bajwa A**, KumarS, Park F, **Singh UP**. Piceatannol induces regulatory T cells and modulates the inflammatory response and adipogenesis. Biomed Pharmacother. 2023May;161:114514. doi: 10. 1016/j. biopha. 2023. 114514. Epub 2023 Mar 13. PMID:36921534; PMCID: PMC10071559.

Xu X, Zhang C, **Jiang J**, Xin M, Hao J. Effect of TDP43-CTFs35 on Brain Endothelial Cell Functions in Cerebral Ischemic Injury. Mol Neurobiol. 2022Jul;59(7):4593-4611. doi: 10. 1007/s12035-022-02869-5. Epub 2022 May 18. PMID:35581521.

Smith A, Cao X, Gu Q, Kubi Amos-Abanyie E, Tolley EA, Vidal G, Lyn-Cook B, **Starlard-Davenport A**. Characterization of the Metabolome of Breast Tissues fromNon-Hispanic Black and Non-Hispanic White Women Reveals Correlations between Microbial Dysbiosis and Enhanced Lipid Metabolism Pathways in Triple-Negative Breast Tumors. Cancers (Basel). 2022 Aug 23;14(17):4075. doi:10. 3390/cancers14174075. PMID: 36077608; PMCID: PMC9454857.

Fleming AM, Phillips AL, Hendrick LE, Drake JA, Dickson PV, **Glazer ES**, **Shibata D**, Cleary SP, Yakoub D, Deneve JL. Segmental bile duct resection versus pancreatoduodenectomy for middle and distal third bile duct cancer. A systematic review and meta-analysis of comparative studies. HPB (Oxford). 2023Nov;25(11):1288-1299. doi: 10. 1016/j. hpb. 2023. 06. 012. Epub 2023 Jun 24. PMID:37423850.

Peoples AR, Oswald LB, Ose J, Daniels B, Himbert C, Hathaway CA, Gigic B, Kirchhoff AC, Lin T, Grossman D, Tward J, Varghese TK Jr, Figueiredo JC, Toriola AT, Beck A, Scaife C, Shibata D, LaStayo P, Gonzalez B, Salas K, Ashworth, Moten AS, Dickson PV, Deneve JL, **Shibata D**, Stanfill AG, **Glazer ES**. Impact of Social Determinants of Health on Outcomes Following Resection for Hepatocellular Carcinoma. Ann Surg Oncol. 2023 Feb;30(2):738-747. doi:10. 1245/s10434-022-12735-2. Epub 2022 Nov 1. PMID: 36319871.

Meena AS, Shukla PK, Rao R, Canelas C, Pierre JF, **Rao R**. TRPV6 deficiency attenuates stress and corticosterone-mediated exacerbation of alcohol-induced gut barrier dysfunction and systemic inflammation. Front Immunol. 2023 Jan31;14:1093584 doi: 10. 3389/fimmu. 2023. 1093584. PMID: 36817471; PMCID:PMC9929865.

Yu Z, Zhan J, Dong W, Lu L, **Jablonski MM**, Aleya L, Chen J, Zhang P, Chen H, Gu W. Potential Similarities in Sex Difference in Key Genes and Their Expression, Network, EQTL and Pathways between COVID-19 and Chronic Kidney Disease Based on Mouse Model. J Pers Med. 2022 Jul 21;12(7):1190. doi:10. 3390/jpm12071190. PMID: 35887687; PMCID: PMC9323909.

Kurosu M, Mitachi K, Pershing EV, Horowitz BD, Wachter EA, Lacey JW 3rd, Ji Y, Rodrigues DJ. Antibacterial effect of rose bengal against colistin-resistant gram-negative bacteria. J Antibiot (Tokyo). 2023 Jul;76(7):416-424. doi:10. 1038/s41429-023-00622-1. Epub 2023 Apr 19. PMID: 37076631.

Fan J, Wang S, Chen K, **Sun Z**. Aging impairs arterial compliance via Klotho-mediated downregulation of B-cell population and IgG levels. Cell Mol Life Sci. 2022 Aug 24;79(9):494. doi: 10. 1007/s00018-022-04512-x. PMID: 36001158; PMCID: PMC10082671.

Halle JL, Counts BR, Paez HG, Baumfalk DR, Zhang Q, Mohamed JS, **Glazer ES**, Puppa MJ, Smuder AJ, Alway SE, Carson JA. Recovery from FOLFOX chemotherapy-induced systemic and skeletal muscle metabolic dysfunction in mice. Am J Physiol Endocrinol Metab 2023 Aug 1;325(2):E132-E151. do: 10. 1152/ajpendo. 00096. 2023. Epub 2023 Jun 28. PMID: 37378624; PMCID: PMC10393342.

Liu T, Gu L, Wu Z, Albadari N, **Li W**, Zhou M. MYCN mRNA degradation and cancer suppression by a selective small-molecule inhibitor in MYCN-amplified neuroblastoma. Front Oncol 2022 Nov 24;12:1058726. doi:10. 3389/fonc. 2022. 1058726. PMID: 36505784; PMCID: PMC9730801.

Lee J, Zhu Y, Williams DJ, Self WH, Arnold SR, **McCullers JA**, Ampofo K, PaviaAT, Anderson EJ, Jain S, Edwards KM, Grijalva CG. Red Blood Cell Distribution Width and Pediatric Community-Acquired Pneumonia Disease Severity. Hosp Pediatr. 2022 Sep 1;12(9):798-805. doi: 10. 1542/hpeds. 2022-006539. PMID: 35922590.

Zhang L, Hung GC, Meng S, Evans R, **Xu J**. LncRNA MALAT1 Regulates Hyperglycemia Induced EMT in Keratinocyte via miR-205. Noncoding RNA. 2023 Feb11;9(1):14. doi: 10. 3390/ncrna9010014. PMID: 36827547; PMCID: PMC9963368.

Raghavan S, Brishti MA, **Collier DM**, Leo MD. Hypoxia induces purinergic receptor signaling to disrupt endothelial barrier function. Front Physiol. 2022Nov 21;13:1049698. doi: 10. 3389/fphys. 2022. 1049698. PMID: 36479340; PMCID: PMC9720161.

Li M, Li L, Asemota S, Kakhniashvili D, **Narayanan R**, Wang X, Liao FF. Reciprocal interplay between OTULIN-LUBAC determines genotoxic and inflammatory NF-κB signal responses. Proc Natl Acad Sci U S A. 2022 Aug16;119(33):e2123097119. doi: 10. 1073/pnas. 2123097119. Epub 2022 Aug 8. PMID:35939695; PMCID: PMC9388121.

Victor AK, Hedgecock T, Donaldson M, Johnson D, Rand CM, Weese-Mayer DE, **Reiter LT**. Analysis and comparisons of gene expression changes in patient-derived neurons from ROHHAD, CCHS, and PWS. Front Pediatr. 2023 May10;11:1090084 doi: 10. 3389/fped. 2023. 1090084. PMID: 37234859; PMCID: PMC10206321.

Wilkerson JL, Basu SK, Stiles MA, Prislovsky A, Grambergs RC, Nicholas SE, Karamichos D, Allegood JC, Proia RL, **Mandal N**. Ablation of Sphingosine Kinase 1 Protects Cornea from Neovascularization in a Mouse Corneal Injury Model. Cells. 2022 Sep 17;11(18):2914. doi: 10. 3390/cells11182914. PMID: 36139489; PMCID: PMC9497123.

Tian C, Li L, Fan L, Brown A, Norris EJ, Morrison M, **Glazer ES**, Zhu L. A hepatoprotective role of peritumoral non-parenchymal cells in early liver tumorigenesis. Dis Model Mech. 2023 Mar 1;16(3):dmm049750. doi:10. 1242/dmm. 049750. Epub 2023 Mar 9. PMID: 36728410; PMCID: PMC10040241.
Al-Aqtash R, Ross MS, **Collier DM**. Extracellular histone proteins activate P2XR7 channel current. J Gen Physiol.2023 Jul 3;155(7):e202213317. doi:10. 1085/jgp. 202213317. Epub 2023 May 18. PMID: 37199689; PMCID: PMC10200710.

Shiah YJ, Shan L, Radin DI, **Huang GT**. Effects of intentionally treated water on the growth of mesenchymal stem cells: An exploratory study. Explore (NY). 2022 Nov-Dec;18(6):663-669. doi: 10. 1016/j. explore. 2021. 11. 007. Epub 2021 Nov24. PMID: 34887234.

Chaib M, Hafeez BB, Mandil H, Daria D, Pingili AK, Kumari S, Sikander M,Kashyap VK, Chen GY, Anning E, Tripathi MK, Khan S, Behrman S, Yallapu MM, JaggiM, **Makowski L**, Chauhan SC. Reprogramming of pancreatic adenocarcinoma immunosurveillance by a microbial probiotic siderophore. Commun Biol. 2022 Nov4;5(1):1181. doi: 10. 1038/s42003-022-04102-4. PMID: 36333531; PMCID: PMC9636404.

Shukla PK, Rao RG, Meena AS, Giorgianni F, Lee SC, Raju P, Shashikanth N, Shekhar C, Beranova S, Balazs L, Tigyi G, Gosain A, **Rao R**. Paneth cell dysfunction in radiation injury and radio-mitigation by human α-defensin 5. Front Immunol. 2023 Aug 10;14:1174140. doi: 10. 3389/fimmu. 2023. 1174140. PMID:37638013; PMCID: PMC10448521.

Lindley CL, Gigic B, Peoples AR, Han CJ, Lin T, Himbert C, Warby CA, BoehmJ, Hardikar S, Ashworth A, Schneider M, Ulrich A, Schrotz-King P, Figueiredo JC, Li CI, **Shibata D**, Siegel EM, Toriola AT, Ulrich CM, Syrjala KL, Ose J. Pre-Surgery Inflammatory and Angiogenesis Biomarkers as Predictors of 12-Month Cancer-Related Distress: Results from the ColoCare Study. Cancer Epidemiol Biomarkers Prev. 2023 Mar 6;32(3):363-370. doi: 10. 1158/1055-9965. EPI-22-0882. PMID: 36595657; PMCID: PMC9991988.

Kim S, Samanta K, Nguyen BT, Mata-Robles S, Richer L, Yoon JY, **Gomes-Solecki M**. A portable immunosensor provides sensitive and rapid detection of Borrelia burgdorferi

antigen in spiked blood. Sci Rep. 2023 May 9;13(1):7546. doi:10. 1038/s41598-023-34108-9. PMID: 37161039; PMCID: PMC10170079.

Kim S, Kim YE, **Kim IH**. Simultaneous analysis of social behaviors and neural responses in mice using round social arena system. STAR Protoc. 2022 Dec16;3(4):101722. doi: 10. 1016/j. xpro. 2022. 101722. Epub 2022 Sep 24. PMID:36153733; PMCID: PMC9513260.

Fleming AM, Deschner BW, Williard FW, Drake JA, Vanderwalde A, Xiu J, Somer BG, Yakoub D, Tsao MW, **Glazer ES,** Dickson PV, **Shibata D**, Philip PA, Hwang JJ, Shields AF, Marshall JL, Korn WM, Lenz HJ, Deneve JL. Peritoneal metastases from primary appendiceal and colorectal carcinomas demonstrate distinct molecular identities on comprehensive tumor analysis. J Surg Oncol. 2023Apr;127(5):815-822. doi: 10. 1002/jso. 27198. Epub 2023 Jan 11. PMID: 36629137.

Mondal K, Grambergs RC, **Gangaraju R**, **Mandal N**. A Comprehensive Profiling of Cellular Sphingolipids in Mammalian Endothelial and Microglial Cells Cultured in Normal and High-Glucose Conditions. Cells. 2022 Sep 30;11(19):3082. doi:10. 3390/cells11193082. PMID: 36231042; PMCID: PMC9563724.

Fowler S, Wang T, Munro D, Kumar A, Chitre AS, Hollingsworth TJ, Garcia Martinez A, St Pierre CL, Bimschleger H, Gao J, Cheng R, Mohammadi P, Chen H, Palmer AA, Polesskaya O, **Jablonski MM**. Genome-wide association study finds multiple loci associated with intraocular pressure in HS rats. Front Genet. 2023Jan 30;13:1029058. doi: 10. 3389/fgene. 2022. 1029058. PMID: 36793389; PMCID: PMC9922724.

Govatati S, Pichavaram P, Kumar R, **Rao GN**. Blockade of CD47 function attenuates restenosis by promoting smooth muscle cell efferocytosis and inhibiting their migration and proliferation. J Biol Chem. 2023Apr;299(4):104594. doi: 10. 1016/j. jbc. 2023. 104594. Epub 2023 Mar 8. PMID:36898577; PMCID: PMC10124914.

Norseeda K, Bin Aziz Pavel F, Rutherford JT, Meer HN, Dureja C, Hurdle JG, **Hevener KE**, Sun D. Synthesis and evaluation of phenylimidazole FabK inhibitors as new Anti-C. Difficile agents. Bioorg Med Chem. 2023 Jun 6;88-89:117330. doi:10. 1016/j. bmc. 2023. 117330. Epub 2023 May 16. PMID: 37224699.

Ose J, Gigic B, Hardikar S, Lin T, Himbert C, Warby CA, Peoples AR, LindleyCL, Boehm J, Schrotz-King P, Figueiredo JC, Toriola AT, Siegel EM, Li CI, UlrichA, Schneider M, **Shibata D**, Ulrich CM. Presurgery Adhesion Molecules and Angiogenesis Biomarkers Are Differently Associated with Outcomes in Colon and Rectal Cancer: Results from the ColoCare Study. Cancer Epidemiol Biomarkers Prev. 2022 Aug 2;31(8):1650-1660. doi: 10. 1158/1055-9965. EPI-22-0092. PMID:35667092; PMCID: PMC9509698.

Himbert C, Stephens WZ, Gigic B, Hardikar S, Holowatyj AN, Lin T, Ose J, Swanson E, Ashworth A, Warby CA, Peoples AR, Nix D, Jedrzkiewicz J, Bronner M, Pickron B,

Scaife C, Cohan JN, Schrotz-King P, Habermann N, Boehm J, Hullar M, Figueiredo JC, Toriola AT, Siegel EM, Li CI, Ulrich AB, **Shibata D**, Boucher K, Huang LC, Schneider M, Round JL, Ulrich CM. Differences in the gut microbiome by physical activity and BMI among colorectal cancer patients. Am J Cancer Res. 2022 Oct 15;12(10):4789-4801. PMID: 36381318; PMCID: PMC9641409.

Himbert C, Ose J, Gigic B, Viskochil R, Santuci K, Lin T, Ashworth A, Cohan JN, Scaife CL, Jedrzkiewicz J, Damerell V, Atkins KM, Gong J, Mutch MG, Bernadt C, Felder S, Sanchez J, Cohen SA, Krane MK, Hinkle N, Wood E, Peoples AR, Figueiredo JC, Toriola AT, Siegel EM, Li CI, **Shibata D**, Boucher K, Round JL, Ulrich AB, Schneider M, Huang LC, Hardikar S, Ulrich CM. Associations of combined physical activity and body mass index groups with colorectal cancer survival outcomes. BMC Cancer. 2023 Apr 3;23(1):300. doi:10. 1186/s12885-023-10695-8. PMID: 37013476; PMCID: PMC10069054.

Khom S, Borgonetti V, Vozella V, **Kirson D**, Rodriguez L, Gandhi P, Bianchi PC, Snyder A, Vlkolinsky R, Bajo M, Oleata CS, Ciccocioppo R, Roberto M. Glucocorticoid receptors regulate central amygdala GABAergic synapses in Marchigian-Sardinian alcohol-preferring rats. Neurobiol Stress. 2023 Jun4;25:100547. doi: 10. 1016/j. ynstr. 2023. 100547. PMID: 37547774; PMCID: PMC10401345.

Fan J, Wang S, Lu X, **Sun Z**. Transplantation of bone marrow cells frommiR150 knockout mice improves senescence-associated humoral immune dysfunction and arterial stiffness. Metabolism. 2022 Sep;134:155249. doi:10. 1016/j. metabol. 2022. 155249. Epub 2022 Jul 2. PMID: 35792174; PMCID:PMC9796492.

Nicholas SE, Choi AJ, Lam TN, Basu SK, **Mandal N**, Karamichos D. Potentiation of Sphingolipids and TGF-β in the human corneal stroma reveals intricate signaling pathway crosstalks. Exp Eye Res. 2023 Jun;231:109487. doi:10. 1016/j. exer. 2023. 109487. Epub 2023 Apr 19. PMID: 37084874.

Chen J, Lin Y, **Sun Z**. Inhibition of miR-101-3p prevents human aortic valve interstitial cell calcification through regulation of CDH11/SOX9 expression. Mol Med. 2023 Feb 21;29(1):24. doi: 10. 1186/s10020-023-00619-4. PMID: 36809926; PMCID: PMC9945614.

Kim YE, Kim S, **Kim IH**. Neural circuit-specific gene manipulation in mouse brain in vivo using split-intein-mediated split-Cre system. STAR Protoc. 2022 Nov 3;3(4):101807. doi: 10. 1016/j. xpro. 2022. 101807. PMID: 36386891; PMCID:PMC9641071.

Tian C, Li L, Pan Q, Xu B, Li Y, Fan L, Brown A, Morrison M, Dey K, Yang JJ, Yu J, **Glazer ES**, Zhu L. Spatiotemporal regulation of cholangiocarcinoma growth and dissemination by peritumoral myofibroblasts in a Vcam1-dependentmanner. Oncogene. 2023 Apr;42(15):1196-1208. doi: 10. 1038/s41388-023-02639-0. Epub 2023 Feb 24. PMID: 36828890; PMCID: PMC10079548.

Singla B, Aithbathula RV, Pervaiz N, Kathuria I, Swanson M, Ekuban FA, Ahn W, Park F, Gyamfi M, Cherian-Shaw M, **Singh UP**, Kumar S. CD47 Activation byThrombospondin-1 in Lymphatic Endothelial Cells Suppresses Lymphangiogenesis and Promotes Atherosclerosis. Arterioscler Thromb Vasc Biol. 2023Jul;43(7):1234-1250. doi: 10. 1161/ATVBAHA. 122. 318904. Epub 2023 Jun 1. PMID:37259865; PMCID: PMC10281185.

Liu X, Zhang J, Li P, Han P, Kang YJ, **Zhang W**. Gene expression patterns and related pathways in the hearts of rhesus monkeys subjected to prolonged myocardial ischemia. Exp Biol Med (Maywood). 2023 Feb;248(4):350-360. doi:10. 1177/15353702231151968. Epub 2023 Feb 22. PMID: 36814407; PMCID: PMC10159524.

Xu F, Ziebarth JD, Goeminne LJ, Gao J, Williams EG, Quarles LD, **Makowski L**, **Cui Y**, Williams RW, Auwerx J, Lu L. Gene network based analysis identifies aco expression module involved in regulating plasma lipids with high-fat diet response. J Nutr Biochem. 2023 Sep;119:109398. doi:10. 1016/j. jnutbio. 2023. 109398. Epub 2023 Jun 10. PMID: 37302664.

Azim S, Zubair H, Rousselle T, McDaniels JM, Shetty AC, **Kuscu C**, Kuscu C, Talwar M, Eason JD, Maluf DG, Mas VR. Single-cell RNA sequencing reveals peripheral blood mononuclear immune cell landscape associated with operational tolerance in a kidney transplant recipient. Am J Transplant. 2023Sep;23(9):1434-1445. doi: 10. 1016/j. ajt. 2023. 04. 035. Epub 2023 May 16. PMID:37201755; PMCID: PMC10527369.

Khan F, Anelo OM, Sadiq Q, Effah W, Price G, Johnson DL, Ponnusamy S,Grimes B, Morrison ML, Fowke JH, Hayes DN, **Narayanan R**. Racial Differences in Androgen Receptor (AR) and AR Splice Variants (AR-SVs) Expression in Treatment-Naïve Androgen-Dependent Prostate Cancer. Biomedicines. 2023 Feb 21;11(3):648. doi: 10.3390/biomedicines11030648. PMID: 36979627; PMCID: PMC10044992.

Orgil BO, Munkhsaikhan U, Pierre JF, Li N, Xu F, Alberson NR, Johnson JN, Wetzel GT, Boukens BJD, Lu L, Towbin JA, **Purevjav E**. The TMEM43 S358L mutation affects cardiac, small intestine, and metabolic homeostasis in a knock-in mouse model. Am J Physiol Heart Circ Physiol. 2023 Jun 1;324(6):H866-H880. doi: 10. 1152/ajpheart. 00712. 2022. Epub 2023 Apr 21. PMID: 37083466; PMCID:PMC10190833.

Slayden AV, Dyer CL, Ma D, **Li W**, Bukiya AN, Parrill AL, Dopico AM. Discovery of agonist-antagonist pairs for the modulation of Ca[2]+ and voltage-gated K+ channels of large conductance that contain beta1 subunits. Bioorg Med Chem. 2022 Aug 15;68:116876. doi:10. 1016/j. bmc. 2022. 116876. Epub 2022 Jun 13. PMID: 35716586; PMCID: PMC10464842.

Mishra NK, Shrinath P, **Rao R**, Shukla PK. Sex-Specific Whole-Transcriptome Analysis in the Cerebral Cortex of FAE Offspring. Cells. 2023 Jan 15;12(2):328. doi: 10. 3390/cells12020328. PMID: 36672262; PMCID: PMC9856965.

Romero LO, Caires R, Kaitlyn Victor A, Ramirez J, Sierra-Valdez FJ, Walsh P, Truong V, Lee J, Mayor U, **Reiter LT**, Vásquez V, Cordero-Morales JF. Linoleic acid improves PIEZO2 dysfunction in a mouse model of Angelman Syndrome. Nat Commun. 2023 Mar 1;14(1):1167. doi: 10. 1038/s41467-023-36818-0. PMID: 36859399; PMCID: PMC9977963.

Vannier E, Richer LM, Dinh DM, Brisson D, Ostfeld RS, **Gomes-Solecki M**. Deployment of a Reservoir-Targeted Vaccine Against Borrelia burgdorferi Reduces the Prevalence of Babesia microti Coinfection in Ixodes scapularis Ticks. J Infect Dis. 2023 May 12;227(10):1127-1131. doi: 10. 1093/infdis/jiac462. PMID:36416014; PMCID: PMC10175066.

Wang X, Bajpai AK, Gu Q, Ashbrook DG, **Starlard-Davenport A**, Lu L. Weighted gene co-expression network analysis identifies key hub genes and pathways in acute myeloid leukemia. Front Genet. 2023 Feb 27;14:1009462. doi:10. 3389/fgene.2023. 1009462. PMID: 36923792; PMCID: PMC10008864.

Beasley MM, **Tunstall BJ**, Kearns DN. Intermittent access cocaine self-administration produces context-specific escalation and increased motivation. Drug Alcohol Depend. 2023 Apr 1;245:109797. doi:10. 1016/j. drugalcdep. 2023. 109797. Epub 2023 Feb 4. PMID: 36801708; PMCID:PMC10033440.

Beasley MM, Gunawan T, **Tunstall BJ**, Kearns DN. Intermittent access training produces greater motivation for a non-drug reinforcer than long access training. Learn Behav. 2022 Dec;50(4):509-523. doi: 10. 3758/s13420-022-00512-w. Epub 2022Feb 7. PMID: 35132517; PMCID: PMC10237344.

Gu Q, Palani CD, Smith A, Li B, Amos-Abanyie EK, Ogu U, Lu L, Pace BS, **Starlard-Davenport A**. MicroRNA29B induces fetal hemoglobin via inhibition of the HBG repressor protein MYB in vitro and in humanized sickle cell mice. Front Med (Lausanne). 2022 Nov 25;9:1043686. doi:10. 3389/fmed. 2022.1043686. PMID: 36507536; PMCID: PMC9732025.

Xiao Z, Cao L, Smith MD, Li H, **Li W**, Smith JC, Quarles LD. Genetic interactions between Polycystin-1 and TAZ in osteoblasts define a novel mechanosensing mechanism regulating bone formation in mice. Res Sq [Preprint]. 2023 May 29:rs. 3. rs-2957026. doi: 10. 21203/rs. 3. rs-2957026/v1. PMID: 37398127;PMCID: PMC10312920.

Deng S, Krutilina RI, Hartman KL, Chen H, Parke DN, Wang R, Mahmud F, Ma D, Lukka PB, Meibohm B, **Seagroves TN**, Miller DD, **Li W**. Colchicine-Binding Site Agent CH-2-77 as a Potent Tubulin Inhibitor Suppressing Triple-Negative Breast Cancer. Mol Cancer Ther. 2022 Jul 5;21(7):1103-1114. doi:10.1158/1535-7163.MCT-21-0899. PMID: 35499388; PMCID: PMC9256790.

Bajpai AK, Gu Q, Orgil BO, Xu F, Torres-Rojas C, Zhao W, Chen C, **Starlard-Davenport A**, Jones B, Lebeche D, Towbin JA, **Purevjav E**, Lu L, **Zhang W**. Cardiac copper content and its relationship with heart physiology: Insights based on quantitative genetic and functional analyses using BXD family mice. Front Cardiovasc Med. 2023 Feb 2;10:1089963. doi: 10. 3389/fcvm. 2023. 1089963. PMID:36818345; PMCID: PMC9931904.

Sakaria RP, Davidson JM, Coleman N, Wilcox A, **Talati AJ**. Improving RedReflex Screening in a Level III NICU Through a Quality Improvement-based Approach. Hosp Pediatr. 2022 Dec 1;12(12):1093-1100. doi:10. 1542/hpeds. 2022-006520. PMID: 36321385.

Dwyer AR, Perez Kerkvliet C, Truong TH, Hagen KM, Krutilina RI, Parke DN, Oakley RH, Liddle C, Cidlowski JA, **Seagroves TN**, Lange CA. Glucocorticoid Receptors Drive Breast Cancer Cell Migration and Metabolic Reprogramming viaPDK4. Endocrinology. 2023 Jun 6;164(7):bqad083. doi: 10.1210/endocr/bqad083.

Borooah S, Chekuri A, Pachauri S, Sahu B, Vorochikhina M, Suk JJ, BartschDU, Chavali VRM, **Jablonski MM**, Ayyagari R. A Novel Mouse Model for Late-Onset Retinal Degeneration (L-ORD) Develops RPE Abnormalities Due to the Loss ofC1qtnf5/Ctrp5. Adv Exp Med Biol 2023;1415:335-340. doi:10. 1007/978-3-031-27681-1_48. PMID: 37440053.

Dong W, Postlethwaite BC, Wheller PA, Brand D, Jiao Y, **Li W**, Myers LK, Gu W. Beta-caryophyllene prevents the defects in trabecular bone caused by Vitamin D deficiency through pathways instated by increased expression of klotho. Bone Joint Res. 2022 Aug;11(8):528-540. doi: 10. 1302/2046-3758. 118. BJR-2021-0392. R1. PMID: 35920089; PMCID: PMC9396919.

Krutilina RI, Hartman KL, Oluwalana D, Playa HC, Parke DN, Chen H, Miller DD, **Li W**, **Seagroves TN**. Sabizabulin, a Potent Orally Bioavailable Colchicine Binding Site Agent, Suppresses HER2+ Breast Cancer and Metastasis. Cancers (Basel). 2022 Oct 29;14(21):5336. doi: 10.3390/cancers14215336. PMID: 36358755; PMCID: PMC9658816.

Yasmen N, Sluter MN, Li L, Yu Y, **Jiang J**. Transient inhibition of microsomal prostaglandin E synthase-1 after status epilepticus blunts brain inflammation and is neuroprotective. Mol Brain. 2023 Jan 25;16(1):14. doi:10. 1186/s13041-023-01008-y. PMID: 36694204; PMCID: PMC9875432.

Xiao Y, Feng Q, Huang L, Meng X, Han P, **Zhang W**, Kang YJ. Copper promotes cardiac functional recovery via suppressing the transformation of fibroblasts to myofibroblasts in ischemia-infarcted monkey hearts. J Nutr Biochem. 2023Jan;111:109180. doi: 10. 1016/j. jnutbio. 2022. 109180. Epub 2022 Oct 12. PMID:36240958.

Samanta K, Azevedo JF, Nair N, Kundu S, **Gomes-Solecki M**. Infected Ixodess capularis Nymphs Maintained in Prolonged Questing under Optimal Environmental Conditions for One Year Can Transmit Borrelia burgdorferi (Borreliella genusnovum) to Uninfected Hosts. Microbiol Spectr. 2022 Aug 31;10(4):e0137722. doi: 10. 1128/spectrum. 01377-22. Epub 2022 Jul 11. PMID: 35862961; PMCID: PMC9431577.

Sipe LM, Chaib M, Korba EB, Jo H, Lovely MC, Counts BR, Tanveer U, Holt JR, Clements JC, John NA, Daria D, Marion TN, Bohm MS, Sekhri R, Pingili AK, Teng B, Carson JA, Hayes DN, Davis MJ, Cook KL, Pierre JF, **Makowski L**. Response to immune checkpoint blockade improved in pre-clinical model of breast cancer after bariatric surgery. Elife. 2022 Jul 1;11:e79143. doi: 10. 7554/eLife. 79143. PMID:35775614; PMCID: PMC9342954.

Kassan M, Kwon Y, Munkhsaikhan U, Sahyoun AM, Ishrat T, Galán M, Gonzalez AA, Abidi AH, Kassan A, Ait-Aissa K. Protective Role of Short-Chain Fatty Acids against Ang- II-Induced Mitochondrial Dysfunction in Brain Endothelial Cells: A Potential Role of Heme Oxygenase 2. Antioxidants (Basel). 2023 Jan 10;12(1):160. doi: 10. 3390/antiox12010160. PMID: 36671022; PMCID: PMC9854784.

Christofi E, Chazirakis A, Chrysostomou C, Nicolaou MA, **Li W**, Doxastakis M, Harmandaris VA. Deep convolutional neural networks for generating atomistic configurations of multi-component macromolecules from coarse-grained models. JChem Phys. 2022 Nov 14;157(18):184903. doi: 10. 1063/5. 0110322. PMID: 36379782.

Orgil BO, Xu F, Munkhsaikhan U, Alberson NR, Bajpai AK, Johnson JN, Sun Y, Towbin JA, Lu L, **Purevjav E**. Echocardiography phenotyping in murine genetic reference population of BXD strains reveals significant QTLs associated with cardiac function and morphology. Physiol Genomics. 2023 Feb 1;55(2):51-66 doi:10. 1152/physiolgenomics. 00120. 2022. Epub 2022 Dec 19. PMID: 36534598; PMCID: PMC9902221.

Gage GA, Muench MA, Jee C, Kearns DN, Chen H, **Tunstall BJ**. Intermittent-access operant alcohol self-administration promotes binge-like drinking and drinking despite negative consequences in male and female heterogeneous stock rats. Neuropharmacology. 2023 Sep 1;235:109564. doi:10. 1016/j. neuropharm. 2023. 109564 Epub 2023 May 5. PMID: 37149215; PMCID: PMC10247413.

Sluter MN, Bhuniya R, Yuan X, Ramaraju A, Chen Y, Yu Y, Parmar KR, Temrikar ZH, Srivastava A, Meibohm B, **Jiang J**, **Yang CY**. Novel, Brain-Permeable, Cross-Species Benzothiazole Inhibitors of Microsomal Prostaglandin E Synthase-1(mPGES-1) Dampen Neuroinflammation In Vitro and In Vivo. ACS Pharmacol Transl Sci. 2023 Mar 21;6(4):587-599. doi: 10. 1021/acsptsci. 2c00241. PMID: 37082746; PMCID: PMC10111624.

Hwang DJ, He Y, Ponnusamy S, Thiyagarajan T, Mohler ML, **Narayanan R**, Miller DD. Metabolism-Guided Selective Androgen Receptor Antagonists: Design, Synthesis, and

Biological Evaluation for Activity against Enzalutamide-Resistant Prostate Cancer. J Med Chem. 2023 Mar 9;66(5):3372-3392. doi:10. 1021/acs. jmedchem. 2c01858. Epub 2023 Feb 24. PMID: 36825758; PMCID: PMC10243532.

Aithabathula RV, Pervaiz N, Kathuria I, Swanson M, **Singh UP**, Kumar S, Park F, **Singla B**. Hydrogen sulfide donor activates AKT-eNOS signaling and promotes lymphatic vessel formation. PLoS One. 2023 Oct 26;18(10):e0292663. doi:10. 1371/journal. pone. 0292663. PMID: 37883422; PMCID: PMC10602273.

II. Conferences / Presentations

- Artificial Intelligence in Medicine with the Arkansas Bioinformatics Group
- MidSouth Computational Biology and Bioinformatics Society (MCBIOS)
- UTHSC Research Resource Fair, 2023

III. PRESENTATIONS GIVEN TO PROMOTE CORE RESOURCES AND CORE USAGE

A. Tours

Ten tours for new faculty were given. Dr. Johnson met with five postdocs to discuss core services and bioinformatics analysis.

B. Courses and Internal Presentations

Co-Course Director, PATH942, Web-Based Bioinformatics and Computational Biology Tools (Dr. Johnson also developed the course materials.)

IV. SUMMARY OF ACTIVITIES

A. Personnel

Director: Daniel L. Johnson, PhD (100% effort)

B. Oversight Committee

The following faculty were members of the FY23 Molecular Bioinformatics Core Internal Advisory Board (IAB):

Lawrence Reiter (Neurology), *IAB Chair*
Ramesh Narayanan (Medicine – Hematology)
Megan Mulligan (Genetics, Genomics, and Informatics)
Salvatore Mancarella (Physiology)
Nick Laribee (Pathology)

C. Equipment

Equipment currently maintained in the core (all functional):

Equipment	Cost	Funding Source	Year of Purchase
Analysis Server	$3,400	Office of Research	2015
Analysis Server	$3,400	Office of Research	2015
Analysis Server	$3,400	Recharge Fees, mBIO	2016
Analysis Server	$3,400	Recharge Fees, mBIO	2016
Deep Storage System	$5,400	Office of Research	2017
Windows 10 Server for SPSS and GSEA software	$2,100	Recharge Fees, mBIO	2018
Software Development Center	$2,300	Recharge Fees, mBIO	2018
Analysis Server	$3,200	Recharge Fees, mBIO	2021
Analysis Server	$3,200	Recharge Fees, mBio	2021
File Storage (for individual PIs to access)	$30,000	Office of the Chancellor (initial core investment)	2015

D. Service Contracts

No service contracts are needed since all equipment is maintained locally by Dr. Johnson.

E. FY23 Usage Volumes by Service Request Type

- 557 service requests, inclusive of resale of 131 site licenses for GraphPad Prism. The remainder of requests were for biostatistics, alignments, peak annotations and peak calling, data quality control and normalization, data mining, data visualization and gene set enrichment analysis. A total of 68 total hours of custom data mining or scripting was invoiced in FY23.
- The core served 59 internal research laboratories across 16 departments and four UHTSC Colleges (COM, COP, COD, and CGHS), plus one user at UTK in Microbiology). One external user (Duke University) was also served. Dr. Johnson provided 17 letters of support for grant submissions.

Departments served, FY23

Pharmaceutical Sciences	8 users
Physiology	8 users
Neurology	5 users
Pediatrics	5 users
Genetics, Genomics and Informatics	4 users
MIB	4 users
Pharmacology	4 users
Anatomy & Neurobiology	3 users

Ophthalmology	3 users
Pathology	3 users
Medicine	2 users
Transplant Surgery	2 users
Bioscience Research	1 user
College of Graduate Health Sciences	1 user
Orthopaedic Surgery	1 user
Surgery	1 user
UTK, Microbiology	1 user
External user	Duke University

F. Multi-year trends

FY23 was the eighth full service for the mBIO Core. Service requests and revenues have increased for FY23 compared to FY22.

G. FY23 Fee Structure

In FY18, per recommendation of the mBIO Internal Advisory Board, the core moved to a flat-fee schedule rather than an hourly or custom scripting/data mining fee structure. The chart below shows the FY23 service fees associated with each type of service task.

Service	
Advanced Clustering	$51.50 per experiment
Alignment	$10.30 per sample
Biostatistics	$34.90 per paired condition
Custom Scripting	$45.02 per hour (1 hour min)
Data Mining	$81.03 per hour (1 hour min)
David Pathway Analysis	$57.40 per paired comparison
Gene Set Enrichment Analysis	$86.66 per paired comparison
GEO Upload Support	$231.86 per experiment
Hands-On Training	$70 per hour
Heatmap	$12.38 per image
iPathway Guide Analysis	$150 per comparison
Pearson's correlation coefficient	$12.38 per image
Principal Components Analysis	$23.64 per image
Quality Control Assurance	$5.15 per sample
String Analysis	$56.28 per comparison
Variant Calls	$86.66 per sample
Venn Diagram	$12.38 per image
Volcano Plot	$12.38 per image
GraphPad Prism license	$113.30
Long-term data storage	$100/TB for 3 years of mirrored storage

V. GRANTS SUPPORTED BY THE CORE, FY23

Bajwa, Amandeep
USPHS Grant DK-117183, Mitochondrial Therapy for Kidney Injury

Collier, Daniel
USPHS Grant HL-133451, Trauma Induced Endothelial Cell Ca2+ Signaling

Cui, Yan
USPHS Grant CA-262296, Algorithm-based prevention and reduction of cancer health disparity arising from data inequality

Foehring, Robert
USPHS Grant NS-044163, Dynamics of Kv channel function in identified populations of pyramidal neurons in neocortex

Freeman, Kevin
USPHS Grant CA-216394, Dissecting the contribution of the transcriptional regulators of SNS fate to neuroblastoma oncogenesis

Gadiparthi, Rao
USPHS Grant HL-103575, GPCR Signaling and Vascular Wall Remodeling

Gangaraju, Raja Shekhar
Department of Defense Grant W81XWH2210697, TSG6 Exosomes for Treatment of Visual Dysfunction as Related to Military-Relevant Trauma

USPHS Grant NS-127924, Regulation of Mesenchymal Stem Cell Secretome for Treatment of Microglia Damage in Traumatic Brain Injury

Gomes-Solecki, Maria
University of Iowa-Subcontract to USPHS AI-139267, Field trial and modeling of transmission-blocking vaccine to prevent Lyme disease

Makowski (Hayes), Liza
NIH R073366239, Determining the contribution of microbial-derived metabolites to protective immunity in obesity-driven cancer risk.

Hevener, Kirk
Department of Defense Grant W81XWH2010296, Development and evaluation of inhibitors of the C. difficile enzyme, FabK, as microbiome-sparing antibacterials

Huang, George
National Kaohsiung Normal University subcontract, Investigating biochemical mechanisms underlying mind-matter interactions: effect of intention on human stem cell properties via cryptochrome

Jiang, Jianxiong
USPHS Grant NS-100947, Inflammatory regulation of neurotrophin signaling in epileptogenesis

Kassan, Modar
USPHS Grant Hl-150360, MiR-204 regulates type 1 IP3R/Ca2+ axis to control vascular smooth muscle cell contractility and blood pressure: Potential role of the gut microbiome

Khan, Mohammad Moshahid
USPHS Grant NS-114616, Examining Progression of a Neurodegenerative Disorder

University of the Rio Grande Valley – Alzheimer's Foundation- subcontract, LncRNA Malat1 as a potential therapeutic target for Alzheimer's Disease

Kim, Il Hwan
USPHS Grant MH-117429, Genes, Neural Circuits and Behavior

Kim, Ki
USPHS Grant DK-129367, The role of enteroendocrine cell differentiation in the success of bariatric surgery

Laribee, Ronald
USPHS Grant CA-233028, Endolysosomal-nuclear communication mediated through V-ATPase and NHE9 dependent epigenetic signaling

Li, Wei
Veru-111 & analogs sponsored research by Veru Inc.

Department of Defense Grant W81XWH2010011, Discovery of Orally Bioavailable Tubulin Inhibitors to Overcome Taxane Resistance in Metastatic Breast Cancer

Makowski, Liza
USPHS Grant CA-253329, Role of microbial-modulated bile acid receptor signaling in breast cancer

USPHS Grant CA-272541, Determining the contribution of microbial-derived metabolites to protective immunity in obesity-driven cancer risk

Mancarella, Salvatore
USPHS Grant HL-153638, Defining the roles of Orai3 channel in cardiomyocytes and cardiomyopathy

Mandal, Nawajes
USPHS Grant EY-031316, Sphingolipids and their Impact in Corneal Wound Healing

Narayanan, Ramesh
Oncternal Therapeutics contract

Nowak Jr, Thaddeus S
USPHS Grant NS-113957, Genetics of stroke vulnerability in C57BL/6 mouse substrains

Parfenova, Elena
USPHS Grant NS-105655, Endothelial Vasoprotection by Hypothermia

Rao, Radhakrishna
USPHS Grant AA-029270, Defining the Role of Intestinal Calcium Channels in Alcoholic Liver Damage

Reiter, Lawrence
Subcontract with Lurie Children's Hospital Chicago, IL, Rapid-onset Obesity with Hypothalamic dysfunction, Hypoventilation, & Autonomic Dysregulation (ROHHAD): Dental Pulp Stem Cell-Derived Models to Investigate Cause & Consequences

Foundation for Prader-Willi Research, Analysis of Delayed Neural Development in PWS DPSC Derived Neurons

Seagroves, Tiffany
Department of Defense W81XWH2010019, Discovery of Orally Bioavailable Tubulin Inhibitors to Overcome Taxane Resistance in Metastatic Breast Cancer (Partnering PI)

Singh, Udai
USPHS Grant AI-140405, Adipose T cell microRNAs (miRs) regulate macrophage function during obesity

Sun, Zhongjie
USPHS Grant AG-062375, Epigenetic Regulation of Kidney Function and Blood Pressure

Towbin, Jeffrey Allen
USPHS Grant HL-151438, Discovery of modifier genes in cardiomyopathy

Xiao, Jianfeng
USPHS Grant NS-119967, Identification and characterization of the gene associated with the spontaneous autosomal recessive spinning mice

Xu, Junwang
USPHS Grant GM-128660, The role of long non-coding RNA GAS5 in diabetic wounds

VI. BUSINESS DEVELOPMENT

A. Market Assessment

In FY23, this core processed 557 requests including 68 hours of custom data mining or custom scripting on behalf of 59 total users across 17 departments and four colleges (COM, COP, COD, and CGHS) at UTHSC and one user from UTK. Dr. Johnson provided 17 letters of support for grant submissions. The core provided office hours and consultations for >50 investigators and students. To reach out to external customers, the director also attended the Arkansas Artificial Intelligence (AI) meeting and the MCBIOS meeting.

B. Marketing Plans to Obtain New Business

The focus of marketing for the mBIO core in FY24 will be to continue expanding the core customer base throughout the UTHSC system and the Mid-South/Delta region. We will continue participating in events sponsored by the Office of Research, holding local seminars and workshops, and expanding the mBIO Core website. Dr. Johnson presents a series of talks each spring to educate new researchers in bioinformatics workflows, and to advertise the mBIO core services.

C. Forecasted Volumes for New Business and Recommendations for FY24

The core increased pricing 3% for the FY24 period over FY23. This new rate structure became effective July 1, 2023, and continues to place UTHSC in the bottom-third of peer academic institutions that offer bioinformatics services. Based on the IAB recommendations in FY18, the core moved to a flat fee structure in FY19 for all services other than custom scripting and data mining. We will continue the trend of sample-based fee rather than hourly rates.

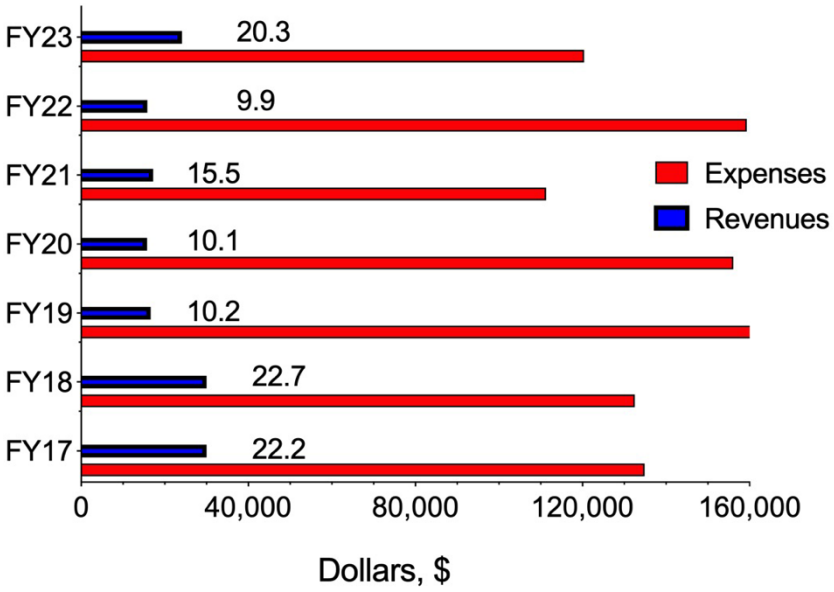
In FY23 the number of licenses for Prism (GraphPad) software for statistics and graphing increased to a 131 total licenses. Prism access is provided as a renewable institutional site license through the mBIO core (i.e., each license must be renewed each year). A license is needed for every unique computer address and cannot be shared among computers located within the same laboratory. The cost of Prism will increase by approximately 35% in FY24 and these increases will be passed on to customers in FY24 at the time of renewal.

The external customer markup rate for services will continue to be 20%, which is the rate approved for the mBIO service center, and the rate approved by the Office of Finance in 2017. This level of markup is consistent with other regional cores that offer bioinformatics services to external customers.

VI. Actual Budget FY22 (July 1, 2022 to June 30, 2023)

FY2023	DEBITS	CREDITS
Salaries	85,788	
Supplies	34,603	
Service Contracts	0	
Equipment (> $5,000)	0	
Other Expenses	0	
TOTAL EXPENSES	***120,391***	
FY23 Internal Recoveries		24,119
FY23 External Recoveries		0
TOTAL CREDITS		***24,119***
Income / (Subsidy)	(96,272)	
State Appropriation	163,189	
Net Income / (Subsidy)	**66,917**	

VII. Historical Revenues and Expenses, FY17-FY23



Expenses (red bars) and revenues (blue bars) are shown for each FY since FY17. The numbers beside the blue bar indicate the percentage of expenses covered by the revenues that are generated by service fees. The state appropriation/budget subsidy allocated to the core is not reflected in this figure.

Proteomics and Metabolomics (PMC) Institutional Research Core Facility Analysis Report- FY23

Written by David Kakhniashvili, PhD; Natalie Smith, MS; and Tiffany Seagroves, PhD

1. Relative to a specific core's mission, is the designation as an "institutional core" appropriate?

The PMC designation as an institutional core is appropriate. The Proteomics Unit served 11 internal users (8 on the Memphis campus and 3 on the UT Knoxville campus) across 8 departments in two UTHSC colleges (Memphis, COM and CON) and 3 departments in 2 UTK colleges. Three external academic users from Michigan State University (MSU), Carnegie Mellon University (CMU, Pittsburgh, PA), and Duke University were also served.

2. Does the core pass the multi-departmental, multi-investigator litmus test?

Yes. The Proteomics Unit served 11 internal users across from eight departments within two UTHSC colleges and 3 departments within 2 UTK colleges, and three external users. The top three users of the PMC, as a percentage of total invoices for completed services were: 1) Klaus Schughart (22.92%, Microbiology, Immunology & Biochemistry, COM, UTHSC), 2) Charity Oyedeji (12.41%, Duke University), and 3) Keesha Roach (9.03%, Community and Population Health, CON, UTHSC). The other PMC users accounted for 55.64% of invoices.

3. Is there sufficient intra- and inter-departmental use and if not, why?

Yes, use of the PMC has increased over FY22 levels and there are returning laboratory users year over year across several departments and at least two colleges. Several grants were recently awarded requiring PMC services.

4. Can the services for the core be outsourced more economically?

No. The UTHSC core's prices for all services remain within the bottom half to third relative to our academic peer institutions. Commercial vendors that offer proteomics (Biognosys, MS Bioworks, etc.) or metabolomics (like Metabolon) cannot compete with academic pricing.

5. Are there unaccounted benefits beyond fiscal consideration to warrant continued institutional underwriting (e.g., grants funded through investigator use, publications, etc.)?

Yes. Reviewers of federal grant applications expect that investigators have local access to proteomics and metabolomics technologies and local experts for project consultation and data analysis. In addition, in FY23, the PMC provided 10 letters of support for new grant applications. These proposals either included core services deemed essential to complete the proposed scientific aims, or included preliminary data generated in the PMC to support the proposed hypotheses; grant submissions are detailed in the core activities report. In FY23, the Proteomics Unit of PMC supported 15 PubMed-indexed publications and 8 grant awards.

6. Is the core currently self-sufficient or is it subsidized by the institution?
The PMC is subsidized by the institution. The total net income of the Proteomics Unit of PMC and the PMC Core as a whole was $1,335 after the state appropriation ($129,474).

7. Accomplishments, FY23

- Increased usage by UTK and external users
- The PMC supported 15 publications, with additional manuscripts either in review

Financial Overview – FY23:

PMC, Proteomics and Untargeted Metabolomics Unit:

TOTALS	FY17	FY18	FY19	FY20	FY21	FY22	FY23*
Revenues	26,470	37,827	40,930	26,237	15,326	40,136	52,888
Expenses	(143,921)	(163,712)	(139,814)	(163,774)	(110,341)	(130,261)	(181,027)
Income (Subsidy)	(117,451)	(125,885)	(98,884)	(137,537)	(95,015)	(90,125)	(128,139)
Other Costs	(5,356)	0	0	0	0	0	0
Income (Subsidy)	(122,807)	(125,885)	(98,884)	(137,537)	(95,015)	(90,125)	(128,139)
State Appropriation	90,640	93,360	95,694	97,608	138,942	150,325	129,474
Net Income (Subsidy)	(32,167)	(32,525)	(3,190)	(39,929)	43,927	60,200	1,335
Subsidy, % before Appropriation	82%	77%	71%	84%	86%	70%	71%
Subsidy, % after State Appropriation	22%	20%	2%	24%	--	--	<1%

*All values in FY23 are for the Proteomics Unit only

MPMS Unit (Operations FY20-FY22)

TOTALS	FY20	FY21	FY22
Revenues	44,710	41,216	21,140
Expenses	(66,970)	(80,841)	(53,358)
Income (Subsidy)	(22,260)	(39,625)	(32,218)
Other Costs	0	0	0
Income (Subsidy)	(22,260)	(39,625)	(32,218)
State Appropriation	0	7,828	10,642
Net Income (Subsidy)	(22,260)	(31,797)	(21,576)
Subsidy, % before State Appropriation	33%	49%	60%
Subsidy, % after State Appropriation	33%	39%	40%

7. Suggested outcomes:
It is recommended that the PMC continue as an institutional core, focused on untargeted proteomics analysis.

Proteomics & Metabolomics Core (PMC)
Summary of Institutional Core Activities for FY23

Written by David Kakhniashvili, PhD; Natalie Smith, MS; and Tiffany Seagroves, PhD

I. PUBLICATIONS:

Full-length published articles (UTHSC investigator appears in bold; external users in italics; the core director is underlined)

Proteomics and Untargeted Metabolomics Unit:

Thiyagarajan T, Ponnusamy S, Hwang DJ, He Y, Asemota S, Young KL, Johnson DL, Bocharova V, Zhou W, Jain AK, Petricoin EF, Yin Z, Pfeffer LM, Miller DD, **Narayanan R**. Inhibiting androgen receptor splice variants with cysteine-selective irreversible covalent inhibitors to treat prostate cancer. Proc Natl Acad Sci U S A. 2023 Jan 3;120(1):e2211832120. doi: 10.1073/pnas.2211832120.Epub 2022 Dec 28. PMID: 36577061; PMCID: PMC9910435.

Laribee RN, Boucher AB, Madireddy S, Pfeffer LM. The STAT3-Regulated Autophagy Pathway in Glioblastoma. Pharmaceuticals (Basel). 2023 Apr29;16(5):671. doi: 10.3390/ph16050671. PMID: 37242454; PMCID: PMC10223172.

Butler MG, Victor AK, **Reiter LT**. Autonomic nervous system dysfunction in Prader-Willi syndrome. Clin Auton Res. 2023 Jun;33(3):281-286. doi:10.1007/s10286-022-00909-7. Epub 2022 Dec 14. PMID: 36515769.

Bahouth SW, Nooh MM, **Mancarella S**. Involvement of SAP97 anchored multiprotein complexes in regulating cardiorenal signaling and trafficking networks. Biochem Pharmacol. 2023 Feb;208:115406. doi: 10.1016/j.bcp.2022.115406. Epub 2022 Dec31. PMID: 36596415.

Wang Y, **Schughart K**, Pelaia TM, Chew T, Kim K, Karvunidis T, Knippenberg B, Teoh S, Phu AL, Short KR, Iredell J, Thevarajan I, Audsley J, Macdonald S, Burcham J, Predict-Consortium, Tang B, McLean A, Shojaei M. Pathway and Network Analyses Identify Growth Factor Signaling and MMP9 as Potential Mediators of Mitochondrial Dysfunction in Severe COVID-19. Int J Mol Sci. 2023 Jan28;24(3):2524. doi: 10.3390/ijms24032524. PMID: 36768847; PMCID: PMC9917147.

Li M, Li L, Asemota S, Kakhniashvili D, **Narayanan R**, Wang X, Liao FF. Reciprocal interplay between OTULIN-LUBAC determines genotoxic and inflammatory NF-κB signal responses. Proc Natl Acad Sci U S A. 2022 Aug16;119(33):e2123097119. doi: 10.1073/pnas.2123097119. Epub 2022 Aug 8. PMID:35939695; PMCID: PMC9388121.

Victor AK, Hedgecock T, Donaldson M, Johnson D, Rand CM, Weese-Mayer DE, **Reiter LT**. Analysis and comparisons of gene expression changes in patient-derived neurons from ROHHAD, CCHS, and PWS. Front Pediatr. 2023 May10;11:1090084. doi: 10.3389/fped.2023.1090084. PMID: 37234859; PMCID:PMC10206321.

Kim S, Kim YE, **Kim IH**. Simultaneous analysis of social behaviors and neural responses in mice using round social arena system. STAR Protoc. 2022 Dec16;3(4):101722. doi: 10.1016/j.xpro.2022.101722. Epub 2022 Sep 24. PMID:36153733; PMCID: PMC9513260.

Wang Y, **Schughart K**, Pelaia TM, Chew T, Kim K, Karvunidis T, Knippenberg B, Teoh S, Phu AL, Short KR, Iredell J, Thevarajan I, Audsley J, Macdonald S, Burcham J, McLean A; PREDICT-19 consortium; Tang B, Shojaei M. Blood transcriptome responses in patients correlate with severity of COVID-19 disease. Front Immunol. 2023 Jan 20;13:1043219. doi: 10.3389/fimmu.2022.1043219. PMID:36741372; PMCID: PMC9896980.

Kim YE, Kim S, **Kim IH**. Neural circuit-specific gene manipulation in mouse brain in vivo using split-intein-mediated split-Cre system. STAR Protoc.2022 Nov 3;3(4):101807. doi: 10.1016/j.xpro.2022.101807. PMID: 36386891; PMCID:PMC9641071.

Khan F, Anelo OM, Sadiq Q, Effah W, Price G, Johnson DL, Ponnusamy S, Grimes B, Morrison ML, Fowke JH, Hayes DN, **Narayanan R**. Racial Differences in Androgen Receptor (AR) and AR Splice Variants (AR-SVs) Expression in Treatment-Naïve Androgen-Dependent Prostate Cancer. Biomedicines. 2023 Feb 21;11(3):648. doi:10.3390/biomedicines11030648. PMID: 36979627; PMCID: PMC10044992.

Romero LO, Caires R, Kaitlyn Victor A, Ramirez J, Sierra-Valdez FJ, Walsh P, Truong V, Lee J, Mayor U, **Reiter LT**, Vásquez V, Cordero-Morales JF. Linoleic acid improves PIEZO2 dysfunction in a mouse model of Angelman Syndrome. Nat Commun. 2023 Mar 1;14(1):1167. doi: 10.1038/s41467-023-36818-0. PMID: 36859399;PMCID: PMC9977963.

Faist A, Schloer S, Mecate-Zambrano A, Janowski J, Schreiber A, Boergeling Y, Conrad BCG, Kumar S, Toebben L, **Schughart K**, Baumgardt M, Kessler M, HoenzkeK, Hocke A, Trautmann M, Hartmann W, Kato H, Rescher U, Christersson A, Kuehn J, Mellmann A, Wolff T, Kuempers P, Rovas A, Wiewrodt R, Wiebe K, Barth P, Ludwig S, Brunotte L. Inhibition of p38 signaling curtails the SARS-CoV-2 induced inflammatory response but retains the IFN-dependent antiviral defense of the lung epithelial barrier. Antiviral Res. 2023 Jan;209:105475. doi:10.1016/j.antiviral.2022.105475. Epub 2022 Nov 21. PMID: 36423831; PMCID:PMC9677559.

Heydemann L, Ciurkiewicz M, Beythien G, Becker K, **Schughart K**, Stanelle-Bertram S, Schaumburg B, Mounogou-Kouassi N, Beck S, Zickler M, Kühnel M, Gabriel G, Beineke A, Baumgärtner W, Armando F. Hamster model for post-COVID-19alveolar regeneration offers an opportunity to understand post-acute sequelae ofSARS-CoV-2. Nat Commun. 2023 Jun 5;14(1):3267. doi: 10.1038/s41467-023-39049-5.PMID: 37277327; PMCID: PMC10241385.

Hwang DJ, He Y, Ponnusamy S, Thiyagarajan T, Mohler ML, **Narayanan R**, Miller DD. Metabolism-Guided Selective Androgen Receptor Antagonists: Design, Synthesis, and Biological Evaluation for Activity against Enzalutamide-Resistant Prostate Cancer. J Med Chem. 2023 Mar 9;66(5):3372-3392. doi:10.1021/acs.jmedchem.2c01858. Epub 2023 Feb 24. PMID: 36825758; PMCID:PMC10243532.

II. PRESENTATIONS GIVEN TO PROMOTE CORE USAGE

Three PMC tours for investigators by Dr. Kakhniashvili

10-04-2022 Fall 2022: mBIO Core Bioinformatics Workshop Series:
"Common Molecular Tools and Data Analysis Workflow to Accelerate Your Research"

1. "Proteomics and Pathway Analysis"
   Presented by Dr. Johnson, Molecular Bioinformatics Core
2. "PMC: Instrumentation, Applications, and Services"
   Presented by Dr. Kakhniashvili

III. SUMMARY OF ACTIVITIES

A. Personnel

PMC Core Director: David Kakhniashvili, Ph.D. (100% effort)

Oversight Committee (Internal Advisory Board)
Sarka Beranova, Ph.D. (Pharmaceutical Sciences)
Ivan Gerling, Ph.D. (Medicine-Endocrinology)
Lawrence Reiter, Ph.D. (Neurology)
Heather Smallwood, Ph.D. (Pediatrics); *CHAIR*
Salvatore Mancarella, Ph.D. (Physiology)

B. Equipment Used

Equipment	Cost	Funding Source; Fiscal Year Purchased
Mass Spectrometer – Thermo Fisher Orbitrap Fusion Lumos* + UHPLC units*	$1,027150	Office of Research 2016
UHPLC – Thermo Fisher UltiMate 3000 RSLC Nano*		Office of Research 2016
UHPLC – Thermo Fisher Vanquish*		Office of Research 2016
SpeedVac – Thermo Fisher SPD1010-115	$10,629	Office of Research 2016

NanoDrop One – Thermo Fisher	$8,984	Office of Research 2016
Server Computer	$6,272	Office of Research 2016
SW – Protein Metrics Bionic	$7,700	Office of Research 2016
Micro-centrifuge Legend Micro 21R Sorvall w/RTR	$5,356	Office of Research 2017
Freezer TDE-600, -80C Thermo Fisher	$12, 190	Office of Research 2022
Total cost of equipment (>$5,000)	**$1,078, 281**	

*Equipment necessary to launch the core

Service Contracts

Proteomics and Untargeted Metabolomics Unit:

Service Contract #	Equipment Covered	Vendor	Cost, $
40411585	Mass spectrometer Orbitrap Fusion Lumos	Thermo Electron North America	60,114
	UHPLC Ultimate 3000RSLCnano Pump		6,380
	UHPLC Ultimate 3000RSLCnano Auto-sampler WPS-3000TPL RS		2,899
Sub-Total			69,393
Discount, 10%			-6,939.30
Total			**$62,453.70**

D. Usage Volumes (Invoices by Service Type, PI and Department), FY23

Proteomics and Untargeted Metabolomics Services:

Internal (UTHSC) Users		**Usage Volume, $**	
College, Department	**PI**	**PI, Total**	**UTHSC only Departments Total**
COM, Medicine	Narayanan, R.	1,530.24	1,530.24
COM, Physiology	Mancarella, S.	5,112.66	5,112.66
COM, Anatomy & Neurobiology	Kim, Il Hwan	2,643.12	2,643.12
COM, Neurology	Reiter, L.	5,951.45	5,951.45
COM, Genetics, Genomics & Informatics	Freeman, K.	4,138.58	4,138.58
COM, Pathology	Laribee, N.	4,537.10	4,537.10
COM, Microbiol., Immunol & Biochemistry	Schughart, K.	17,267.86	17,267.86
CON, Community & Population Health	Roach, K.	6,797.67	6,797.67
UT-Knoxville, Animal Sci.	Mathew, D.	3,999.65	-
UT-Knoxville, Microbiology	Johnson, J.	5,379.99	-
UT-Knoxville, Chem. & Biomol. Engineering	Dalhaimer, P.	2,677.92	-
	Internal Users, Total	**60,036.24**	**47,978.68**
External Users		**Usage Volume, $**	
Institution	**PI**	**PI, Total**	**Institution**
Michigan State University (MSU)	Ashkarran, A.	1,043.34	MSU
Carnegie Melone University (CMU)	Wayne, E.	4,896.48	CMU
Duke University	Oyedeji, C.	9,350.33	Duke Univ.
	External Users, Total	**15,290.15**	
Total Invoiced (Internal and External Users)		**75,326.39**	

E. Multi-year trends (comparison to previous FY)

Proteomics and Untargeted Metabolomics Unit:

Internal (UTHSC) Users	Usage Volume, $					
College, Department	**FY18**	**FY19**	**FY20**	**FY21**	**FY22**	**FY23**
COM, Medicine	2,210	2,235.10	17,208.09	4,441.62	12,195.45	1,530.24
COM, MIB	410	0	0	0	0	17,267.86
COM, Neurology	0	0	0	0	1,654.53	5,951.45
COM, Pathology	0	0	2,985.58	4,348.21	0	4,537.10
COM, Pediatrics	510	5,211.80	116.70	0	0	0
COM, Pharmacology	15,850	15,501.50	0	2,283.80	1,024.22	0
COM, Physiology	7,140	6,386	1,209.43	0	4,985.99	5,112.66
COM, Anatomy & Neurobiology	0	0	0	2.199.12	0	2,643.12
COM, Diagnostic and Health Sci.	0	0	0	0	2,566.08	0
COM, GG&I	0	0	0	0	0	4,138.58
COD, Bioscience Research	0	6,859.80	0	0	0	0
COP, Pharmaceutical Sci.	10,720	2,904.60	0	513.58	1,519.48	0
CON, Com. and Popul. Health	0	0	0	0	0	6,797.67
Internal Users, Total	**36,840**	**39,099**	**21,520**	**13,786**	**23,945.75**	**47,978.68**
External Users	**3,496.50**	**12,700**	**1,082**	**1,202**	**14,987.71**	**27,347.71**
Internal and External Users	**40,337**	**51,799**	**22,602**	**14,988**	**38,933.42**	**75,326.39**

F. FY23 Service Fee Structure

PMC: PROTEOMICS AND UNTARGETED METABOLOMICS UNIT:

Protein iTRAQ (isobaric tags for relative and absolute quantification)/TMT (tandem mass tags) labeling:

4-plex:	$811.50
6-plex:	$1,159.28
8-plex:	$1,449.10
10-plex	$1,565.03
11-plex	$1,644.40
16-plex	$1,905.50

Protein identification:
LC/MS/MS, DB search, note: does not include sample digestion/preparation)

RP LC/MS/MS (30 min):	$81.14/run
RP LC/MS/MS (60 min):	$127.52/run
RP LC/MS/MS (120 min):	$208.67/run
RP LC/MS/MS (240 min):	$347.78/run

Protein identification and mapping of specified post-translational modifications (PTM):
LC/MS/MS, DB/PTM search, note: does not include sample digestion/preparation

RP LC/MS/MS (60 min):	$127.52/sample
RP LC/MS/MS (120 min):	$208.67/sample
RP LC/MS/MS (240 min):	$347.78/sample
Search for specified PTMs:	$34.77/PTM

Differential protein expression analysis by iTRAQ/PMT (reporter ion quantification):
LC/MS/MS, DB search/quantification, note: does not include sample labeling/preparation

Unfractionated mixture of labeled peptides, 2hr RP-LC/MS/MS:	$231.86/run
Unfractionated mixture of labeled Peptides, 4hr RP-LC/MS/MS:	$382.56/run

Differential protein expression analysis by SILAC analysis (precursor ion quantification):
LC/MS/MS, DB search/quantification, note: does not include sample labeling/preparation

Unfractionated mixture of labeled peptides, 2hr RP-LC/MS/MS:	$231.86/run

Unfractionated mixture of labeled Peptides, 4hr RP-LC/MS/MS:	$382.56/run

Protein differential expression analysis, MudPIT:
MudPit, DB search, note: does not include sample digestion/preparation; 2hr RP-LC/MS/MS/fraction:

6 (SCX or HpHRP) step fractions	$173.89
7-12 (SCX or HpHRP) step fractions:	$168.09
>12 (SCX or HpHRP) step fractions:	$162.31

Absolute quantification of specified (targeted) proteins (parallel reaction monitoring):
PRM analysis for peptide quantification, note: does not include sample digestion/preparation

LC/MC/MS (30 min)	$92.74/run
LC/MS/MS (60 min)	$144.91/run
LC/MS/MS (120 min)	$231.86/run

Absolute quantification of specified metabolites/small molecules:
LC/MS/MS, post-acquisition analysis, calibration curve, internal standard, AUC quantification

LC/MS/MS (15 min):	$19.71/run
LC/MS/MS (30 min):	$34.77/run

Differential quantification of metabolites – untargeted analysis
LC/HRAM-MS/MS, post-acquisition analysis, HRAM AUC quantification, MS/MS identification

LC/MS/MS (15 min):	$34.77/run
LC/MS/MS (30 min):	$57.97/run

Consultation (initial consult-no cost): $106.09/consult

Volume Discount for PMC Bulk MS runs:

The volume MS “run” discount rate does not include reagents or kits, such as the TMT kit for isobaric labeling, or labor-intensive steps, such as sample processing, but will be applied to MS “runs”.

The below volume discount rate will be applied if samples are submitted simultaneously for processing in bulk*, or after the volume threshold has been met for the current FY.

30-49 MS runs, for a single project:	10% discount, all MS runs
50-99 MS runs, for a single project:	15% discount, all MS runs

100+ MS runs, for a single project: 20% discount, all MS runs

*If samples are submitted piecemeal, then the volume discount will be applied only for those MS runs that exceed the discount threshold. For example, if a PI submits three sets of samples requiring 15, then 10, then 20 MS runs, for a total of 45 MS runs that are completed at different times on separate iLab service requests, then the discount would be applied at MS run #31 onwards.

IV. GRANTS SUPPORTED BY THE CORE, PMC UNIT ONLY

A. GRANTS AND CONTRACTS SUPPORTING THE CORE, FY23:

Kim, Il Hwan
USPHS Grant MH-117429, Genes, Neural Circuits and Behavior

Schughart, Klaus
University of North Carolina Subcontract to USPHS Grant AI-100625, Systems immunogenetics of biodefense and emerging pathogens in the collaborative cross - Influenza (IAV) response study

Freeman, Kevin
USPHS Grant CA-216394, Dissecting the contribution of the transcriptional regulators of SNS fate to neuroblastoma oncogenesis

Reiter, Lawrence
USPHS Gant NS-115776, The role of UBE3A in gliopathic seizures.

Foundation Prader-Willi Research-, Analysis of Delayed Neural Development in PWS DPSC Derived Neurons

Laribee, Ronald
USPHS Grant CA-233028, Endolysosomal-nuclear communication mediated through V-ATPase and NHE9 dependent epigenetic signaling

Narayanan, Ramesh
Department of Defense Grant W81XWH- 21-1-0055, Androgen Receptor-Targeted Treatment for Therapeutically Challenging Breast Cancer

Roach, Keesha
University of Georgia, Augusta subcontract to USPHS Grant HL-106365, Understanding the role of AVPR1A in pain experience in sickle cell disease

B. LETTERS OF SUPPORT

Letters of support were provided for 10 grant applications:

PI	Institution, College, Department	Date
Internal Users	UTHSC, 3 Colleges, 6 Departments	
Yue, J	UTHSC, COM, Pathology	09-15-2022
Chen, H.	UTHSC, COM, Pharmacology	10-03-2022
Zhao, Q*	UTHSC, COM, Preventive Medicine	10-24-2022
Laribee, R.	UTHSC, COM, Pathology	01-19-2023
Laribee, R.	UTHSC, COM, Pathology	05-15-2023
Freeman, K.	UTHSC, COM, Genetics Genomics and Informatics	05-22-2023
Mohamed, J.	UTHSC, COHP, Diagnostics	01-19-2023
Mohamed, J.	UTHSC, COHP, Diagnostics	04-17-2023
Peters, B.	UTHSC, COP, Clinical Pharmacy	05-30-2023
External Users		
Shen, Q.	Rhodes College	07-08-2022

**Starred applications included dedicated support for Dr. Kakhniashvili as a co-investigator.*

V. BUSINESS DEVELOPMENT PLAN

A. Market Assessment

The PMC core is defined as an institutional core based on its service to multiple colleges and departments within UTHSC. The potential additional customers for our user base include UTHSC, University of Memphis, the VA, Le Bonheur Children's Hospital, and other commercial and academic partners in the Memphis metropolitan area. Investigators from St. Jude are also potential customers since the queue for their internal proteomics core is currently several weeks long. Our core also has capacity to analyze samples for regional/national academic or commercial customers.

Currently, there is not a dedicated MS instrument in the PMC for untargeted metabolomics; these projects are referred to UT-Knoxville, or to other academic cores. Our Lumos Orbitrap MS is left in a proteomics profiling mode, without "flipping" the instrument to a metabolomics mode, as per the recommendation of the PMC Internal Advisory Board. This recommendation was made after discovering that the Orbitrap instrument/HPLC required substantial downtime for cleaning every time a "flip" was executed.

B. Competitive Analysis

Typically, the biggest threats to proteomics and metabolomics cores are other academic core facilities that accept external samples, NIH-funded Regional Comprehensive Metabolomics Resource Cores (RCMRCs), and, particularly for metabolomics, commercial vendors like Metabolon. The PMC core offers value-added services that include the scientific expertise and breadth of training of

the director and quick turnaround time. Proteomics resources are also highly desired campus facilities of several newly recruited faculty, or candidates who have recently interviewed for key positions on campus. The closest proteomics/metabolomics core facilities are located at St. Jude Children's Hospital, which is available for use only by those UTHSC faculty who directly collaborate with St. Jude investigators.

C. Marketing Plans to Obtain New Business

A primary focus of the PMC will be to continue advertisement of services to the UTHSC campus, throughout the Memphis Medical District and throughout the University of Tennessee system. The branding strategy will involve local advertisement on the campus. The core will continue participation in the Hot Topics in Research seminar series, and the Office of Research-sponsored events to faculty (technology fairs, etc.). The PMC will also continue to host seminars by commercial vendors to advertise onboarding of new equipment or to educate users about proteomics approaches and technologies.

D. Forecasted Volumes for New Business

In FY24, we project, that internal recoveries from PMC proteomics-based services will increase 10% over FY23 levels, based on estimated demand and knowledge of upcoming projects by the director. The MPMS unit did not process any samples in FY23, and was officially closed June 30, 2023.

E. Budgets

PMC: Proteomics and Untargeted Metabolomics Services

FY2023 Budget

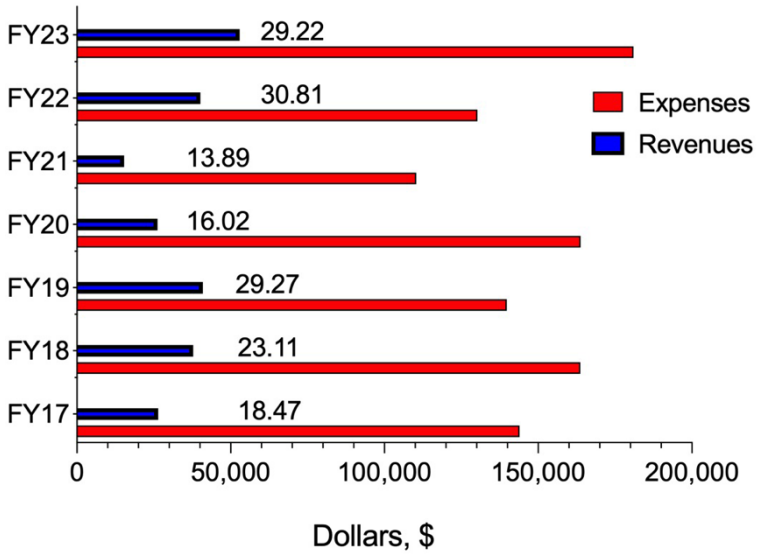
FY2023	DEBITS	CREDITS
Salaries	89,296**	
Supplies	29,277	
Service Contracts	62,454*	
Equipment (> $5,000)	0	
Other Expenses	0	
TOTAL EXPENSES	***181,027***	
FY23 Internal Recoveries		52,888
FY23 External Recoveries		0
TOTAL CREDITS		***52,888***
Income / (Subsidy)	(128,139)	
State Appropriation	129,474	
Net Income / (Subsidy)	**1,335**	

*A portion of Dr. David Kakhniashvili's salary was paid from Dr. Qi Zhao's grant (20%).

**Service Contracts/Maintenance expenditures included a Thermo Electron invoice, which totaled $62,454 for FY23.

Subsidy, % before state appropriation 71%
Subsidy, % after state appropriation <1%

VI. Historical Revenues and Expenses, FY17-FY23



Expenses (red bars) and revenues (blue bars) are shown for each FY since FY17. The numbers beside the blue bar indicate the percentage of total expenses covered by the revenues that are generated by service fees. The state appropriation/budget subsidy allocated to the core is not reflected in this figure.

Flow Cytometry and Cell Sorting (FCCS) Institutional Research Core Facility Analysis Report- FY23

Written by Deidre Daria, PhD; Natalie Smith, MS; and Tiffany Seagroves, PhD

1. Relative to a specific core's mission, is the designation as an "institutional core" appropriate?

The FCCS core's designation as an institutional core is appropriate since it provided services for 24 laboratories representing 12 departments and three colleges (COM, COP, CON) in FY23. In addition, the core provided lecture-based training in the basics of flow cytometry that was open to the campus for no charge; attendees across four colleges attended (COM, COP, COPH, COD).

2. Does the core pass the multi-departmental, multi-investigator litmus test.

Yes. In FY23, this core processed 246 cytometry projects on the ZE5, 14 flow sorting projects, and 55 data analysis requests from 36 individual users corresponding to 24 labs across 12 departments and three colleges (COM, COP, and CON). The college with the largest number of individual users was the College of Medicine with 23 laboratories from 12 departments. The top five laboratories based on the percentage of invoices of completed services accounted for 72.1% of total revenues. These investigators were: 1) Amber Smith (Surgery, COM, 22.47%), 2) Elizabeth Fitzpatrick (MIB, COM, 18.3%), 3) Marko Radic (MIB, COM 17.21%), 4) Gabor Tigyi (Physiology, COM 9.39%), and 5) Liza Makowski (Medicine-Hematology, COM, 4.55%). The remainder of users accounted for the other 27.9% of invoices. Overall, 32 individuals from 21 UTHSC laboratories took advantage of the basics in flow cytometry courses offered at no charge by Dr. Daria.

3. Is there sufficient intra- and inter-departmental use and if not, why?

Yes. Fifty-eight individual users from multiple departments and colleges were served.

4. Can the services for the core be outsourced more economically?

No. St. Jude's core facility is only available on a select basis to the outside community and the University of Memphis does not have cell sorting capabilities. Samples may be run at the VA, but users are expected to run and analyze their own samples unassisted. No outside sources provide data analysis support. It should also be noted that live, stained cells cannot be shipped to other cores or commercial entities for flow cytometry analysis or cell sorting without compromising data integrity or cell viability, respectively, and samples must be processed locally.

5. Are there unaccounted benefits beyond fiscal consideration to warrant continued institutional underwriting (e.g., grants funded through investigator use, publications, etc.)?

Yes. In FY23, core activities led to 57 unique PubMed-indexed publications and supported 27 awarded extramural grant and contracts and multiple additional intramural grants or startup funding packages. Reviewers of federal grant applications (NIH) expect that the investigators will have local access to flow cytometry facilities as verified in support letters provided by the FCCS Core. In addition, 32 individuals participated in the flow cytometry classes and hands-on cytometry training was provided to ten new users.

6. Is the core currently self-sufficient, or is it subsidized by the institution?
In FY23, the core was subsidized by the institution, not including salary of the former Core Director Dr. Tony Marion, which was entirely provided by the Department of Microbiology, Immunology and Biochemistry (MIB). Dr. Daria assisted the RBL with sorting upon request and ~3% of her salary was subsidized by the RBL in FY23. Overall, FY23 ended with a net subsidy of $155,173 (88%) after accounting for unrealized expected external income.

Accomplishments this past year:

- Dr. Tony Marion revised a scored S10 grant proposal submitted in FY22, which was awarded in FY23. An Aurora Cytek instrument will be purchased to replace the BD Biosciences Aria IIu instrument.
- Spectral cytometry classes were provided by Cytek and the Cytek Aurora was demonstrated with live cells on campus.
- Advanced flow cytometry classes were offered for the first time in FY23.
- Dr. Tony Marion continued to serve as president and member of the executive council for SEFCIG (Southeast Flow Cytometry Interest Group), a regional chapter of ISAC.
- Dr. Deidre Daria served as assistant treasurer for SEASR (Southeastern Association of Shared Resources), a regional chapter of ABRF.
- Dr. Daria participated in SEFCIG2023, a meeting focused on new cell analysis technologies and small particle research.
- Dr. Daria participated in the FlowTex conference, which discussed the techniques and challenges of high parameter panel design.

Financial Overview – FY23:

TOTALS	FY17	FY18	FY19	FY20	FY21	FY22	FY23
Revenues	24,320	28,892	25,745	30,499	32,824	31,533	32,034
Expenses	(75,999)	(166,094)	(126,532)	(199,646)	(217,136)	(192,206)	(177,162)
Income (Subsidy)	(51,679)	(137,202)	(100,787)	(169,147)	(184,312)	(160,673)	(145,128)
Other Costs	286,592	0	0	0	0	0	0
Income (Subsidy)	(338,271)	(137,202)	(100,787)	(169,147)	(184,312)	(160,673)	(145,128)
State Appropriation	0	0	0	0	64,760	9,598	(10,045)
Net Income (Subsidy)	(338,271)	(137,202)	(100,787)	(169,147)	(119,552)	(151,075)	(155,173)
Subsidy, % before State Appropriation	68%	82.6%	80%	85%	85%	84%	82%
Subsidy, % after State Appropriation	93%	82.6%	80%	85%	55%	79%	88%

Dr. Tony Marion's salary was entirely subsidized by the MIB until his retirement August 2022. The unrealistic expected external income set by finance resulted in a net negative state appropriation, reducing the net overall budget. Excluding this value, the true subsidy was $145,128, or 82%.

7. Suggested outcomes:

The FCCS Core should continue to be operated as an institutional core.

Flow Cytometry and Cell Sorting (FCCS) Institutional Core Facility
Summary of Institutional Core Activities for FY23

Written by Deidre Daria, PhD; Natalie Smith, MS; and Tiffany Seagroves, PhD

PUBLICATIONS (Full-length published articles; Journal publication dates: July 1, 2022 to June 30, 2023; UTHSC investigators are in bold; core director is underlined)

Thiyagarajan T, Ponnusamy S, Hwang DJ, He Y, Asemota S, Young KL, Johnson DL, Bocharova V, Zhou W, Jain AK, Petricoin EF, Yin Z, Pfeffer LM, Miller DD, **Narayanan R**. Inhibiting androgen receptor splice variants with cysteine-selective irreversible covalent inhibitors to treat prostate cancer. Proc Natl Acad Sci U S A. 2023 Jan 3;120(1):e2211832120. doi: 10.1073/pnas.2211832120.Epub 2022 Dec 28. PMID: 36577061; PMCID: PMC9910435.

Radic M, Muller S. LL-37, a Multi-Faceted Amphipathic Peptide Involved in NETosis. Cells. 2022 Aug 8;11(15):2463. doi: 10.3390/cells11152463. PMID:35954305; PMCID: PMC9368159.

Odobasic D, Hawkins CL, **Radic M**. New roles of neutrophils and granulocytic MDSC in autoimmune diseases, inflammation, and anti-microbial immunity. Front Immunol. 2022 Jul 29;13:974062. doi: 10.3389/fimmu.2022.974062.PMID: 35967293; PMCID: PMC9372723.

Starlard-Davenport A, Gu Q, Pace BS. Targeting Genetic Modifiers of HBG Gene Expression in Sickle Cell Disease: The miRNA Option. Mol Diagn Ther. 2022Sep;26(5):497-509. doi: 10.1007/s40291-022-00589-z. Epub 2022 May 12. PMID:35553407; PMCID: PMC9098152.

Patel PS, Castelow C, Patel DS, Bhattacharya SK, Kuscu C, Kuscu C, **Makowski L**, Eason JD, Bajwa A. Mitochondrial Role in Oncogenesis and Potential Chemotherapeutic Strategy of Mitochondrial Infusion in Breast Cancer. Int J Mol Sci. 2022 Oct 27;23(21):12993. doi: 10.3390/ijms232112993. PMID: 36361782; PMCID: PMC9658440.

Si L, Bai H, Oh CY, Jiang A, Hong F, Zhang T, Ye Y, Jordan TX, Logue J, McGrath M, Belgur C, Calderon K, Nurani A, Cao W, Carlson KE, Prantil-Baun R, Gygi SP, Yang D, **Jonsson CB**, tenOever BR, Frieman M, Ingber DE. Self-assembling short immunostimulatory duplex RNAs with broad-spectrum antiviral activity. Mol Ther Nucleic Acids. 2022 Sep 13;29:923-940. doi: 10.1016/j.omtn.2022.08.031.Epub 2022 Aug 24. PMID: 36032397; PMCID: PMC9398551.

Mitachi K, Mingle D, Effah W, Sánchez-Ruiz A, Hevener KE, **Narayanan R**, Clemons WM Jr, Sarabia F, Kurosu M. Concise Synthesis of Tunicamycin V and Discovery of a Cytostatic DPAGT1 Inhibitor. Angew Chem Int Ed Engl. 2022 Aug1;61(31):e202203225. doi: 10.1002/anie.202203225. Epub 2022 Jun 10. PMID:35594368; PMCID: PMC9329268.

Radic MZ, Zouali M. Editorial: SARS-CoV-2 variants, B lymphocytes, and autoreactivity. Front Immunol. 2023 Jan 10;13:1125732. doi:10.3389/fimmu.2022.1125732. PMID: 36703988; PMCID: PMC9872959.

Silva V, **Radic M**. COVID-19 Pathology Sheds Further Light on Balance between Neutrophil Proteases and Their Inhibitors. Biomolecules. 2022 Dec 30;13(1):82.doi: 10.3390/biom13010082. PMID: 36671467; PMCID: PMC9855895.

Li M, Li L, Asemota S, Kakhniashvili D, **Narayanan R**, Wang X, **Liao FF**. Reciprocal interplay between OTULIN-LUBAC determines genotoxic and inflammatory NF-κB signal responses. Proc Natl Acad Sci U S A. 2022 Aug16;119(33):e2123097119. doi: 10.1073/pnas.2123097119. Epub 2022 Aug 8. PMID:35939695; PMCID: PMC9388121.

Bhatti FU, Jeong YH, Kim DG, **Yi AK**, Brand DD, Hasty KA, Cho H. Characterization of Non-Invasively Induced Post-Traumatic Osteoarthritis in Mice. Antioxidants (Basel). 2022 Sep 9;11(9):1783. doi: 10.3390/antiox11091783.PMID: 36139857; PMCID: PMC9495497.

Myers LK, Ouyang YX, Patel JR, Odens HH, Woo-Rasberry V, Park J, **Yi AK**, Rosloniec EF, Brand DD, Stuart JM, Kang AH. Role of Citrullinated Collagen in Autoimmune Arthritis. Int J Mol Sci. 2022 Aug 30;23(17):9833. doi:10.3390/ijms23179833. PMID: 36077232; PMCID: PMC9456437.

Sluter MN, Li Q, Yasmen N, Chen Y, Li L, Hou R, Yu Y, **Yang CY**, Meibohm B, Jiang J. The inducible prostaglandin E synthase (mPGES-1) in neuroinflammatory disorders. Exp Biol Med (Maywood). 2023 May;248(9):811-819. doi:10.1177/15353702231179926. Epub 2023 Jul 29. PMID: 37515545; PMCID: PMC10468642.

Chaib M, Tanveer UA, **Makowski L**. Myeloid cells in the era of cancer immunotherapy: Top 3 unanswered questions. Pharmacol Ther. 2023 Apr;244:108370.doi:

Verne ZT, Fields JZ, Zhang BB, **Zhou Q**. Autonomic dysfunction and gastroparesis in Gulf War veterans. J Investig Med. 2023 Jan;71(1):7-10. doi:10.1136/jim-2021-002291. PMID: 35798472.

Deng S, Krutilina RI, Hartman KL, Chen H, Parke DN, Wang R, Mahmud F, Ma D, Lukka PB, Meibohm B, **Seagroves TN**, Miller DD, **Li W**. Colchicine-Binding Site Agent CH-2-77 as a Potent Tubulin Inhibitor Suppressing Triple-Negative Breast Cancer. Mol Cancer Ther. 2022 Jul 5;21(7):1103-1114. doi:10.1158/1535-7163.MCT-21-0899. PMID: 35499388; PMCID: PMC9256790.

Chaib M, Hafeez BB, Mandil H, Daria D, Pingili AK, Kumari S, Sikander M, Kashyap VK, Chen GY, Anning E, Tripathi MK, Khan S, Behrman S, Yallapu MM, Jaggi M, **Makowski L**, Chauhan SC. Reprogramming of pancreatic adenocarcinoma immunosurveillance by a microbial probiotic siderophore. Commun Biol. 2022 Nov4;5(1):1181. doi: 10.1038/s42003-022-04102-4. PMID: 36333531; PMCID: PMC9636404.

Yuan X, Jiang H, Fu D, Robida A, Rajanayake K, Yuan H, Wen B, Sun D, Watch BT, Chinnaswamy K, Stuckey JA, Paczesny S, Rech JC, **Yang CY**. Structure-Activity relationship of 1-(Furan-2ylmethyl) Pyrrolidine-Based Stimulation-2 (ST2) inhibitors for treating graft versus host disease. Bioorg Med Chem. 2022 Oct1;71:116942. doi: 10.1016/j.bmc.2022.116942. Epub 2022 Jul 22. PMID: 35930851;PMCID: PMC9451522.

Hu H, Mady Traore MD, Li R, Yuan H, He M, Wen B, Gao W, **Jonsson CB**, **Fitzpatrick EA**, Sun D. Optimization of the Prodrug Moiety of Remdesivir to Improve Lung Exposure/Selectivity and Enhance Anti-SARS-CoV-2 Activity. J Med Chem. 2022 Sep 22;65(18):12044-12054. doi: 10.1021/acs.jmedchem.2c00758. Epub2022 Sep 7. PMID: 36070561.

Ahmed HA, Ismael S, Salman M, Devlin P, McDonald MP, **Liao FF**, Ishrat T. Direct AT2R Stimulation Slows Post-stroke Cognitive Decline in the 5XFAD Alzheimer's Disease Mice. Mol Neurobiol. 2022 Jul;59(7):4124-4140. doi:10.1007/s12035-022-02839-x. Epub 2022 Apr 29. PMID: 35486224.

Shukla PK, Rao RG, Meena AS, Giorgianni F, Lee SC, Raju P, Shashikanth N, Shekhar C, Beranova S, Balazs L, **Tigyi G**, Gosain A, Rao R. Paneth cell dysfunction in radiation injury and radio-mitigation by human α-defensin 5. Front Immunol. 2023 Aug 10;14:1174140. doi: 10.3389/fimmu.2023.1174140. PMID:37638013; PMCID: PMC10448521.

Zhong M, Wang Y, Lin G, **Liao FF**, Zhou FM. Dopamine-independent development and maintenance of mouse striatal medium spiny neuron dendritic spines. Neurobiol Dis. 2023 Jun 1;181:106096. doi: 10.1016/j.nbd.2023.106096. Epub 2023Mar 29. PMID: 37001611.

Fan J, Wang S, Chen K, **Sun Z**. Aging impairs arterial compliance via Klotho-mediated downregulation of B-cell population and IgG levels. Cell Mol Life Sci.2022 Aug 24;79(9):494. doi: 10.1007/s00018-022-04512-x. PMID: 36001158; PMCID:PMC10082671.

Dacheux MA, Norman DD, **Tigyi GJ**, Lee SC. Emerging roles of lysophosphatidic acid receptor subtype 5 (LPAR5) in inflammatory diseases and cancer. Pharmacol Ther. 2023 May;245:108414. doi: 10.1016/j.pharmthera.2023.108414. Epub 2023 Apr13. PMID: 37061203; PMCID: PMC10290275.

Smith AP, Lane LC, Ramirez Zuniga I, Moquin DM, Vogel P, Smith AM. Increased virus dissemination leads to enhanced lung injury but not inflammation during influenza-associated secondary bacterial infection. FEMS Microbes. 2022 Jul25;3:xtac022. doi: 10.1093/femsmc/xtac022. PMID: 37332507; PMCID: PMC10117793.

Singla B, Aithbathula RV, Pervaiz N, Kathuria I, Swanson M, Ekuban FA, Ahn W, **Park F**, **Gyamfi M**, Cherian-Shaw M, Singh UP, Kumar S. CD47 Activation byThrombospondin-1 in Lymphatic Endothelial Cells Suppresses Lymphangiogenesis

and Promotes Atherosclerosis. Arterioscler Thromb Vasc Biol. 2023Jul;43(7):1234-1250. doi: 10.1161/ATVBAHA.122.318904. Epub 2023 Jun 1. PMID:37259865; PMCID: PMC10281185.

Merigeon EY, Yang D, Ihms EA, Bassit LC, **Fitzpatrick EA**, **Jonsson CB**, Schinazi RF, Block DS, Olsen HS. An ACE2-IgG4 Fc Fusion Protein Demonstrates Strong Binding to All Tested SARS-CoV-2 Variants and Reduced Lung Inflammation in Animal Models of SARS-CoV-2 and Influenza. Pathog Immun. 2022 Aug23;7(1):104-121. doi: 10.20411/pai.v7i1.491. PMID: 36072571; PMCID: PMC9438944.

Kim S, Kim YE, **Kim IH**. Simultaneous analysis of social behaviors and neural responses in mice using round social arena system. STAR Protoc. 2022 Dec16;3(4):101722. doi: 10.1016/j.xpro.2022.101722. Epub 2022 Sep 24. PMID:36153733; PMCID: PMC9513260.

Aithabathula RV, Pervaiz N, Kathuria I, Swanson M, Singh UP, Kumar S, **Park F**, Singla B. Hydrogen sulfide donor activates AKT-eNOS signaling and promotes lymphatic vessel formation. PLoS One. 2023 Oct 26;18(10):e0292663. doi:10.1371/journal.pone.0292663. PMID: 37883422; PMCID: PMC10602273.

Kim YE, Kim S, **Kim IH**. Neural circuit-specific gene manipulation in mouse brain in vivo using split-intein-mediated split-Cre system. STAR Protoc.2022 Nov 3;3(4):101807. doi: 10.1016/j.xpro.2022.101807. PMID: 36386891; PMCID: PMC9641071.

Taylor MK, Williams EP, Xue Y, Jenjaroenpun P, Wongsurawat T, Smith AP, Smith AM, Parvathareddy J, Kong Y, Vogel P, Cao X, Reichard W, Spruill-Harrell B, Samarasinghe AE, Nookaew I, **Fitzpatrick EA**, Smith MD, Aranha M, Smith JC, **Jonsson CB**. Dissecting Phenotype from Genotype with Clinical Isolates of SARS-CoV-2 First Wave Variants. Viruses. 2023 Feb 23;15(3):611. doi:10.3390/v15030611. PMID: 36992320; PMCID: PMC10059853.

Fan J, Wang S, Lu X, **Sun Z**. Transplantation of bone marrow cells from miR150knockout mice improves senescence-associated humoral immune dysfunction and arterial stiffness. Metabolism. 2022 Sep;134:155249. doi:10.1016/j.metabol.2022.155249. Epub 2022 Jul 2. PMID: 35792174; PMCID:PMC9796492.

Krutilina RI, Hartman KL, Oluwalana D, Playa HC, Parke DN, Chen H, Miller DD, Li W, **Seagroves TN**. Sabizabulin, a Potent Orally Bioavailable Colchicine Binding Site Agent, Suppresses HER2+ Breast Cancer and Metastasis. Cancers (Basel). 2022 Oct 29;14(21):5336. doi: 10.3390/cancers14215336. PMID: 36358755;PMCID: PMC9658816.

Franks H, Wang R, Li M, Wang B, Wildmann A, Ortyl T, O'Brien S, Young D, **Liao FF**, Sakata K. Heat shock factor HSF1 regulates BDNF gene promoters upon acute stress in the hippocampus, together with pCREB. J Neurochem. 2023Apr;165(2):131-148. doi: 10.1111/jnc.15707. Epub 2022 Nov 17. PMID: 36227087;PMCID: PMC10097844.

Nichols JH, Williams EP, Parvathareddy J, Cao X, Kong Y, **Fitzpatrick E**, Webby RJ, **Jonsson CB**. Upper Respiratory Infection Drives Clinical Signs and Inflammatory Responses Following Heterologous Challenge of SARS-CoV-2 Variants of Concern in K18 Mice. Viruses. 2023 Apr 11;15(4):946. doi: 10.3390/v15040946.PMID: 37112926; PMCID: PMC10144791.

Deng S, Banerjee S, Chen H, Pochampally S, Wang Y, Yun MK, White SW, Parmar K, Meibohm B, Hartman KL, Wu Z, Miller DD, **Li W**. SB226, an inhibitor of tubulin polymerization, inhibits paclitaxel-resistant melanoma growth and spontaneous metastasis. Cancer Lett. 2023 Feb 28;555:216046. doi:10.1016/j.canlet.2022.216046. Epub 2022 Dec 31. PMID: 36596380; PMCID:PMC10321023.

Albadari N, Xie Y, Liu T, Wang R, Gu L, Zhou M, Wu Z, **Li W**. Synthesis and biological evaluation of dual MDM2/XIAP inhibitors based on the tetrahydroquinoline scaffold. Eur J Med Chem. 2023 Jul 5;255:115423. doi:10.1016/j.ejmech.2023.115423. Epub 2023 Apr 26. PMID: 37130471; PMCID:PMC10246915.

Xu F, Ziebarth JD, Goeminne LJ, Gao J, Williams EG, Quarles LD, **Makowski L**, Cui Y, Williams RW, Auwerx J, Lu L. Gene network based analysis identifies aco expression module involved in regulating plasma lipids with high-fat diet response. J Nutr Biochem. 2023 Sep;119:109398. doi:10.1016/j.jnutbio.2023.109398. Epub 2023 Jun 10. PMID: 37302664.

Swanson M, Yun J, Collier DM, Seif C, **Yang CY**, Regner KR, **Park F**. Identification of cell division cycle protein 20 in various forms of acute and chronic kidney injury in mice. Am J Physiol Renal Physiol. 2023 Aug1;325(2):F248-F261. doi: 10.1152/ajprenal.00302.2022. Epub 2023 Jun 22. PMID:37348027.

Chen X, Chen L, Lin G, Wang Z, Kodali MC, Li M, Chen H, Lebovitz SG, OrtylTC, Li L, Ismael S, Singh P, Malik KU, Ishrat T, Zhou FM, Zheng W, **Liao FF**. White matter damage as a consequence of vascular dysfunction in a spontaneous mouse model of chronic mild chronic hypoperfusion with eNOS deficiency. Mol Psychiatry. 2022 Nov;27(11):4754-4769. doi: 10.1038/s41380-022-01701-9. Epub2022 Aug 10. PMID: 35948662; PMCID: PMC9734049.

Samanta K, Azevedo JF, Nair N, Kundu S, **Gomes-Solecki M**. Infected Ixodes scapularis Nymphs Maintained in Prolonged Questing under Optimal Environmental Conditions for One Year Can Transmit Borrelia burgdorferi (Borreliella genusnovum) to Uninfected Hosts. Microbiol Spectr. 2022 Aug 31;10(4):e0137722.doi: 10.1128/spectrum.01377-22. Epub 2022 Jul 11. PMID: 35862961; PMCID:PMC9431577.

Swanson ML, Regner KR, Moore BM 2nd, **Park F**. Cannabinoid Type 2 Receptor Activation Reduces the Progression of Kidney Fibrosis Using a Mouse Model of Unilateral Ureteral Obstruction. Cannabis Cannabinoid Res. 2022Dec;7(6):790-803. doi: 10.1089/can.2021.0127. Epub 2022 Feb 23. PMID: 35196117.

Sipe LM, Chaib M, Korba EB, Jo H, Lovely MC, Counts BR, Tanveer U, Holt JR, Clements JC, John NA, Daria D, Marion TN, Bohm MS, Sekhri R, Pingili AK, Teng B, Carson JA, Hayes DN, Davis MJ, Cook KL, Pierre JF, **Makowski L**. Response to immune checkpoint blockade improved in pre-clinical model of breast cancer after bariatric surgery. Elife. 2022 Jul 1;11:e79143. doi: 10.7554/eLife.79143. PMID:35775614; PMCID: PMC9342954.

Singh N, Khatib J, Chiu CY, Lin J, Patel TS, **Liu-Smith F**. Tumor Androgen Receptor Protein Level Is Positively Associated with a Better Overall Survival in Melanoma Patients. Genes (Basel). 2023 Jan 28;14(2):345. doi:10.3390/genes14020345. PMID: 36833272; PMCID: PMC9957358.

Vannier E, Richer LM, Dinh DM, Brisson D, Ostfeld RS, **Gomes-Solecki M**. Deployment of a Reservoir-Targeted Vaccine Against Borrelia burgdorferi Reduces the Prevalence of Babesia microti Coinfection in Ixodes scapularis Ticks. J Infect Dis. 2023 May 12;227(10):1127-1131. doi: 10.1093/infdis/jiac462. PMID:36416014; PMCID: PMC10175066.

Rakib A, Mandal M, Showkat A, Kiran S, Mazumdar S, Singla B, Bajwa A, Kumar S, **Park F**, Singh UP. Piceatannol induces regulatory T cells and modulates the inflammatory response and adipogenesis. Biomed Pharmacother. 2023 May;161:114514. doi: 10.1016/j.biopha.2023.114514. Epub 2023 Mar 13. PMID:36921534; PMCID: PMC10071559.

Gu Q, Palani CD, Smith A, Li B, Amos-Abanyie EK, Ogu U, Lu L, Pace BS, **Starlard-Davenport A**. MicroRNA29B induces fetal hemoglobin via inhibition of the HBG repressor protein MYB in vitro and in humanized sickle cell mice. Front Med (Lausanne). 2022 Nov 25;9:1043686. doi:10.3389/fmed.2022.1043686. PMID: 36507536; PMCID: PMC9732025.

Chen J, Lin Y, **Sun Z**. Inhibition of miR-101-3p prevents human aortic valve interstitial cell calcification through regulation of CDH11/SOX9 expression. Mol Med. 2023 Feb 21;29(1):24. doi: 10.1186/s10020-023-00619-4. PMID: 36809926;PMCID: PMC9945614.

Yuan X, Howie KL, Kazemi Sabzvar M, Chinnaswamy K, Stuckey JA, **Yang CY**. Profiling the Binding Activities of Peptides and Inhibitors to the U2 Auxiliary Factor Homology Motif (UHM) Domains. ACS Med Chem Lett. 2023 Mar21;14(4):450-457. doi: 10.1021/acsmedchemlett.2c00537. Erratum in: ACS Med ChemLett. 2023 Apr 14;14(5):681. PMID: 37077390; PMCID: PMC10107908.

Niture S, Gadi S, Qi Q, **Gyamfi MA**, Varghese RS, Rios-Colon L, Chimeh U,Vandana, Ressom HW, Kumar D. MicroRNA-483-5p Inhibits Hepatocellular Carcinoma Cell Proliferation, Cell Steatosis, and Fibrosis by Targeting PPARα and TIMP2.Cancers (Basel). 2023 Mar 10;15(6):1715. doi: 10.3390/cancers15061715. PMID:36980601; PMCID: PMC10046356.

Kim S, Samanta K, Nguyen BT, Mata-Robles S, Richer L, Yoon JY, **Gomes-Solecki M**. A portable immunosensor provides sensitive and rapid detection of Borrelia burgdorferi antigen in spiked blood. Sci Rep. 2023 May 9;13(1):7546. doi:10.1038/s41598-023-34108-9. PMID: 37161039; PMCID: PMC10170079.

Khan F, Anelo OM, Sadiq Q, Effah W, Price G, Johnson DL, Ponnusamy S, Grimes B, Morrison ML, Fowke JH, Hayes DN, **Narayanan R**. Racial Differences in Androgen Receptor (AR) and AR Splice Variants (AR-SVs) Expression in Treatment-Naïve Androgen-Dependent Prostate Cancer. Biomedicines. 2023 Feb 21;11(3):648. doi:10.3390/biomedicines11030648. PMID: 36979627; PMCID: PMC10044992.

Wang X, Bajpai AK, Gu Q, Ashbrook DG, **Starlard-Davenport A**, Lu L. Weighted gene co-expression network analysis identifies key hub genes and pathways in acute myeloid leukemia. Front Genet. 2023 Feb 27;14:1009462. doi:10.3389/fgene.2023.1009462. PMID: 36923792; PMCID: PMC10008864.

Hwang DJ, He Y, Ponnusamy S, Thiyagarajan T, Mohler ML, **Narayanan R**, Miller DD. Metabolism-Guided Selective Androgen Receptor Antagonists: Design, Synthesis, and Biological Evaluation for Activity against Enzalutamide-Resistant Prostate Cancer. J Med Chem. 2023 Mar 9;66(5):3372-3392. doi:10.1021/acs.jmedchem.2c01858. Epub 2023 Feb 24. PMID: 36825758; PMCID:PMC10243532.

Sluter MN, Bhuniya R, Yuan X, Ramaraju A, Chen Y, Yu Y, Parmar KR, Temrikar ZH, Srivastava A, Meibohm B, Jiang J, **Yang CY**. Novel, Brain-Permeable, Cross-Species Benzothiazole Inhibitors of Microsomal Prostaglandin E Synthase-1(mPGES-1) Dampen Neuroinflammation In Vitro and In Vivo. ACS Pharmacol Transl Sci. 2023 Mar 21;6(4):587-599. doi: 10.1021/acsptsci.2c00241.PMID: 37082746; PMCID: PMC10111624.

Bajpai AK, Gu Q, Orgil BO, Xu F, Torres-Rojas C, Zhao W, Chen C, **Starlard-Davenport A**, Jones B, Lebeche D, Towbin JA, Purevjav E, Lu L, Zhang W. Cardiac copper content and its relationship with heart physiology: Insights based on quantitative genetic and functional analyses using BXD family mice. Front Cardiovasc Med. 2023 Feb 2;10:1089963. doi: 10.3389/fcvm.2023.1089963. PMID:36818345; PMCID: PMC9931904.

Radic M, Randolph B. Autologous Anti-CD19 CAR T Cells as Therapy for Systemic Lupus Erythematosus. Transplant Cell Ther. 2023 Jan;29(1):3-4. doi:10.1016/j.jtct.2022.12.003. PMID: 36608961.

I. PRESENTATIONS, AND MEETINGS TO PROMOTE CORE USAGE AND FUNCTION

A. Meetings to support core functions and instrumentation

Dr. Daria served as assistant treasurer for SEASR (Southeast Association of Shared Resources) a regional chapter of the Association of Biomolecular Resource Facilities, and she assisted in the organization of the annual meeting in June of 2023 in Atlanta, GA. SEASR provides a forum for core directors, managers, and technical staff to discuss common issues associated with shared resource labs. The meeting program included both scientific and administrative topics relevant to shared resource laboratories and included topics such as small particle cell sorting, diversity in the workforce, and unique funding opportunities.

Since his election in 2019, Dr. Marion has served as the president of the Southeast Flow Cytometry Interest Group (SEFCIG), a professional organization associated with the International Society for Advancement of Cytometry (ISAC), which promotes research, development, and applications in analytical cytometry. In March of 2023 SEFCIG held an in-person meeting in Miami, Florida. Topics included instrument set-up for microparticle flow cytometry analysis, multicolor panel design, and discovery of unique markers using the latest technologies and techniques. It also provided an opportunity to interact with new flow cytometer core directors, managers, and technical staff who have recently upgraded their instruments to spectral-based cell sorters, which is a goal of the UTHSC FCCS. The ThermoFisher Bigfoot Spectral Sorter and the Cytek Aurora CS were considered for an S10 instrumentation grant proposal submitted in May of 2022.

In March of 2023 and May of 2023 Dr. Daria attended the virtual regional FlowTex meeting associated with ISAC and the CYTO2023 meeting held by ISAC. These meetings included high parameter panel design and data analysis workshops, clinical and cell sorting sessions, and round-table discussions on the future of flow cytometry cores.

B. Continuing Education

In FY23 Dr. Daria attended two workshops offered by ISAC, “Best Practices for a Smooth Flow from Cell sorting into Genomics” and “Best Practices in Genomic Cytometry and Single Cell Muti-omics”. She also attended the virtual tSNE, and the FlowSom Workshops, High Parameter Analysis Workflow, and Cell Cycle basics webinars offered through FlowJo as well as the Bioinformatics Bootcamp offered through the University of Texas Health Science Center San Antonio.

C. Instrument/Software Training and Seminars

Dr. Deidre Daria taught a four-part seminar series entitled “Flow Cytometry Basics” four separate times to the entire campus during FY23 and twice to individual labs. Advanced cytometry classes covering compensation and pre-processing data for high dimensional analysis were also offered for the first time in FY23. The Flow Cytometry Core also hosted Sarah Stuart Chewning, PhD,

MPH and Timothy Brown from ThermoFisher for a seminar entitled “CAR-T Therapy in Gleoblastoma: Mutiplexing and Flow Cytometry Methods Explored”. The FCCS Core participated in the UTHSC educational “Hot Topics in Research” to inform the UTHSC research community of the resources available in the core.

In anticipation of a the S10-supported purchase of a new spectral sorter, Cytek provided a two-day training session consisting of both lecture and hands-on training with the Cytek Aurora spectral cytometer instrument. Invited interested users were provided instruction on how to design panels, instrument operation, and data analysis. A Cytek technical specialist was on site for two days for instrument demonstration and provided one-on-one instrument training with panels currently in use on the ZE5. The instrument was placed in the core for 2 weeks for the use of all UTHSC personnel to try at no charge. It is anticipated that the new instrumentation will be validated and ready for campus use by Q3 of FY24.

SUMMARY OF ACTIVITIES

A. Personnel

Emeritus Professor and former Scientific Director: Tony Marion, PhD, Professor (40% effort; no salary provided by the core operating budget). Dr. Marion retired August 2022.

Scientific Director (appointed, August 2023): Deidre Daria, PhD, Research Specialist (FY22 effort: 97% effort, FCCS core, >3% effort RBL core).

B. FCCS Internal Advisory Board

Additional members with extensive flow and spectral flow cytometry experience were added to the board at the request of the NIH in anticipation of the S10 award and the chair position was assumed by Dr. David Brand. The FY23 FCCS Core Advisory Committee consists of the following members:

David Brand (Medicine-Rheumatology, COM and VAMC); (*CHAIR, May 2023)**
Maria Gomes-Solecki (MIB, COM)
Rajashekhar Gangaraju (Ophthalmology, COM)
Liza Makowski (Medicine-Hematology, COM); *CHAIR*
Udai Singh (Pharmaceutical Sciences, COP)*
Elizabeth Fitzpatrick (MIB, COM)*
Marko Radic (MIB, COM)*

**New members added at request of NIH for S10 award*

C. Equipment and research resources

FY23 equipment located in the FCCS lab:

Equipment	Cost	Funding Source
FACSAria IIu sorter	$483,000	S10 RR022465 (PI: Marion), 2008
AMO aerosol maintenance		included with FACSAria
Lauda recirculating bath		included with FACSAria
Bio-Rad ZE5*	$286,592*	VC Research startup, 2016

*after discount and LSR II trade-in, List $355,342

FY23 Surplus equipment (not in operation)

Equipment	Cost	Funding Source
FACSAria II sorter*	$367,940	E0701655001, 2009. Kindly donated by the UTHSC RBL
AMO aerosol maintenance		included with FACSAria
Lauda recirculating bath		included with FACSAria
Amnis FlowSight#	$0	Kindly donated by UTHSC Dept. of Ophthalmology

*The FACSAria II was removed from the RBL and gifted to the FCCS in Q2 of FY22 due to the replacement with a spectral cytometer from Cytek in Q2 of FY23in the RBL.

D. Service Contracts

BD Biosciences Aria IIu sorter $34,840
(Specialty Underwriters)

Bio-Rad ZE5 $27,000
(Bio-Rad)

E. Usage Volumes

Service Types	FY20 units	FY21 units	FY21 units	FY21 h	FY22units	FY22 h	FY23, units	FY23 h
Flow cytometry	242	239	239	309.5	208	269.5	246	346
Cell sorting	20	28	28	99.5	30	95	14	22
Data Analysis	51	34	34	22.5	29	23.5	55	45
Training	16	8	8	21.5	6	15.5	10	22
RBL Live/Cell Sorting		1	1	0.5				
RBL Flow Cytometry		6	6	23.75	7	14.5		

F. Multi-year trends

FY period	UTHSC users (# labs)	External or commercial users (# labs)	Flow cytometry (total # uses)	Cell sorting (total # uses)
FY23	34	0	246	14
FY22	40	1	208	30
FY21	29	0	239	28
FY20	31	1	242	20
FY19	23	0	193	47
FY18	25	0	193	29
FY17	23	1	148	26
FY16	24	1	287	29
FY15	23	2	283	28
FY14	15	2	163	27
FY13	20	2	347	28
FY12	18	2	279	28
FY11	25	2	318	37

G. Fee Structure

In FY23, the FY22 service prices were escalated by 3%.

FACSAria (Cell Sorter) *#	**UTHSC**	**External, Academic**	**Commercial**
2- or 4-way Sorting	$142.67	$190.22	Negotiated agreement
Sorting to Plates or Single Cell Sorting	$142.67	$190.22	Negotiated agreement
Small Particle sorting	$178.39	$225.95	Negotiated agreement
Bio-Rad ZE5 (Flow Cytometer)	**UTHSC**	**External, Academic**	**Commercial**
Investigator-operated cytometry (billed in 30-minute increments)	$61.34	$90.43	N/A
Operator-assisted cytometry (billed in 30-minute increments)	$83.51	$125.22	Negotiated agreement
Raw Data Analysis (30-minute minimum, then billed in 15-minute increments)	$61.34	$90.43	Negotiated agreement
Training	**UTHSC**	**External, Academic**	**Commercial**
Cytometry instruments and software training (per hour)	$95.11	$142.93	N/A

**Training on instruments does not include cell sorting. Only the FCCS Operator or Director may use the cell sorters.*
#Price includes set-up fee

II. GRANTS

A. GRANTS SUPPORTED BY THE CORE, FY23

Dale, James
Moderna Research

Davenport, Athena S
USPHS Grant DK144641, MicroRNA-based epigenetic approach to induce fetal hemoglobin

Gangaraju, Raja Shekhar
USPHS Grant NS127924, Regulation of Mesenchymal Stem Cell Secretome for Treatment of Microglia Damage in Traumatic Brain Injury

Gomes-Solecki, Maria
University of Iowa-Subcontract USPHS AI139267, Field trial and modeling of transmission-blocking vaccine to prevent Lyme disease

Gyamfi, Maxwell
USPHS Grant AA028806, Human pregnane X receptor and sexual dimorphism in alcoholic liver disease

Hayes, Liza
USPHS Grant CA262112, Determining susceptibility loci in triple negative breast cancer using a novel pre-clinical model

Jonsson, Colleen
USPHS Grant AI142762, Center of Excellence for Encephalitic Alphavirus Therapeutics

Kim, Il Hwan
USPHS Grant MH117429, Genes, Neural Circuits and Behavior

Virginia Polytechnic Institute AG075000, Losing specificity: the role of the locus coeruleus in age-related distractibility

Li, Wei
Veru Inc - Li, Veru-111 & Analogs sponsored research by Veru Inc.

Department of Defense W81XWH2010011 - Li, Discovery of Orally Bioavailable Tubulin Inhibitors to Overcome Taxane Resistance in Metastatic Breast Cancer

Liao, Francesca-Fang
USPHS Grant AG058467, Novel mechanistic link between metabolic changes and dementia potential role of miRNA21

Liu-Smith, Feng
USPHS Grant CA252393, Identification of luteolin as a BRAF-degrading molecule for developing new therapeutic agents

Makowski, Liza
USPHS Grant CA253329, Role of microbial-modulated bile acid receptor signaling in breast cancer

Narayanan, Ramesh
Army Grant W81XWH- 21-1-0055, Androgen Receptor-Targeted Treatment for Therapeutically Challenging Breast Cancer

Park, Frank
Errant and Rocco Therapeutics, Development of B-globin Vector System

Radic, Marko
Triumvira Immunologies, Sponsored Research Agreement_Evaluation of Anti-CD19 TAC-T cell Efficacy in SLE Patient Cell Cultures

Bristol- Myers Squibb, Analysis of Receptor-Mediated Cellular Interactions

Roach, Keesha
University of Georgia Augusta HL106365, Understanding the role of AVPR1A in pain experience in sickle cell disease

Roy, Neeta
Regeneron Pharmaceuticals, Observational Study of Conjunctivitis in the setting of treatment (R668-AD-1884): Analysis of conjunctival surface cells population

Seagroves, Tiffany
Army Grant W81XWH2010019, Discovery of Orally Bioavailable Tubulin Inhibitors to Overcome Taxane Resistance in Metastatic Breast Cancer

Smith, Amber
USPHS Grant AI139088, Predictive Modeling of Influenza-Pneumococcal Coinfection

USPHS Grant AI170115, Virtual Patient Cohorts to Illuminate Immunologic Drivers of Influenza Severity

Sun, Zhongjie
USPHS Grant AG062375, Epigenetic Regulation of Kidney Function and Blood Pressure

USPHS Grant HL154147, Investigation into Arterial Stiffness and Hypertension

Tigyi, Gabor
USPHS Grant CA092160, Anticancer Strategies Targeting the Autotaxin-LPA Receptor Axis

Yi, Ae-Kyung
USPHS Grant AR069010, Inhibitory Receptors and Autoimmune Arthritis

B. GRANT APPLICATIONS TO SUPPORT THE CORE

In FY22 Dr. Marion submitted as PI a revised NIH S10 Shared Instrumentation Grant proposal to acquire a new sorter Cytek Aurora CS with specifications that align with the mission of the FCCS Core to provide the latest in flow cytometry technology and to provide access to state-of-the-art instrumentation. This instrument was selected to replace the aging FACSAria IIu model of cell sorters currently located within the FCCS core facility. The FACSAria IIu has exceeded its 10-12 year durable life and BD Bioscience has notified the core that it will no longer support repair effective Jan 1, 2024. The proposed Cytek Aurora CS sorter would also serve as a second analyzer. The grant proposal was supported by several major/minor users representing 14 UTHSC laboratories from 10 departments. The status of the NIH S10 grant was still pending at the close of FY23. The official notice of the S10 award in the amount of $616,949 was received in July 2023 (FY24).

III. BUSINESS DEVELOPMENT

A. FCCS Core history

The UTHSC Flow Cytometry and Cell Sorting (FCCS) laboratory was established in 2003. The mission of the FCCS laboratory and the FCCS Core is to provide the UTHSC and Memphis research community with access to state-of-the-art instruments, expertise, instruction and assistance with experimental design, and data analysis for digital, multicolor flow cytometry and cell sorting, including indexed single-cell sorting. Prior to 2003, flow cytometry and cell sorting services were part of the Molecular Resource Center (MRC). The acquisition of the BD Biosciences LSR II flow cytometer in 2003 with a S10 shared equipment grant from NIH NCRR (PI: Tony Marion) provided UTHSC researchers with the first capability for the now standard digital "multicolor" flow cytometry. Flow cytometry was separated from the MRC at that time to become an independent shared research support laboratory. The core laboratory was expanded to include cell sorting in 2008 with the acquisition of the newly developed and state-of-the-art BD Biosciences FACSAria cell sorter also with NIH NCRR S10 grant support (PI: Tony Marion). Dr. Marion initiated the movement to modernize flow cytometry and cell sorting at UTHSC, was PI for both instrumentation grants, and has been director of the core laboratory since its inception.

In 2016, the BD Biosciences LSR II flow cytometer was replaced with the Bio-Rad ZE5 21-color cytometer (formally known as the Propel Yeti). This ZE5 has provided the campus with a highly technically sophisticated flow cytometer with a yellow-green laser (561 nm), which the LSR II did not have. That deficiency had previously limited the usefulness of PE and PE-tandem fluorophores and the potential to incorporate red fluorescence proteins and "fruit dyes" into experiments that require those fluorophores, in most cases only excited by the 561 nm laser. The potential to quantify red fluorescence protein expression in single cells augments protocols that employ red fluorescence protein expression in *in vivo* imaging studies. In addition to the yellow-green laser with seven fluorescence detectors, the ZE5 has a violet, 405 nm; blue, 488 nm; and red, 640nm lasers with 7, 4, 7 and 3

fluorescence detectors for a total of 21 fluorescence detectors. The ZE5 also has a FALS (forward angle light scatter) detector on the violet laser to improve detection of small, subcellular particles, such as extracellular vesicles and bacteria.

In 2018, Dr. Deidre Daria replaced Dr. Terry-Ann Milford, PhD as the full-time flow cytometry specialist dedicated to assist users in the planning and execution of flow cytometry and cell sorting experiments.

In 2019, the FCCS was tasked with the operation, training, and maintenance of the RBL FACSAria II cell sorter. Prior to this time, the RBL FACSAria was not in use and was not operational. The RBL FACSAria was repaired in FY20, but because the room where the repaired RBL FACSAria was housed was inaccessible for most of FY20 (September 2019 to March 2020) due to a roof leak, the instrument was inaccessible for most of FY20. Although repaired and functional in FY21, the RBL sorter has reached its durable lifespan, was transferred to the FCCS in January of FY22, and is scheduled to be replaced in FY23 with a Cytek Aurora instrument, which will be available only to RBL users and staff, with the ability to request assistance from the FCCS Core, if needed. Since the RBL gifted the FACSAria II to the FCCS, it is no longer been covered by a service agreement, rather, it is being held to be sold as used equipment or to be used as a trade-in towards a new instrument.

In 2021, the FCCS accepted the gift of the Cytek (formerly Luminex) AMNIS FlowSight Imaging Cytometer from the Department of Ophthalmology. The FlowSight was not in use, nor was it operational, prior to the time of acquisition by the FCCS. Sufficient need was not demonstrated to place instrument into operation and Cytek has notified users that it will no longer support the Amnis FlowSight as of Dec. 31, 2023. This instrument will be given back to the Department of Ophthalmology or sold as used equipment.

In 2023, Dr. Tony Marion retired as core director, but continues to support the core as emeritus professor and PI of the newly funded instrumentation grant. Dr. Deidre Daria was appointed core director following Dr. Marion's retirement.

B. Market Assessment

The FCCS Core provides access to state-of-the-art multicolor flow cytometry and fluorescence-activated cell sorting (FACS) for the UTHSC and Memphis research community. Services offered by the FCCS Core include training in the use of the flow cytometer in the FCCS laboratory as well as advice and assistance for multicolor flow cytometry experimental design and data analysis. The core can also perform two- and four-way FACS for BSL1/2 samples and index single-cell FACS into microwells or onto microscope slides. The research services provided by the FCCS Core are competitive with similar flow cytometry and cell sorting research cores at other major research institutions. Pricing for services in the FCCS Core is likewise competitive with southeast regional research institutions. A customer satisfaction survey was launched in FY23. The chief complaints were lack of a 561

laser on the sorter and the lack of predesigned panels offered to investigators for the instrument. In the survey, investigators also requested more educational opportunities.

One of the goals of the FCCS Core is to provide state-of-the-art technology to UTHSC core users. In Q3/Q4 of FY24, the new Cytek Aurora spectral cell sorter is expected to be functional and open to campus use. This purchase was entirely funded by an NIH S10 award (1S10OD032329-01A1 PI, Tony Marion). It also comes with a 561 laser, and all panels that investigators previously developed on the ZE5 can also be run on the Aurora sorter. Since both the FCCS and RBL maintain Cytek Aurora sorters, flow cytometry panels developed can be cross-shared between cores.

The FCCS Core has experienced relatively stable use of both flow cytometry and cell sorting services for the past five years (Section III.F). Over those five years, the FCCS Core has provided services for 35+ individual research laboratories from five colleges and five outside academic institutions or commercial companies. Since the transition to the YETI (ZE5) flow cytometer in 2017, the core has trained 65 new users. The FCCS Core is a critical resource for the grant-supported research mission at UTHSC as well as local, external researchers who depend upon the FCCS Core for data collection.

C. Competitive Analysis

There are other flow cytometers and cell sorters available in the Memphis medical district. Within the UTHSC campus, a Miltenyi MACSQuant flow cytometer is housed at the Translational Science Research Building, an Agilent Novocyte and EMD Millipore Guava EasyCyte are located within the College of Pharmacy. Users of these instruments participate in the educational seminars, but rarely pay for fee-based services in the FCCS Core. Two cytometers, the Cytek Aurora and the MacsQuant Tyto, are located within the RBL, but are only used by researchers within the RBL. In FY23, while the RBL decommissioned the Aria IIu sorter and installed the Cytek Aurora, FCCS did not support experiments in the RBL. FCCS will resume assistance with operation of the flow cytometry instruments in the RBL in FY24.

Outside of the UTHSC campus, housed within either the Le Bonheur Children's Hospital, the Children's Research Foundation, or the Memphis VA Medical Center (VAMC), are a BD Biosciences LSR II flow cytometer, a Sony SH800 FACS sorter, a Bio-Rad S3 FACS sorter, a Cytek Aurora, and a FACSAria FACS sorter. Users who choose these resources do so either because of convenience, or because use of the other instruments is free of charge (at the VAMC or within departmental "cores"). Although these other services do not advertise their services, or actively compete with the FCCS Core, they do siphon away users who might otherwise use the FCCS Core.

D. Marketing Plans to Obtain New Business

The technical capabilities of the FCCS Core will be sustained and expanded by the acquisition of the Cytek Aurora spectral sorter in FY24.

The capabilities of the FCCS Core, particularly in the areas of high-dimensional single-cell analysis and multi-omics research require communication to the research community. Each version of the Operational Strategic Plan for Research has recognized the importance of including single-cell analyses into research protocols in all areas of research that involve analyses of cellular phenotypes and their manipulation, and the diversity of gene expression among individual cells with similar phenotype or origin. Currently, the FCCS Core has the capability to perform indexed single cell sorting based upon up to 12 different fluorescence parameters and the ZE5 can comfortably analyze 14+ parameters. The FCCS core is working with the UTHSC Molecular Bioinformatics Core to establish high-dimensional data analysis pipelines in anticipation of the new Cytek Aurora sorter capabilities, which can analyze up to 45+ parameters on a single cell. This sorter will include a 561 nm laser, which is needed by investigators who utilize red “fruit” dyes, enabling users to expand their current panels without sacrificing markers, and the new sorter will allow users to also capitalize on a cellular autofluorescence as a parameter.

In FY23, the core optimized a 12-color myeloid panel for use on all current and future core instruments as well as flow cytometry instruments in the RBL with plans for an additional 2 panels to be developed and optimized in FY24. In-house creation and validation of these panes is expected to significantly reduce the challenges new investigators face when learning flow cytometry skills, and well also reduce the time and money spent by the investigator when developing panels on their own. In addition, because the number of parameters measured at the single-cell level is continually increasing, the core will need to establish optimized panels for use on the Cytek Aurora CS that are flexible enough for experienced investigators to tailor towards their specific needs (20+ parameters). In turn, optimized panels will provide datasets needed to establish the machine-learning tools for high-dimensional data analysis in the mBIO Core, and will also provide a framework panel for the future experiments.

The BD Biosciences LSR II flow cytometer was replaced in Q1 of FY17 with the Propel YETI (Bio-Rad ZE5) 21-color cytometer. As an early adopter, we had unlimited technical support and service from Propel. Bio-Rad acquired rights to manufacture and service the Yeti in 2017, rebranded as the ZE5. Bio-Rad also acquired rights to the Propel EVO software, now named Everest, also in 2017. The ZE5 has provided the campus with a highly technically sophisticated flow cytometer with a yellow-green laser (561 nm), which the LSR II did not have. Yellow-green laser excitation of several fluorophores eliminates, or at least vastly reduces, the problem of autofluorescence generated by the 488 nm laser. The potential to quantify red fluorescence protein expression in single cells also

augments protocols that employ red fluorescence protein expression during *in vivo* imaging studies.

The FCCS core will continue to participate in workshops and/or “Hot Topics” emphasizing the capabilities of the FCCS Core and informing investigators how flow cytometry can support their research needs. To continue its educational mission and to increase visibility to researchers, the FCCS Core will continue with its four-part lecture series designed to educate users in the basics of flow cytometry, panel design, compensation, and gating and the core will continue to advertise these classes campus-wide. Advanced flow cytometry classes were developed and provided by the core to the campus in FY23 and will continue to be offered at UTHSC. In addition, the core will sponsor Shared Resources Technology Talks from guest speakers and organize presentations and webinars from vendors on new technologies related to flow cytometry. These objectives will provide users with additional educational support and maintain the core’s mission of providing the latest technologies and expertise.

To address the many important technical requirements of flow cytometry, the FCCS Core established a UTHSC FCCS SharePoint site accessible to all UTHSC personnel and continues to release additional basic flow cytometry protocols as well as “tech notes” through this portal. The information located on this site will provide some of the educational and technical support needed by researchers as well as serving to highlight the capabilities of the core.

E. Forecasted Volumes for New Business

As panel design and complexity increase so too does the time and effort involved in designing and optimizing a high-quality panel fit for downstream high-dimensional data analysis. Optimization can take weeks or months, discouraging investigators and leading them to seek alternative approaches. The core will continue to optimize smaller panels for new-to-flow investigators as well as a 15-20+ color option which is expandable for experienced investigators and will begin to advertise these options in FY24. These panels are portable between the RBL- and FCCS-Core owned instruments and are expected to entice new investigators by reducing time and effort spent in development and to retain current investigators with designs specific to our instruments. In addition, the optimal choice of fluorochromes and antibody concentrations developed in our SOPs will be highly specific to our individual flow cytometry instruments, which should further encourage users to utilize the core instruments as opposed to other instruments.

The BD Biosciences Aria IIu sorter lacks a 561 laser and, therefore, is limited in the number parameters it can measure on a single cell. Currently core users need to redesign panels acquired on the ZE5 if they need to sort cells. The new Cytek Aurora sorter offers a 561 laser, and uses spectral-based technology allowing for better resolution of parameters, increasing the number of parameters that can be measured on a single cell. Acquisition of the Cytek Aurora is expected to solve the

current complaints users have for the core and should fit the needs of our users for several years.

Because of the success of the educational classes, the core will continue provide basic flow cytometry classes and will expand courses to offer data analysis educational opportunities using the core optimized panels. These classes will also serve as a marketing tool while maintaining the core's mission of providing cutting edge service and technology.

We will also continue to participate in events sponsored by SEFCIG, ISAC, SEASR and ABRF to further expand our expertise and our visibility to an external customer base. We will also continue to participate in the Office of Research Hot Topics seminar series and to recruit guest speakers for the institutional core labs special technology seminars that are focused on flow cytometry.

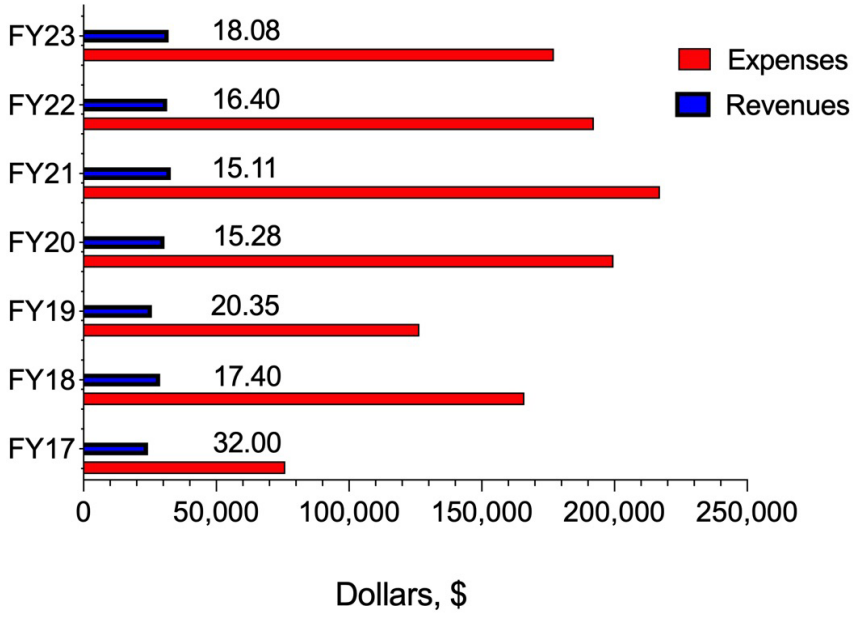
VI. Budget

FY2023	DEBITS	CREDITS
Salaries	114,499	
Supplies	8,924	
Service Contracts	53,739*	
Equipment (> $5,000)	0	
Other Expenses	0	
TOTAL EXPENSES	***177,162***	
FY23 Internal Recoveries		32,034
FY23 External Recoveries		0
TOTAL CREDITS		***32,034***
Income / (Subsidy)	(145,128)	
State Appropriation	(10,045)	
Net Income / (Subsidy)	**(155,173)**	

*Service Contracts/Maintenance expenditures included the BD Biosciences (through Specialty Underwriters) invoice, which totaled $26,739 and the Bio-Rad Laboratories invoice, which totaled $27,000 for FY23.

Subsidy, % before State Appropriation	82%
Subsidy, % after State Appropriation	88%

VII. Historical Revenues and Expenses, FY17-FY23



Expenses (red bars) and revenues (blue bars) are shown for each FY since FY17. The numbers beside the blue bar indicate the percentage of expenses covered by the revenues that are generated by service fees. The state appropriation/budget subsidy allocated to the core is not reflected in this figure.

Research Histology Core (RHC) Institutional Research Core Facility Analysis Report- FY23

Written by Natalie Smith, MS and Tiffany Seagroves, PhD

1. Relative to a specific core's mission, is the designation as an "institutional core" appropriate?

The RHC core designation as an institutional core is appropriate since it served 19 UTHSC laboratories across 8 departments and two colleges (COM and COP).

2. Does the Core pass the multi-departmental, multi-investigator litmus test?

Yes. In FY23, this core processed 4,455 service item requests for 19 unique laboratories across 8 departments and two colleges (COM and COP). The top five users, based on the percentage of invoiced service requests were: 1) Dr. Amandeep Bajwa (Pediatrics, COM, 25.47%), 2) Tiffany Seagroves (Pathology, COM, 16.22%), 3) Junwang Xu (Physiology, COM, 15.35%), 4) Wei Li (Pharmaceutical Sciences, COP, 7.5% and 5) Dr. Gabor Tigyi (Physiology, COM, 7.12%). The other 14 users accounted for the remaining 28.34% of invoices for completed projects.

3. Is there sufficient intra- and inter-departmental use and if not, why?

Yes, 19 unique users were served across multiple departments and two colleges. Overall, use by the COP has increased since FY22.

4. Can the services for the core be outsourced more economically?

No. The service fee structure is very competitive relative to other similar academic cores in our region (UT Health Science Center is in the bottom quartile), or to commercial vendors. In addition, shipment of grossed specimens in either ethanol-based or formaldehyde solutions to outside vendors for tissue processing is highly regulated and requires unique shipping and handling regulatory compliance and recordkeeping, which can be burdensome and expensive.

5. Are there unaccounted benefits beyond fiscal consideration to warrant continued institutional underwriting? (e.g., grants funded through investigator use, publications, etc.)?

Yes. In FY23, core activities led to 32 publications and supported 16 grants or contracts. In addition, Ms. Natasha Jones (University Clinical Health, UCH, Manager) provided expert consultation on project design at no cost to the investigators.

6. Is the core currently self-sufficient or is it subsidized by the Institution?

In FY23, the core was subsidized by the institution.

Accomplishments this past year:

- The RHC continued its fifth full year of operation as a partnership between the Office of Research and the Department of Pathology/University Clinical Health (UCH). The RHC will continue operations through FY24, with the support of the new Pathology Chair, Dr. Xianfeng Frank Zhao
- The core supported 32 publications and 16 extramural grant awards/contracts.

Financial Overview – FY23:

TOTALS	FY19	FY20	FY21	FY22	FY23
Revenues*	11,018	24,136	23,568	13,261	15,786
Expenses**	(129,931)	(75,345)	(79,927)	(67,373)	(65,405)
Income (Subsidy)	(118,913)	(51,209)	(56,359)	(54,112)	(49,619)
Other Costs	0	0	0	0	0
Income (Subsidy)	(118,913)	(51,209)	(56,359)	(54,112)	(49,619)
State Appropriation	0	0	12,045	16,646	*(21,091)***
Net Income (Subsidy)	(118,913)	(51,209)	(44,314)	(37,466)	(70,010)
Subsidy, % before State Appropriation	91%	68%	71%	80%	76%
Subsidy, % after State Appropriation	91%	68%	55%	56%	*N.D.*

* Revenues after 50:50 share with University Clinical Health (UCH) per the negotiated MOU.

** Includes salary support for the UCH-based histotechnician and 50% of the total expenses for supplies and equipment maintenance, after pro-rating with UCH based on the volume of research-specific projects.

*** The required income budget, or funds expected to be received from projects external to UTHSC, was set to be unrealistically high, resulting in a *negative state appropriation* in FY23. Therefore, in FY23, the % subsidy after the state appropriation was not determined (N.D.).

7. Suggested outcomes:

It is recommended that RHC continue as an institutional core.

Research Histology Core (RHC) Institutional Core Facility
Summary of Institutional Core Activities for FY 2023

Written by Natalie Smith, MS and Tiffany Seagroves, PhD

I. PUBLICATIONS

Full-length published articles (UTHSC faculty investigators are indicated in bold)

McDaniels JM, Shetty AC, **Kuscu C**, Kuscu C, Bardhi E, Rousselle T, Drachenberg C, Talwar M, Eason JD, Muthukumar T, Maluf DG, Mas VR. Single nuclei transcriptomics delineates complex immune and kidney cell interactions contributing to kidney allograft fibrosis. Kidney Int. 2023Jun;103(6):1077-1092. doi: 10.1016/j.kint.2023.02.018. Epub 2023 Feb 28. PMID:36863444; PMCID: PMC10200746.

Pervaiz N, Kathuria I, Aithabathula RV, **Singla B**. Matricellular proteins in atherosclerosis development. Matrix Biol. 2023 Jun;120:1-23. doi:10.1016/j.matbio.2023.04.003. Epub 2023 Apr 20. PMID: 37086928; PMCID: PMC10225360.

Kim JY, Silvaroli JA, Martinez GV, Bisunke B, Luna Ramirez AV, Jayne LA, Feng MJHH, Girotra B, Acosta Martinez SM, Vermillion CR, Karel IZ, Ferrell N, Weisleder N, Chung S, Christman JW, Brooks CR, Madhavan SM, Hoyt KR, Cianciolo RE, Satoskar AA, Zepeda-Orozco D, Sullivan JC, Davidson AJ, **Bajwa A**, Pabla NS. Zinc finger protein 24-dependent transcription factor SOX9 up-regulation protects tubular epithelial cells during acute kidney injury. Kidney Int. 2023Jun;103(6):1093-1104. doi: 10.1016/j.kint.2023.02.026. Epub 2023 Mar 13. PMID:36921719; PMCID: PMC10200760.

Patel PS, Castelow C, Patel DS, Bhattacharya SK, **Kuscu C**, Kuscu C, **Makowski L**, Eason JD, **Bajwa A**. Mitochondrial Role in Oncogenesis and Potential Chemotherapeutic Strategy of Mitochondrial Infusion in Breast Cancer. Int J MolSci. 2022 Oct 27;23(21):12993. doi: 10.3390/ijms232112993. PMID: 36361782;PMCID: PMC9658440.

Kumar S, **Singla B**, Singh AK, Thomas-Gooch SM, Zhi K, **Singh UP**. Hepatic, Extrahepatic and Extracellular Vesicle Cytochrome P450 2E1 in Alcohol and Acetaminophen-Mediated Adverse Interactions and Potential Treatment Options. Cells. 2022 Aug 23;11(17):2620. doi: 10.3390/cells11172620. PMID: 36078027;PMCID: PMC9454765.

Lamanilao GG, Dogan M, Patel PS, Azim S, Patel DS, Bhattacharya SK, EasonJD, **Kuscu C**, Kuscu C, **Bajwa A**. Key hepatoprotective roles of mitochondria inliver regeneration. Am J Physiol Gastrointest Liver Physiol. 2023 Mar1;324(3):G207-G218. doi: 10.1152/ajpgi.00220.2022. Epub 2023 Jan 17. PMID:36648139; PMCID: PMC9988520.

Kumar A, Sinha N, Kodidela S, Zhou L, **Singh UP**, Kumar S. Effect of benzo(a)pyrene on oxidative stress and inflammatory mediators in astrocytes and HIV-infected macrophages. PLoS One. 2022 Oct 14;17(10):e0275874. doi:10.1371/journal.pone.0275874. PMID: 36240258; PMCID: PMC9565757.

Rakib A, Mandal M, Showkat A, Kiran S, Mazumdar S, **Singla B**, **Bajwa A**, KumarS, **Park F**, **Singh UP**. Piceatannol induces regulatory T cells and modulates the inflammatory response and adipogenesis. Biomed Pharmacother. 2023 May;161:114514. doi: 10.1016/j.biopha.2023.114514. Epub 2023 Mar 13. PMID:36921534; PMCID: PMC10071559.

Kiran S, Mandal M, Rakib A, **Bajwa A**, **Singh UP**. miR-10a-3p modulates adiposity and suppresses adipose inflammation through TGF-β1/Smad3 signaling pathway. Front Immunol. 2023 Jun 2;14:1213415. doi: 10.3389/fimmu.2023.1213415.PMID: 37334370; PMCID: PMC10272755.

Deng S, Krutilina RI, Hartman KL, Chen H, Parke DN, Wang R, Mahmud F, Ma D, Lukka PB, Meibohm B, **Seagroves TN**, Miller DD, **Li W**. Colchicine-Binding Site Agent CH-2-77 as a Potent Tubulin Inhibitor Suppressing Triple-Negative Breast Cancer. Mol Cancer Ther. 2022 Jul 5;21(7):1103-1114. doi:10.1158/1535-7163.MCT-21-0899. PMID: 35499388; PMCID: PMC9256790.

Swanson M, Yun J, Collier DM, Seif C, **Yang CY**, Regner KR, **Park F**. Identification of cell division cycle protein 20 in various forms of acute and chronic kidney injury in mice. Am J Physiol Renal Physiol. 2023 Aug1;325(2):F248-F261. doi: 10.1152/ajprenal.00302.2022. Epub 2023 Jun 22. PMID:37348027.

Yu Z, Zhan J, Dong W, Lu L, Jablonski MM, Aleya L, Chen J, Zhang P, Chen H, **Gu W**. Potential Similarities in Sex Difference in Key Genes and Their Expression, Network, EQTL and Pathways between COVID-19 and Chronic Kidney Disease Based on Mouse Model. J Pers Med. 2022 Jul 21;12(7):1190. doi:10.3390/jpm12071190. PMID: 35887687; PMCID: PMC9323909.

Fan J, Wang S, Chen K, **Sun Z**. Aging impairs arterial compliance via Klotho-mediated downregulation of B-cell population and IgG levels. Cell Mol Life Sci.2022 Aug 24;79(9):494. doi: 10.1007/s00018-022-04512-x. PMID: 36001158; PMCID: PMC10082671.

Zhang L, Hung GC, Meng S, Evans R, **Xu J**. LncRNA MALAT1 Regulates Hyperglycemia Induced EMT in Keratinocyte via miR-205. Noncoding RNA. 2023 Feb11;9(1):14. doi: 10.3390/ncrna9010014. PMID: 36827547; PMCID: PMC9963368.

Shukla PK, Rao RG, Meena AS, Giorgianni F, Lee SC, Raju P, Shashikanth N, Shekhar C, Beranova S, Balazs L, **Tigyi G**, Gosain A, Rao R. Paneth cell dysfunction in radiation injury and radio-mitigation by human α-defensin 5.Front Immunol. 2023 Aug 10;14:1174140. doi: 10.3389/fimmu.2023.1174140. PMID:37638013; PMCID: PMC10448521.

Singla B, Aithbathula RV, Pervaiz N, Kathuria I, Swanson M, Ekuban FA, Ahn W, **Park F**, **Gyamfi M**, Cherian-Shaw M, **Singh UP**, Kumar S. CD47 Activation byThrombospondin-1 in Lymphatic Endothelial Cells Suppresses Lymphangiogenesis and Promotes Atherosclerosis. Arterioscler Thromb Vasc Biol. 2023Jul;43(7):1234-1250. doi: 10.1161/ATVBAHA.122.318904. Epub 2023 Jun 1. PMID:37259865; PMCID: PMC10281185.

Deng S, Banerjee S, Chen H, Pochampally S, Wang Y, Yun MK, White SW, Parmar K, Meibohm B, Hartman KL, Wu Z, Miller DD, **Li W**. SB226, an inhibitor of tubulin polymerization, inhibits paclitaxel-resistant melanoma growth and spontaneous metastasis. Cancer Lett. 2023 Feb 28;555:216046. doi:10.1016/j.canlet.2022.216046. Epub 2022 Dec 31. PMID: 36596380; PMCID: PMC10321023.

Dwyer AR, Perez Kerkvliet C, Truong TH, Hagen KM, Krutilina RI, Parke DN, Oakley RH, Liddle C, Cidlowski JA, **Seagroves TN**, Lange CA. Glucocorticoid Receptors Drive Breast Cancer Cell Migration and Metabolic Reprogramming viaPDK4. Endocrinology. 2023 Jun 6;164(7):bqad083.

doi: 10.1210/endocr/bqad083.Erratum in: Endocrinology. 2023 Jun 26;164(8): PMID: 37224504; PMCID: PMC10251300.

Fan J, Wang S, Lu X, **Sun Z**. Transplantation of bone marrow cells from miR150 knockout mice improves senescence-associated humoral immune dysfunction and arterial stiffness. Metabolism. 2022 Sep;134:155249. doi:10.1016/j.metabol.2022.155249. Epub 2022 Jul 2. PMID: 35792174; PMCID: PMC9796492.

Chen J, Lin Y, **Sun Z**. Inhibition of miR-101-3p prevents human aortic valve interstitial cell calcification through regulation of CDH11/SOX9 expression. Mol Med. 2023 Feb 21;29(1):24. doi: 10.1186/s10020-023-00619-4. PMID: 36809926; PMCID: PMC9945614.

Guo H, Zhang W, Wang J, Zhao G, Wang Y, Zhu BM, Dong P, Watari H, Wang B, LiW, **Tigyi G**, Yue J. Cryptotanshinone inhibits ovarian tumor growth and metastasis by degrading c-Myc and attenuating the FAK signaling pathway. Front Cell DevBiol. 2022 Sep 28;10:959518. doi: 10.3389/fcell.2022.959518. PMID: 36247016; PMCID: PMC9554091.

Pochampally S, Hartman KL, Wang R, Wang J, Yun MK, Parmar K, Park H, Meibohm B, White SW, **Li W**, Miller DD. Design, Synthesis, and Biological Evaluation of Pyrimidine Dihydroquinoxalinone Derivatives as Tubulin Colchicine Site-Binding Agents That Displayed Potent Anticancer Activity Both In Vitro and In Vivo. ACS Pharmacol Transl Sci. 2023 Mar 22;6(4):526-545. doi: 10.1021/acsptsci.2c00108.PMID: 37082747; PMCID: PMC10111625.

Krutilina RI, Hartman KL, Oluwalana D, Playa HC, Parke DN, Chen H, Miller DD, **Li W**, **Seagroves TN**. Sabizabulin, a Potent Orally Bioavailable Colchicine Binding Site Agent, Suppresses HER2+ Breast Cancer and Metastasis. Cancers (Basel). 2022 Oct 29;14(21):5336. doi: 10.3390/cancers14215336. PMID: 36358755; PMCID: PMC9658816.

Niture S, Gadi S, Qi Q, **Gyamfi MA**, Varghese RS, Rios-Colon L, Chimeh U, Vandana, Ressom HW, Kumar D. MicroRNA-483-5p Inhibits Hepatocellular Carcinoma Cell Proliferation, Cell Steatosis, and Fibrosis by Targeting PPARα and TIMP2.Cancers (Basel). 2023 Mar 10;15(6):1715. doi: 10.3390/cancers15061715. PMID:36980601; PMCID: PMC10046356.

Swanson ML, Regner KR, Moore BM 2nd, **Park F**. Cannabinoid Type 2 Receptor Activation Reduces the Progression of Kidney Fibrosis Using a Mouse Model of Unilateral Ureteral Obstruction. Cannabis Cannabinoid Res. 2022Dec;7(6):790-803. doi: 10.1089/can.2021.0127. Epub 2022 Feb 23. PMID: 35196117.

Vannier E, Richer LM, Dinh DM, Brisson D, Ostfeld RS, **Gomes-Solecki M**. Deployment of a Reservoir-Targeted Vaccine Against Borrelia burgdorferi Reduces the Prevalence of Babesia microti Coinfection in Ixodes scapularis Ticks. J Infect Dis. 2023 May 12;227(10):1127-1131. doi: 10.1093/infdis/jiac462. PMID:36416014; PMCID: PMC10175066.

Xiao Z, Cao L, Smith MD, Li H, **Li W**, Smith JC, **Quarles LD**. Genetic interactions between Polycystin-1 and TAZ in osteoblasts define a novel mechanosensing mechanism regulating bone formation in mice. Res Sq 2023 May 29:rs.3.rs-2957026. doi: 10.21203/rs.3.rs-2957026/v1. PMID: 37398127; PMCID: PMC10312920.

Samanta K, Azevedo JF, Nair N, Kundu S, **Gomes-Solecki M**. Infected Ixodess capularis Nymphs Maintained in Prolonged Questing under Optimal Environmental Conditions for One Year Can Transmit Borrelia burgdorferi *Borreliella genusnovum* to Uninfected Hosts. Microbiol

Spectr. 2022 Aug 31;10(4):e0137722.doi: 10.1128/spectrum.01377-22. Epub 2022 Jul 11. PMID: 35862961; PMCID:PMC9431577.

Sipe LM, Chaib M, Korba EB, Jo H, Lovely MC, Counts BR, Tanveer U, Holt JR, Clements JC, John NA, Daria D, Marion TN, Bohm MS, Sekhri R, Pingili AK, Teng B, Carson JA, Hayes DN, Davis MJ, Cook KL, Pierre JF, **Makowski L**. Response to immune checkpoint blockade improved in pre-clinical model of breast cancer after bariatric surgery. Elife. 2022 Jul 1;11:e79143. doi: 10.7554/eLife.79143. PMID:35775614; PMCID: PMC9342954.

Gage GA, Muench MA, Jee C, Kearns DN, Chen H, **Tunstall BJ**. Intermittent-access operant alcohol self-administration promotes binge-like drinking and drinking despite negative consequences in male and female heterogeneous stock rats. Neuropharmacology. 2023 Sep 1;235:109564. doi:10.1016/j.neuropharm.2023.109564. Epub 2023 May 5. PMID: 37149215; PMCID: PMC10247413.

Sluter MN, Bhuniya R, Yuan X, Ramaraju A, Chen Y, Yu Y, Parmar KR, Temrikar ZH, Srivastava A, Meibohm B, Jiang J, **Yang CY**. Novel, Brain-Permeable, Cross-Species Benzothiazole Inhibitors of Microsomal Prostaglandin E Synthase-1(mPGES-1) Dampen Neuroinflammation In Vitro and In Vivo. ACS Pharmacol Transl Sci. 2023 Mar 21;6(4):587-599. doi: 10.1021/acsptsci.2c00241.PMID: 37082746; PMCID: PMC10111624.

Aithabathula RV, Pervaiz N, Kathuria I, Swanson M, **Singh UP**, Kumar S, **Park F**, **Singla B**. Hydrogen sulfide donor activates AKT-eNOS signaling and promotes lymphatic vessel formation. PLoS One. 2023 Oct 26;18(10):e0292663. doi:10.1371/journal.pone.0292663. PMID: 37883422; PMCID: PMC10602273.

II. PRESENTATIONS GIVEN TO PROMOTE CORE RESOURCES AND CORE USAGE

No presentations were given in FY23.

III. SUMMARY OF ACTIVITIES

A. Personnel

Medical Director: Due to clinical staff turnover, there is not a medical director oversight of the research-only specimens.

Laboratory Manager: Ms. Natasha Jones is the contact for investigators to arrange core services. She is directly involved in processing research specimens and interacts with core customers during sample drop-off and pickup. She is also available for consultation regarding experimental design for preparing specimens for routine histology services.

Administrative Manager: Mr. Tim Hodge. Mr. Hodge supervised the personnel and the operating budget related to clinical pathology services for UCH. He was a full-time employee of UCH. In FY24, a new administrative manager was hired, Mr. Joe Davis.

Histotechnician: The equivalent of one half-time (50% effort) UCH employee is provided by the Office of Research to support research services for the RHC services within the UCH pathology clinical laboratory. Several histotechnicians rotate to complete research projects.

B. Oversight Committee

The following faculty were members of the FY23 Research Histology Core Internal Advisory Board:

Gustavo Miranda-Carboni (Medicine)
Elena Parfenova (Physiology)
RK Rao (Physiology)

C. Equipment and Service Contracts

All equipment maintained by the core is owned by UCH. Per the current contract agreement with UCH, UTHSC shares the costs of equipment maintenance agreements in a 50:50 split with UCH, after maintenance costs are first pro-rated for the fraction of completed research-based projects.

D. Usage Volumes by service request type

Service	FY19	FY20	FY21	FY22	FY23
Blocks/Embed, paraffin	1,623	2,267	1,982	1,104	2,007
Sectioned slides, paraffin	2,773	3,628	4,467	1,856	1,728
H&E stain, paraffin	627	1,241	911	672	610
Sectioned slides, cryosection	1,062	0	0	60	68
H&E stain, cryosection	22	0	0	0	14
Level I-III special stains	118	88	47	51	14

In addition to these fee-for-service options, the core trains researchers to properly employ histology and molecular pathology approaches through consultation. The following services are provided at no charge:

A) Consultation with investigators and their staff on proposed experimental design for histopathology services
B) Boilerplate language for histology core facilities and resources for grant applications
C) Letters of support, including estimated costs of core usage for grant submissions

Overall usage of the core lab:

- The core processed 4,455 service units on behalf of 19 total UTHSC laboratories across eight departments and two colleges in FY23 (COM, COP).

UTHSC departments that requested services FY23:

College of Medicine:
Medicine: 3 investigators
MIB: 2 investigators
Orthopaedic Surgery: 2 investigators
Pediatrics: 1 investigator
Pathology: 1 investigator
Pharmacology: 1 investigator
Physiology: 3 investigators
COP:
Pharmaceutical Sciences: 6 investigators

E. Fee Structure, FY23

The RHC core offers the following services, which are priced in the bottom-quarter to bottom-third relative to peer academic institutions that offer similar histopathology services.

Paraffin Blocks and Slides:	
Processing without paraffin embedding:	$2.90/cassette
Processing and paraffin embedding:	$3.48/block
Unstained slides, paraffin block:	$2.90/slide
Recut of previously faced paraffin block:	$2.90/slide
H&E-staining of cut slides:	$4.06/slide
Frozen Embedded Sections:	
Unstained, cryosectioned slide:	$5.79/slide*
*cyrosectioning requests require an advance appointment	
H&E-staining of cryosectioned slide:	$4.06/slide
Special Stains:	Please inquire
Special stain prices begin at $17.39 per slide	
Extended consult with core manager:	Please inquire

Applies to non-routine, continuing consultations or to special projects consultation to prepare histology projects. Consultation related to experimental design should occur by appointment with the core manager prior to sample submission and the initial consultation is available at no charge.

Referrals for histopathology:
Consultation for histopathology analysis of prepared samples should be arranged by contacting the Department of Pathology and requesting a referral to a pathologist through the department chair. The Department of Pathology also maintains a digital slide scanner for archiving slide images, managed by the Center for Cancer Research.

IV. GRANTS SUPPORTED BY THE CORE, FY23

Gomes-Solecki, Maria
NIH R073018349, Field trial and modeling of transmission-blocking vaccine to prevent Lyme disease

Gu, Weikuan
NIH R073290110, Center of Integrating Genomics and Bioinformatics for International Study of Stroke (CIGB-ISS)

Gyamfi, Maxwell
NIH R073621467, Human pregnane X receptor and sexual dimorphism in alcoholic liver disease

Li, Wei
NIH R073621430, Veru-111 & Analogs sponsored research by Veru Inc.

NIH R073621437, Discovery of Orally Bioavailable Tubulin Inhibitors to Overcome Taxane Resistance in Metastatic Breast Cancer

Makowski, Liza
NIH R073955086, Determining susceptibility loci in triple negative breast cancer using a novel pre-clinical model

Miranda, Susan (Krum)
NIH R073290157, Analysis of Cancer Health Disparities in Osteosarcoma by scRNA-seq

Seagroves, Tiffany
Mary Kay Ash Foundation, R073003528, Targeting Creatine Kinase Brain Isoform (CKB) to Improve Survival from Breast Cancer Brain Metastasis

Department of Defense, R073297151, Discovery of Orally Bioavailable Tubulin Inhibitors to Overcome Taxane Resistance in Metastatic Breast Cancer (Partnering PI)

Department of Defense, R073297156, Targeting Creatine Kinase Brain Isoform (CKB) to Inhibit Brain and Bone Metastasis

Singh, Udai
NIH R073621448, Adipose T cell microRNAs (miRs) regulate macrophage function during obesity

Sun, Zhongjie
NIH R073037522, Epigenetic Regulation of Kidney Function and Blood Pressure

NIH R073037541, Investigation into Arterial Stiffness and Hypertension

Tigyi, Gabor
NIH R073037500, Anticancer Strategies Targeting the Autotaxin-LPA Receptor Axis

NIH R073037568, Intercollaborative Radiation Countermeasure (INTERACT) Consortium for Advanced Development of Medical Countermeasures to Mitigate/Treat Acute and Delayed Radiation Syndromes

Xu, Junwang
NIH R073037549, The role of long non-coding RNA GAS5 in diabetic wounds

V. BUSINESS DEVELOPMENT

A. Market Assessment

The market for core services includes investigators who use research animals at UTHSC, Le Bonheur and the surrounding Memphis area. Investigators who currently do not use the RHC either pay for their own staff to prepare histology specimens, or they use outside vendors such as LabCorp.

B. Marketing Plans to Obtain New Business

The focus of marketing for the RHC core in FY24 will be to continue to expand the core customer base throughout Memphis and the UTHSC system. The core will continue to participate in events sponsored by the Office of Research and will develop marketing materials with Lee Ferguson. Dr. Seagroves will also work with Lee and the Department of Pathology to create the RHC core website and to point to the RHC directly from the Department of Pathology website.

C. Forecasted Volumes for New Business

The core increased pricing for all services by 3% for the FY24 period. The general rate structure became effective July 1, 2019, which placed UTHSC in the bottom-quarter to bottom-third of peer academic institutions that offered histology services. Overall, FY23 total revenues ($15,786) increased relative to FY22 ($13,261) and the total sample volume increased over FY22. However, the number of research laboratories served has decreased since FY21. Notably, several key users return to the RHC FY over FY, such as Dr. Bajwa, Dr. Seagroves and Dr. Wei Li. In FY24, it is projected that core use will

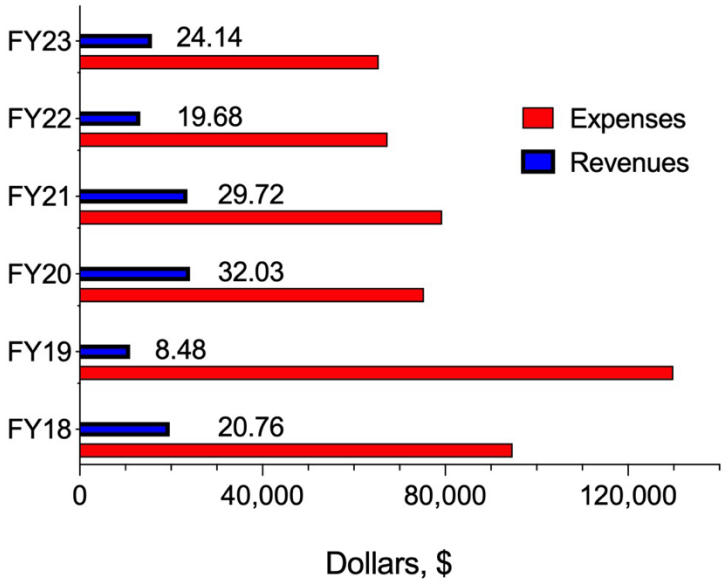
increase relative to FY23 levels due to the increase in the number of awarded grants and contracts, and the record number of mouse cages housed in the LACU in FY22-FY23 since animal specimens are the bulk of samples processed on the research side.

VI. Actual Budget – FY23: (July 1, 2022 to June 30, 2023)

FY2023	DEBITS	CREDITS
Salaries	50,362	
Supplies*	15,043	
Service Contracts	0	
Equipment (> $5,000)	0	
Other Expenses	0	
TOTAL EXPENSES	***65,405***	
FY23 Internal Recoveries*		15,786
FY23 External Recoveries		0
TOTAL CREDITS		***15,786***
Income / (Subsidy)	(49,619)	

*Supplies and recoveries are expressed after the cost-share with UCH

VII. Historical trends in revenues and expenses, RHC



Expenses (red bars) and revenues (blue bars) are shown over time. The numbers beside the blue bars indicate the percentage of expenses covered by revenues generated through service fees.

Advanced Imaging Core (AIC) Institutional Research Core Facility Analysis Report FY23

Written by Rachel Escue, PhD; Natalie Smith, MS; and Tiffany Seagroves, PhD

1. Relative to a specific core's mission, is the designation as an "institutional core" appropriate?
The Advanced Imaging Core designation as an institutional core is appropriate since it served 10 labs within 6 departments (Physiology, Neurology, Medicine, Anatomy and Neurobiology, Dentistry and Pathology) across two colleges (College of Medicine and College of Dentistry).

2. Does the core pass the multi-departmental, multi-investigator litmus test?
Yes. In FY23, the AIC completed over 200 hours of training, consultations, and imaging for 15 unique users from 10 different labs, within 6 departments and 2 colleges.

3. Is there sufficient intra- and inter-departmental use and if not, why?
No. However, while the majority of users are based in Physiology, there has been increased usage from other departments compared to previous years the core has been open.

4. Can the services for the core be outsourced more economically?
No. AIC service fees are already within the bottom-half to bottom-third of average pricing for similar services at peer institutions, and the AIC is the only facility in the Memphis area offering single molecule resolution microscopy with the Elyra 7 equipment.

5. Are there unaccounted benefits beyond fiscal consideration to warrant continued institutional underwriting? (e.g., grants funded through investigator use, publications, etc.)?
Yes. In FY2023, core activities led to 15 publications involving SMLM data and generation of data to support 14 grant proposals.

6. Is the core currently self-sufficient or is it subsidized by the Institution?
In FY23, the AIC was subsidized by the institution. The subsidy required was 94%.

Accomplishments this past year:

- Dr. Rachel Escue presented in the Hot Topics series, "Advancements in Super-resolution Microscopy" on the UTHSC campus (April 2023).
- Dr. Escue traveled to the ABRF annual conference to represent the AIC in June 2023.
- The AIC doubled the number of users in FY23 compared to FY22.
- Dr. Escue represented the AIC at the Research Resource Fair in September 2023.

Financial Overview – FY23:

TOTALS	FY21	FY22	FY23
Revenues	5,080	11,785	8,900
Expenses	(481,567)	(120,922)	(133,470)
Income (Subsidy)	(476,487)	(109,137)	(124,570)
Other Costs	0	0	0
Income (Subsidy)	(476,487)	(109,137)	(124,570)
State Appropriation	18,586	2,418	1,209
Net Income (Subsidy)	(457,901)	(106,719)	(123,361)
Subsidy, % before State Appropriation	99%	90%	94%
Subsidy, % after State Appropriation	95%	88%	93%

The Advanced Imaging Core opened in Q2 of FY21.

7. Suggested outcomes:

It is recommended that the AIC become a college- or department-managed resource if usage or revenues generated does not increase during FY24.

Advanced Imaging Core (AIC) Institutional Core Facility
Summary of Institutional Core Activities for FY 2023

Written by Rachel Escue, PhD; Natalie Smith, MS and Tiffany Seagroves, PhD

I. PUBLICATIONS (published between July 1, 2022 to June 30, 2023)

Thiyagarajan T, Ponnusamy S, Hwang DJ, He Y, Asemota S, Young KL, Johnson DL, Bocharova V, Zhou W, Jain AK, Petricoin EF, Yin Z, Pfeffer LM, Miller DD, **Narayanan R**. Inhibiting androgen receptor splice variants with cysteine-selective irreversible covalent inhibitors to treat prostate cancer. Proc Natl Acad Sci U S A. 2023 Jan 3;120(1):e2211832120. doi: 10.1073/pnas.2211832120.Epub 2022 Dec 28. PMID: 36577061; PMCID: PMC9910435.

Goorha S, Victor AK, **Reiter LT**. Culturing and Neuronal Differentiation of Human Dental Pulp Stem Cells. Curr Protoc. 2022 Nov;2(11):e600. doi:10.1002/cpz1.600. PMID: 36420818; PMCID: PMC10274300.

Fan J, Wang S, Chen K, **Sun Z**. Aging impairs arterial compliance via Klotho-mediated downregulation of B-cell population and IgG levels. Cell Mol Life Sci.2022 Aug 24;79(9):494. doi: 10.1007/s00018-022-04512-x. PMID: 36001158; PMCID: PMC10082671.

Smith AM. Increased virus dissemination leads to enhanced lung injury but not inflammation during influenza-associated secondary bacterial infection. FEMS Microbes. 2022 Jul25;3:xtac022. doi: 10.1093/femsmc/xtac022. PMID: 37332507; PMCID: PMC10117793.

Victor AK, Hedgecock T, Donaldson M, Johnson D, Rand CM, Weese-Mayer DE, **Reiter LT**. Analysis and comparisons of gene expression changes in patient-derived neurons from ROHHAD, CCHS, and PWS. Front Pediatr. 2023 May10;11:1090084. doi: 10.3389/fped.2023.1090084. PMID: 37234859; PMCID:PMC10206321.

Romero LO, Caires R, Kaitlyn Victor A, Ramirez J, Sierra-Valdez FJ, Walsh P, Truong V, Lee J, Mayor U, Reiter LT, **Vásquez V**, Cordero-Morales JF. Linoleic acid improves PIEZO2 dysfunction in a mouse model of Angelman Syndrome. Nat Commun. 2023 Mar 1;14(1):1167. doi: 10.1038/s41467-023-36818-0. PMID: 36859399; PMCID: PMC9977963.

Afolabi JM, Kanthakumar P, Williams JD, Kumar R, Soni H, **Adebiyi A**. Post-injury Inhibition of Endothelin-1 Dependent Renal Vasoregulation Mitigates Rhabdomyolysis-Induced Acute Kidney Injury. Function (Oxf). 2023 May4;4(4):zqad022. doi: 10.1093/function/zqad022. PMID: 37342410; PMCID:PMC10278989.

Caires R, Garrud TAC, Romero LO, Fernández-Peña C, Vásquez V, **Jaggar JH**, Cordero-Morales JF. Genetic- and diet-induced ω-3 fatty acid enrichment enhancesTRPV4-mediated vasodilation in mice. Cell Rep. 2022 Sep 6;40(10):111306. doi:10.1016/j.celrep.2022.111306. PMID: 36070688; PMCID: PMC9498980.

Kumar R, Soni H, Afolabi JM, Kanthakumar P, Mankuzhy PD, Iwhiwhu SA, **Adebiyi A**. Induction of reactive oxygen species by mechanical stretch drives endothelin production in neonatal pig renal epithelial cells. Redox Biol. 2022Sep;55:102394. doi: 10.1016/j.redox.2022.102394. Epub 2022 Jul 4. PMID:35841629; PMCID: PMC9289874.

Fan J, Wang S, Lu X, **Sun Z**. Transplantation of bone marrow cells from miR150knockout mice improves senescence-associated humoral immune dysfunction and arterial stiffness. Metabolism. 2022 Sep;134:155249. doi:10.1016/j.metabol.2022.155249. Epub 2022 Jul 2. PMID: 35792174; PMCID:PMC9796492.

Chen J, Lin Y, **Sun Z**. Inhibition of miR-101-3p prevents human aortic valve interstitial cell calcification through regulation of CDH11/SOX9 expression. Mol Med. 2023 Feb 21;29(1):24. doi: 10.1186/s10020-023-00619-4. PMID: 36809926;PMCID: PMC9945614.

Krutilina RI, Hartman KL, Oluwalana D, Playa HC, Parke DN, Chen H, Miller DD, Li W, **Seagroves TN**. Sabizabulin, a Potent Orally Bioavailable Colchicine Binding Site Agent, Suppresses HER2+ Breast Cancer and Metastasis. Cancers (Basel). 2022 Oct 29;14(21):5336. doi: 10.3390/cancers14215336. PMID: 36358755;PMCID: PMC9658816.

Afolabi JM, Michael OS, Falayi OO, Kanthakumar P, Mankuzhy PD, Soni H, **Adebiyi A**. Activation of renal vascular smooth muscle TRPV4 channels by 5-hydroxytryptamine impairs kidney function in neonatal pigs. Microvasc Res.2023 Jul;148:104516. doi: 10.1016/j.mvr.2023.104516. Epub 2023 Mar 6. PMID:36889668; PMCID: PMC10258165.

Hwang DJ, He Y, Ponnusamy S, Thiyagarajan T, Mohler ML, **Narayanan R**, Miller DD. Metabolism-Guided Selective Androgen Receptor Antagonists: Design, Synthesis, and Biological Evaluation for Activity against Enzalutamide-Resistant Prostate Cancer. J Med Chem. 2023 Mar 9;66(5):3372-3392. doi:10.1021/acs.jmedchem.2c01858. Epub 2023 Feb 24. PMID: 36825758; PMCID:PMC10243532.

Mata-Daboin A, Garrud TAC, Fernandez-Pena C, Peixoto-Neves D, Leo MD, Bernardelli AK, Singh P, Malik KU, **Jaggar JH. 2023.** Vasodilators activate TMEM16A channels in endothelial cells to reduce blood pressure. bioRxiv [Preprint]. 2023 Jun 6:2023.06.02.543450. doi: 10.1101/2023.06.02.543450. PMID: 37333248; PMCID: PMC10274675.

II. SUMMARY OF ACTIVITIES

A. Personnel

Microscopy Manager: Rachel Escue, PhD, staff (100% effort)
Dr. Escue supervises all core activities, including consultations with new users and experimental design, training on the microscope systems, imaging of user samples, data analysis, equipment maintenance, SOP and guide writing, and service request scheduling and billing.

B. AIC Internal Advisory Board

The following faculty were members of the FY23 Advanced Imaging Core Internal Advisory Board:

John Cox (Microbiology, Immunology &l Biochemistry)
TJ Hollingsworth (Opthalmology)
Jonathan Jaggar (Physiology)
Tony Marion (Microbiology, Immunology & Biochemistry)
Wen Lin Sun (Pharmacology)

C. Equipment

FY23 equipment located in the AIC lab space

Equipment	Cost	Funding Source/Purchase FY
Zeiss Elyra 7 (LS)/ Axio Observer	$644,023	Office of Research funding/ FY21

D. Service Contracts

The Elyra system is maintained by a service agreement with Carl Zeiss Microscopy, ($40,483).

E. Usage Volumes by Service Request Type

Service	Revenue	Service Requests	Units (hrs)
Unassisted Imaging by Trained Users - SIM	$1,043.75	13	41.75
Unassisted Imaging by Trained Users - SMLM	$2,781.00	23	67.5
Assisted Imaging	$1,524.40	11	16.75
Workstation – Trained Users	$1,120.15	35	72.5
Assisted Workstation Use	$329.60	3	4
Consultation	$309	3	6
Training	$1,792.20	9	21.75
TOTAL	**$8,900.10**	**97**	**230.25**

*Beginning with FY23, imaging by trained users was broken down into 2 categories (SIM and SMLM) to account for the increased wear on the machine with SMLM. In April of 2023, the consultation fee was eliminated.

Usage by Lab

Lab	Total Revenue	Percent of Total Use
Jaggar, Jonathan	$4,148.20	47%
Sun, Zhongjie (	$1,091.80	12%
Adebiyi, Adebowale	$1,067.25	12%
Reiter, Lawrence	$659.20	7%
Narayanan, Ramesh	$555.75	6%
Du, Jianyang	$533.30	6%
Johnson, Rajasingh	$432.60	5%
Vasquez, Valeria	$206.00	2%
Seagroves, Tiffany	$103.00	1%
Smith, Amber	$103.00	1%

F. Multi-year Trends

Revenues (by service category)

Service	FY23	FY22	FY21
Imaging - trained users	$3,824.75	$7,380.00	$2,240.00
Imaging - assisted users	$1,524.40	$1,560.00	$2,060.00
Workstation - trained users	$1,120.15	$1,065.00	
Workstation - assisted users	$329.60	$140.00	
Consultation	$309.00	$200.00	$250.00
Training	$1,792.20	$1,440.00	$640.00
TOTAL	**$8,900.10**	**$11,785.00**	**$5,190.00**

Hours of Use (by service category)

Service	FY23	FY22	FY21
Imaging - trained users	109.25	135.25	56
Imaging - assisted users	16.75	19.5	23.75
Workstation – trained users	72.5	39.5	
Workstation - assisted users	4	1.75	
Consultation	6	4	6
Training	21.75	18	8
TOTAL	**230.25**	**218**	**93.75**

G. Fee Structure FY23

Beginning with FY23, imaging by trained users was broken down into 2 categories (SIM and SMLM) to account for the increased wear on the machine with SMLM. In April of 2023, the consultation fee was also eliminated to remove barriers to using pre-stained samples for confocal imaging for SRM and SMLM.

Zeiss Elyra 7 Super Resolution Microscopy (SRM) Unit

Extended consultations:	$128.75/hour
Initial training:	$82.40/hour/user
Imaging:	
Imaging of fixed specimens by trained users:	$25.00/hour
Live-imaging of specimens by trained users:	$51.25/hour
SMLM imaging of fixed specimens by trained users:	$41.20/hour
SMLM live-imaging of specimens by trained users:	$51.25/hour
Imaging of fixed specimens by core manager:	$82.40/hour
Live-imaging of prepared specimens by core manager:	$103.00/hour
Data analysis on dedicated workstations (ZEN Black software):	
Unassisted data analysis on the workstation:	$15.45/hour
Assisted data analysis on the workstation:	$82.40/hour

LaVision Ultramicroscope II Light Sheet Fluorescence Microscopy (LSFM) Unit

Services for the LSFM Unit were discontinued in FY23 due to lack of use.

III. GRANTS SUPPORTED BY THE CORE, FY23

Adebiyi, Adebowale

USPHS Grant R01 DK120595, Vascular ion channels and microcirculation in neonatal urinary tract obstruction

USPHS Grant HL151735, Control of microvascular function by ion channels

Du, Jianyang

USPHS Grant MH113986, CO2 inhalation enhances the lability of fear memory.

Jaggar, Jonathan

USPHS GRANT HL133256, Blood pressure regulation by smooth muscle cell ion channels

USPHS Grant HL155180, PKD proteins in endothelial cells

Johnson, Rajasingh
USPHS Grant HL141345, scaRNA Modified Induced Pluripotent Stem Cell-Derived Cardiomyocytes or Exosomes Therapy for Chronic Ischemic Cardiomyopathy Patients

Narayanan, Ramesh
USPHS Grant CA229164, Novel Degraders of the Androgen Receptor (AR) and AR Splice Variants (AR-SVs)

Department of Defense Grant W81XWH- 21-1-0055, Androgen Receptor-Targeted Treatment for Therapeutically Challenging Breast Cancer

Reiter, Lawrence
USPHS Gant NS115776, The role of UBE3A in gliopathic seizures.

Seagroves, Tiffany
Army Grant W81XWH-20-1-0019, Discovery of Orally Bioavailable Tubulin Inhibitors to Overcome Taxane Resistance in Metastatic Breast Cancer (Partnering PI)

Smith, Amber
USPHS Grant AI139088, Predictive Modeling of Influenza-Pneumococcal Coinfection

Sun, Zhongjie
USPHS Grant AG062375, Epigenetic Regulation of Kidney Function and Blood Pressure

USPHS Grant HL154147, Investigation into Arterial Stiffness and Hypertension

Vasquez, Valeria
USPHS Grant GM-133845, Regulation of mechanosensitive ion channels by membrane lipids

IV. BUSINESS DEVELOPMENT

A. AIC History

Planning for the AIC began in FY17 to address the need for more advanced microscopy and imaging services on campus. To that end, a LaVision Biotec (now Miltenyi Biotec) Ultramicroscope II light-sheet fluorescence microscope (LSFM) was purchased in FY2018 and installed in the TSRB. In FY20, the Zeiss Elyra 7 LS super-resolution microscope (SRM) was purchased, but due to the COVID-19 pandemic, installation in the Johnson building was delayed until September 2020. Following the hiring of Dr. Escue as microscopy manager for the AIC in November of 2020, the core officially opened for business in Q3 of FY21 in January of 2021.

B. Market Assessment

The market for AIC services includes any investigators within UTHSC and surrounding institutions who use imaging experiments to support their research. Investigators who do not currently use the AIC for imaging services rely on departmental imaging systems, typically using confocal microscope technology, with a high number of users relying on the imaging center within the UTHSC Neuroscience Institute. However, the AIC is the only location on campus, or in the Memphis area, offering super-resolution microscopy technologies, including single molecule localization microscopy (SMLM), to internal and external customers.

C. Competitive Analysis

While planning for the AIC, Dr. Seagroves compared service fees across 14 research institutions housing similar imaging instruments in core facilities. As a result, AIC prices have been set such that UTHSC ranks in the bottom-half to bottom-third of peer institutions, consistent with pricing policies of other UTHSC institutional cores. In addition, local competition is minimal as there are no facilities in the Memphis area that offer the same services the AIC does. The closest competitor for the AIC is the Neuroscience Institute within UTHSC.

D. Marketing Plans to Obtain New Business

The current goal for marketing the AIC is to expand the user base on the UTHSC campus. To that end, Dr. Escue gave a presentation in April of 2023 as part of the Hot Topics in Research series. In a talk that was both in-person and live-streamed, Dr. Escue introduced super-resolution microscopy to the campus and invited Dr. Alejandro Mata-Dobain from Dr. Jaggar's laboratory to present some of his SMLM data obtained at the core. The AIC had its first drop-in week immediately following Dr. Escue's presentation, allowing potential users to bring their own samples to the core to try out the equipment. In September of 2023, UTHSC held the first Research Resource Fair since the core's opening, allowing the AIC to reach even more potential users on campus. Following suggestions from the internal advisory board, Dr. Escue also will be reaching out to individual departments to present information about the core and techniques available to the faculty in those departments. Drop-in weeks will continue to be offered to users to bring pre-stained samples for evaluation and to learn more about services.

E. Forecasted Volumes for New Business

Beginning this fiscal year, the fee for imaging by trained users was broken up into two categories (SIM and SMLM) to account for the increased strain on the system with SMLM imaging and to allow SIM imaging to better compete with confocal imaging on campus. While overall revenues decreased in FY23 relative to FY22, the core had the highest number of unique users of any other year. With the increased exposure of the core to the campus, it is projected that the core will continue to serve more new customers at UT.

V. ACTUAL BUDGET FY23 (July 1, 2022 to June 30, 2023)

FY2023	DEBITS	CREDITS
Salaries	85,347	
Supplies	7,640	
Service Contracts*	40,483	
Equipment (> $5,000)	0	
Other Expenses	0	
TOTAL EXPENSES	***133,470***	
FY23 Internal Recoveries		8,900
FY23 External Recoveries		0
TOTAL CREDITS		***8,900***
Income / (Subsidy)	(124,570)	
State Appropriation	1,209	
Net Income / (Subsidy)	**(123,361)**	

*Service Contracts/Maintenance-Carl Zeiss Microscopy, $40,483

Subsidy, % before State Appropriation 94%
Subsidy, % after State Appropriation 93%

Conclusions and Global Recommendations Impacting All Cores

Strong support of research cores and shared facilities is essential to maintaining international recognition of research programs, increasing extramural funding, recruiting and retaining outstanding research faculty and generating high-impact data for publications.

Institutional cores are currently defined as shared resources that are, or will be, widely used among UT Health Science Center faculty from multiple departments, colleges and, ideally, campuses. The institutional research cores currently receive their budget from the state of Tennessee, including the Tennessee Higher Education Commission (the Molecular Resource Center of Excellence, MRC) and the institution, which then receives all fees for service. The fees are set based upon market evaluation of similar cores/services. Since FY16, institutional cores have been expected to sit on their financial bottom, to be managed with a business model using business plans to develop budgets and to employ data-based metrics to measure core success. Investment in core facilities is a priority of the Office of Research. Overall, during FY16-FY18, ~$2.5M of the $5M in funds distributed to the VC for Research startup fund were used to subsidize core facilities, including large equipment purchases. In FY19, there were also substantial investments in animal caging and core equipment for the LACU and the RBL cores. In FY21, there was investment in the newly launched Advanced Imaging Core (AIC), including the purchase of a Zeiss Elyra 7 lattice SIM super resolution microscope system.

Detailed core activity and core analysis reports have been provided annually to the campus since FY16. Complete copies of the reports are available for direct download from the UT Health Science Center institutional cores website. Not only do the reports highlight the financial performance of each core, but they also review in detail how the cores serve the campus across colleges and departments, by reporting on the volume of use of services, the extramural grants/awards supported by the core and overall core productivity (such as publications produced, core support of grant awards, core service to the campus, etc.).

Although rates for core services have been routinely increased by 3% over prior fiscal year levels during FY16-FY23, these increases were insufficient to offset the increased operating expenses associated with personnel and with service agreements or supplies. For example, the total budget necessary to operate the core facilities increased from $6,272,412 in FY19 to $7,772,001 in FY21 (23.9%). The influx of additional Institutional support for the core facilities over the FY21- FY22 periods resulted in a non-deficit budget for the first time since these reports were first generated in FY22. The net state funded budget in FY23 decreased from FY22 levels by $319,099, which was offset by increased use of the LACU in FY23. Overall, the cores, including MRC, ended with a net income of $79,059 (**Appendix H, page 12**).

Total recoveries increased in FY23 relative to FY22 for the LACU, mBIO, RHC and MedChem cores. Recoveries were similar to FY22 levels for the FCCS Core. Recoveries decreased for RBL and the AIC. With the recent right-sizing of the operating budget to

prevent aggregate deficit across the cores, there is a continued need to obtain dedicated, recurring budgets for: 1) the cores to replace broken and outdated equipment and 2) to purchase new equipment or to develop new institutional core facilities.

There remain opportunities for further improvements in managing core operations, including enhancing internal and system-level marketing efforts to increase demand for core services, and enhancing communication efforts to spread awareness about core services and the expertise of our core directors on a statewide level. All of these efforts will lead to increased demand for core services and thereby, service fee recoveries, while supporting our researchers as they compete nationally/internationally for extramural support. In addition, there is momentum to continue to apply for extramural support for core equipment (for example, through the S10 grant or other infrastructure mechanisms), federal infrastructure support grants, and to secure philanthropic support. Together, these steps will allow the Office of Research to achieve our long-term goal to reduce additional core subsidies needed at fiscal year-end to "backfill" the operational budgets, while re-investing in core facilities through equipment and infrastructure upgrades.

Across the board, the specific recommendations for all institutional cores are outlined below:

- The highest priority is to secure an annual budget to replace ageing/outdated equipment in the institutional cores. This investment will result in increased extramural funding and will support the recruitment of new faculty and retention of current faculty.
- The second highest priority is to secure an annual, recurring budget to purchase new, high-end instrumentation for the institutional cores so that our campus can invest in cutting-edge technologies that lead to innovative, high impact research programs, increasing the likelihood of grant proposal funding and increasing each health science center campus' national reputation.
- The third highest priority is to ensure continuation of an annual operational budget that is sufficient to meet the budgetary needs of the institutional cores, preventing the recurring need to identify sources to "zero out" net deficits across cores at the end of each fiscal year.
- All institutional cores should continue to incorporate an annual inflationary increase of 3% in user fees to match the 3% inflationary increase that can typically be requested on extramural funding sources. Throughout FY22-FY23 post-COVID-19, the inflation rate remained high, and the costs of supplies and equipment service agreements often far exceeded 3%.
- The Office of Research will continue to promote core capabilities and expertise to internal users, and to expand marketing of core capacities to external users, including commercial users who pay higher service fees. The cores will also continue to participate in the Hot Topics in Research seminar series, technology talks and in new faculty fair events when sponsored by the Office of Academic, Faculty and Student Affairs and/or the Office of Research.

- The Office of Research will continue to strive to eliminate redundant, underutilized core resources or to outsource commodity services in order to invest in emerging technologies in the core facilities. For example, the MPMS Unit of the PMC was sunsetted in June of 2023.
- The Office of Research should increase efforts to coordinate with individual colleges to assist with start-up packages that include capital equipment, including discussions to determine whether individual instrumentation would be utilized more efficiently within a shared resource than in an individual laboratory. We should work with colleges to reduce or to eliminate the redundant purchases of new equipment during faculty recruitment that may already exist in institutional cores and/or that may compete with the institutional cores. An alternative approach to address this issue may be to offer institutional dollars as part of startup packages that can only be spent in the cores.
- Continue to support distribution of boilerplate facilities and resources language for grant and contracts related to institutional core resources and to update these documents at least bi-annually.
- Survey core users more frequently to receive up-to-date feedback about the quality of core services, the perceived value of core services, turnaround time for sample processing and customer service quality, in order to further improve core operations.
- When feasible, work with centers and institutes to cost-share core capital equipment to be utilized by a broad group of member investigators, such as a rodent MRI system.
- To provide sufficient administrative support for core directors in preparation of NIH S10 equipment or other infrastructure-based proposals to acquire high-end instrumentation.
- Enhance the number of technology talks organized by the institutional cores to spread awareness of new technologies and to remind the research community of the breadth of expertise of our core directors.
- Ensure that the IABs for each core meet at least once per year to advise on core operations and to learn about core achievements and challenges.
- Continue to work with the Office of Development and Alumni Affairs to develop relationships with new philanthropic sources and to build relationships with equipment vendors, who may provide discounted or gift-in-kind equipment for the cores. As part of this ongoing effort, Greg Harris became a member of the VCR Research Cabinet in FY18. Recent projects organized by Greg include the acquisition of functional equipment donated by Glaxo Smith Kline.
- If investigators are using the time of core directors and/or core personnel for development of grant proposals, protocol development to provide preliminary data, or in-depth consultation related to experiment, including data analysis and troubleshooting, then it is fair, reasonable, and expected that they should be added on the faculty member’s grant application for the percentage of time utilized. We will continue to engage with the associate vice chancellor for Research-Office of Sponsored Programs and with the assistant/associate deans of Research within the colleges to develop guidelines that are enforceable during pre- and post-award review.

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