

## Global Research, Education, and Business Collaborations- Where Could UTHSC Go Next?

When the University of Tennessee Health Science Center hosted a delegation of Chinese scientists in mid-April as part of an ongoing conversation to bring novel research initiatives, cutting-edge biotechnologies, and a student and postdoctoral Fellow Exchange Program to Memphis, you may wonder what could all this mean for UTHSC's future?

Our university offers several unique assets to companies looking to expand their research capabilities. One asset is the soon-to-be-complete Plough Center for Sterile Drug Delivery Systems. The facility will be a contract manufacturing operation (CMO) for pharmaceutical companies ranging from startups to big pharma. Training for students and professionals in drug manufacturing will also be hosted on-site. It will be one of the few in the USA that can develop a drug from trials to market once completed.

The future UT-Baptist Research UTHSC Biotechnology Research Park will be a state-of-the-art campus designed for the highly-specialized needs of Memphis' growing bioscience community. At completion, the park will feature 1.2 million square feet of laboratory, research, education and business development space located on a 10-acre campus in the heart of the Memphis Medical Center.

Among the key players who visited UTHSC were Y. James Kang, PhD, Professor and Director at Sichuan University West China Regenerative Medicine Center and Chief Scientific Officer and CEO of Sichuan Revotek and Nathan Kangpan, CEO of Revotek - North America. Sichuan Revotek recently received international attention for the creation of the world's first 3-D blood vessel bioprinter and the successful implantation of such artificial blood vessels into rhesus monkeys. Revotek is looking for research capabilities, and eventually a manufacturing site, in the United States to further develop the technology and begin clinical trials. If a partnership with UTHSC is successful, not only could it bring millions of dollars into the Memphis economy but UTHSC would be the first site in the USA to host this technology.

The visit is a reciprocation of a previous trip by a UTHSC delegation to Chengdu in February led by



(Pictured left to right: Drs. Youngentob, Tigyi, Kang, Goodman, Cormier and Brown)

Vice Chancellor for Research Dr. Steven R. Goodman. During that trip, there was discussion on the finalization of a student and postdoctoral Fellow Exchange Program between UTHSC and West China School of Medicine and West China Hospital of Sichuan University. The second part of that visit was dedicated to the establishment of research ties and collaborations with companies in Chengdu's High-Tech Zone. More details on that trip can be found later in this edition of the *Research Rainmaker*.

Nestled in Memphis where companies such as FedEx and Medtronic also host flagship operations, one can see that UTHSC is the prime catalyst for facilitating successful partnerships built on international education, research, and business development. Finalization of these international collaborative efforts between UTHSC and China is expected to be completed in the very near future. Approvals of a UTHSC-Sichuan University Collaborative Research Network (CORNET) Award to stimulate research collaborations between the faculty of these two Universities will also be finalized.

-Ken Brown, JD, MPA, PhD, FACHE  
Executive Vice Chancellor and Chief Operations Officer

## 2 The Research Rainmaker

### Around the World to Build Research and Business Relations with UTHSC



(Pictured left to right: Drs. Thomason, Towbin, Goodman, Cormier, Yates, and Gu)

In February, a UTHSC delegation led by Vice Chancellor for Research Steven Goodman visited Chengdu in the PR of China. The delegation included Dean Don Thomason, Associate VCRs Stephania Cormier and Gabor Tigyi, Assistant VCR Weikuan Gu, Professor of Pharmacy Ryan Yates, and Chief of Pediatric Cardiology at UTHSC and St. Jude Chair of Pediatric Cardiology at Le Bonheur Children's Hospital Jeffrey Towbin.

You might ask what took us around the world to get to their destination as it is stipulated in the title? In fact, we indeed flew around the world but not by choice but due to bad weather and flight cancellations that diverted the trip from flying from San Francisco directly to Chengdu. Instead, we were re-routed via Frankfurt, Germany and from there to the destination in China in a mere 55-hour-long trip.

The second questions that might pop up in your mind is: What did we do in Chengdu to promote UTHSC? The first purpose of the trip was to finalize a Student and Postdoctoral Fellow Exchange Agreement between UTHSC and West China School of Medicine and West China Hospital of Sichuan University (WCSM/WCH). This medical school in Chengdu serves a population of 14 million people with hospital beds numbering in excess of 5,700. With the exchange agreement soon in place, our students and fellows will have an opportunity to receive training in a unique subtropical medical center that receives over 5 million outpatient visits and performs 135,780 surgeries annually, slightly more than what they can see at UTHSC Hospitals. The hospital, later medical school, was founded by Dr. O.L. Kilborn by merging Cunren and Renji Hospitals in 1892 through the joint efforts of missionary organizations from the United States, Britain, and Canada. No doubt that spending

time and training at WCSM/WCH will add a different dimension to the medical and research training of our students.

The second purpose of our trip was to establish research ties and cooperation with companies in the High-Tech Zone of Chengdu. The annual growth rate of the economy in this region was 10.2% with 238 Fortune 500 companies contributing to the GDP \$145.524 billion in 2013. The delegation visited Innolife Ltd. ([www.innolife.com.cn](http://www.innolife.com.cn)), a biopharmaceutical company focused on regeneration of ischemia-induced organ failure through the reactivation of tissue injury/repair signaling system and mobilization of the body's inherent self-repair capability. Their lead product is designed to promote the regeneration of heart muscle after myocardial infarction. Innolife is near receiving FDA approval to launch clinical trials in the USA. They are the ideal partner/customer for the recently launched Clinical Trials Network of Tennessee (CTN2) that can provide patients with narrowly specified diagnostic and demographic parameters for clinical trials. Another company that has an interest in setting up its US operations center is Revotek ([www.revotek.com.cn](http://www.revotek.com.cn)). The name says it all; they developed a revolutionary technology in 3D bioprinting of artificial blood vessels. The technology includes a cloud-based CT/MRI angiographic imaging of the patient's vessel that needs replacement. This custom design is then fed into the 3D bioprinting robot that will print multiple layers of Biosynspheres that contain mesenchymal stem cells isolated from five grams of the patient's abdominal fat. The bioprinted vessel is then surgically implanted by removing the occluded segment of the patient's artery. After a few weeks, the implant develops the normal anatomic layers of the blood vessel they replace. Revotek is looking for a research, and eventually a manufacturing site, in the US to further develop the technology and begin clinical trials. UTHSC and Memphis have unique things to offer to Revotek through the Plough Center and FedEx as a provider of pharmaceutical products and biomedical logistics.

In mid-April, the Chinese delegation reciprocated our visit to tour our facilities and meet with top management from UTHSC, FedEx, Medtronic, Memphis Bioworks, and Innova Venture Capital. Our four-day visit to Chengdu has opened up new vistas for a global collaboration in education and business relations.

-Gabor Tigyi, PhD

Associate Vice Chancellor for Research and Industry Relations

## International Research Collaborations Provide Research Training Opportunities for Students, Postdocs, Staff and Faculty

As highlighted elsewhere in this issue, international collaborations between UTHSC and entities in China are developing. These provide unique opportunities for training both members of the UTHSC team and our international collaborators. The highlighted discussions that took place in February with groups from Chengdu, PRC, noted unique support activities that UTHSC can provide to advance the research and potential products. These are not simple “hand-off” collaborations, but instead, require an integration of teams from both sides. This means that the collaborative teams must educate each other in their technologies and roles. In addition to exchanges of research team members, a curriculum is being developed to fast-track investigators on cutting-edge biotechnologies that will be used in the projects including 3D Bioprinting. The curriculum will use faculty expertise from both teams, be managed by the College of Graduate Health Sciences, and provide graduate credit. Given the time difference between the US and China, the portion of the curriculum that is not laboratory work will be provided on-line; laboratory instruction is anticipated in both China and the US. Eventually, the curriculum may develop into

a certificate program and provide CME credits.

Another research collaboration between UTHSC investigators and investigators at Harbin Medical University is establishing a formal program for training PhD graduate students. This fall we anticipate matriculating several Masters degree students from Harbin Medical University into the College of Graduate Health Sciences PhD programs. Several years in the making, this collaboration is expected to provide both long- and short-term exchanges of trainees as research projects develop between investigators. These exchanges strengthen the research ties and allow access to and education in many of the resources that are available to both institutions.



-Donald B. Thomason, PhD  
Dean, College of Graduate Health Sciences

### Office of Research Special Announcements:

As part of the Office of Research’s continuing effort to foster an outstanding research environment, we would like to introduce several, very accomplished, new hires that will have a significant impact on the research infrastructure at UTHSC. In the area of research safety, we recently hired Mr. Tim Barton as the new Director of Research Safety Affairs. Tim holds a Master’s degree in Environmental and Occupational Health Science and has more than 15 years of experience in the environmental health and safety field. For nearly a decade he has worked at integrated medical centers, managing regulatory compliance and employee safety in research, and healthcare settings. Tim also holds seven different professional certifications and training.

The LACU has recently hired Mr. Stan Latocha as Director of Operations and Facility Manager, and Ms. Casey Inman as Assistant Operations and Quality Assurance Manager. Stan has over 20 years of experience in operations, quality assurance and laboratory animal management. The span of Stan’s career has been within industry working for such companies as Merck and Bristol-Myers Squibb. He holds a BS degree in Animal Science, and certifications in Laboratory Animal Management (ILAM) and Laboratory Animal Technology (RLATG). Casey has more than 15 years of experience in laboratory animal technology, as well as quality assurance program development and monitoring. She comes to UT with background training in Veterinary Technology and Laboratory Animal Technologist certifications (LATG). Casey comes with a diverse laboratory animal background, having worked at places such as the United States Army Medical Research Institute of Infectious Disease, Ft. Detrick, MD-US Army, and the NIH/NEI Central Animal Facility.

-Steven L. Youngentob, PhD  
Senior Associate Vice-Chancellor for Research



## 4 The Research Rainmaker

### An Intimate Conversation with Dr. James Kang and Dr. Steven R. Goodman



After a whirlwind two days of meeting with multiple leaders at companies from across the city of Memphis and speaking with several officials from UTHSC and the University of Memphis, we sat down with Dr. James Kang (left) and Dr. Steven R. Goodman (right) to talk about where they've been, what has been discussed, and what we can expect in the future if collaboration is successful between the two parties.

#### 1. How do you know one another?

**SRG:** "About 11 years ago I met James due to my being the Editor-in-Chief of *Experimental Biology and Medicine*. The journal is published by the Society of Experimental Biology and Medicine (SEBM). I have been serving on the SEBM council ever since becoming Editor-in-Chief. James has been on the council and involved in the journal longer than I. We met through the journal and I'm very fortunate. All my scientific relationships begin in friendship and we are very good friends."

#### 2. What is the purpose of this visit?

**JK:** "Memphis is a good place and I see UTHSC having a very cohesive leadership team for the development of both basic and clinical research in Memphis. Earlier this year, Steve organized a delegation that visited Chengdu and while they were in China we discussed the future development of our research and educational collaborations. We are working to establish a collaboration between UTHSC and Sichuan University and UTHSC and Revotek. I'm here representing both institutes and to discuss our collaborations further. This has been very fruitful and more than I expected. We share the same vision and I will enjoy what we can do in the future."

#### 3. What has been discussed during your time here at UTHSC?

**JK:** "There are two major things: A collaboration focused on Research and Education and another focused on the commercialization of our [Revotek's] research and business development. As previously noted, the collaborations between UTHSC and Sichuan University and UTHSC and Revotek are being developed. I will tentatively say Memphis is going to become the future commercialization and business development site for Revotek's future US headquarters."

**SRG:** "All the collaborations have been verbally agreed on as of now. The final step is they need to be executed in writing by the officials at both universities."

#### 4. How would a partnership between UTHSC and Revotek be beneficial to both parties?

**SRG:** "From a UTHSC standpoint, it's beneficial in many different ways. In our Operational Strategic Plan for Research, we have an entire section focused on UTHSC and Industry Partnerships and that's exactly what we're doing with Revotek. In addition, we are very interested in being a force in clinical trials. We created the Clinical Trials Network of Tennessee (CTN2) which I think would be a perfect platform for conducting clinical trials with the 3D bioprinted blood vessels produced by Revotek. There are also advantages in the research agreements including the CORNET Awards that will occur between UTHSC and Sichuan University in that it will create new collaborations that did not exist previously which will benefit both universities. Additionally, UTHSC students will benefit from training at both Sichuan University and Revotek as well as in a newly developed course focused on 3D bioprinting taught by James and his staff in China."

**JK:** "For Revotek, I'll highlight just a few. Revotek USA is looking for a home site to commercialize our product. UTHSC has a good foundation to support what we are doing now and what we want to do in the future. Secondly, the Clinical Trials Network of Tennessee is definitely beneficial for us as our next step is in clinical trials. Finally, this place offers a cohesive infrastructure and foundation for research interactions. Our technology requires participation from students, faculty and staff which is why I've proposed creating a Memphis Institute of Regenerative Medicine. Everyone here likes this idea and it will be beneficial for both UTHSC and Revotek."

**SRG:** “It will be beneficial in multiple ways and there could potentially be lots of different participants interested in this idea. UTHSC and Revotek, certainly. But there could be interest from the University of Memphis, FedEx, St. Jude, the Memphis Research Consortium, the city of Memphis, and state of Tennessee. There’s a lot of potential good partners that could work together on something that is extremely important.”

#### 5. What resources does UTHSC and the City of Memphis offer that could make us a unique collaborative partner in education, business, and research?

**SRG:** “We’ve mentioned a lot but I will highlight a few. The Plough Center is a perfect site for the production of the 3D bioprinted blood vessels. The fact that we have cardiac surgeons and cardiologists who are very interested. The strong faculty that we have on our campus that are interested in stem cell biology and regenerative medicine are an asset. Having FedEx here in terms of the importance of being able to transfer these 3D bioprinted blood vessels quickly for medical use.”

**JK:** “The only other item I would add are the people here. We have a solid foundation of trust. Additionally, Steve has put together a very cohesive leadership team and they believe in the future. They have convinced me we will work well together.”

#### 6. What benefit(s) does the future UTHSC Biotechnology Research Park present?

**SRG:** “We are in the process of purchasing the TriMetis Vivarium across the street which will be right in the center of this research park. For any animal studies that need to be done relating to the 3D bioprinting work that James does I can’t think of a better facility than that one. In terms of the future research park, it’s going to have lots of wet and dry lab space as well as offices for businesses that are in the biospace. So, if James has an interest for Revotek or any of his companies to utilize that kind of space within the US we’re going to be able to offer a first-class facility.”

**JK:** “We’re not just looking at currently existing facilities as resources but future developments and I think the future research park offers lots of big development opportunities.”

#### 7. Tell me about the UTHSC-Sichuan University CORNET Award and how that will unfold.

**Dr. S. Cormier:** “The Global CORNET Awards are being developed between our university and West China Hospital of Sichuan University, the Regenerative Medicine Research Center specifically. They’re going to center around regenerative medicine, and cardiovascular and pulmonary diseases.”

**SRG:** “The way I see the world is as a Systems Biolo-

gist and I like networks, both in science and in terms of integrating people. What we’re doing with the CORNET Awards is exactly that. We’re creating rich networks of people working in specific areas where there’s no one institution that has critical mass necessary to really address the major issues in any of the diseases we’re interested in. But by having scientists that are working together in collaboration it makes us each more powerful in what we do. That’s why I think these CORNET Awards are very important and I believe that reaching out throughout the globe is essential when it comes to these networks.”

**Dr. S. Cormier:** “Their ways of thinking about research are very different than ours. So coming together as a network of people globally brings a lot more innovation to the team that wouldn’t be brought there otherwise. This broadens the whole perspective on the disease itself.”

#### 8. Describe the Student and Postdoctoral Fellowship Exchange Program between UTHSC and West China School of Medicine and West China Hospital of Sichuan University.

**Dr. S. Cormier:** “The Fellowship Exchange Program will take place with students or trainees from China coming here for a minimum of two years and a maximum of three. The vice-versa will also occur. So we’ll also send our students or trainees to China to work in 3D bioprinting or develop projects in collaboration with other people in the West China Hospital Regenerative Medicine Research Center. Specific details are still being developed regarding how one would apply for this program.”

#### 9. Final thoughts?

**SRG:** “From my perspective, I think the visit went extremely well. I found all the meetings to be interesting. I learned a lot during the various meetings about the needs of Revotek and about the needs that James has from Memphis; but also about what he does with his wonderful technology. To me, it was a really valuable experience and I’m looking forward to the next one.”

**JK:** “Well I don’t think I have too much to add but we enhanced our friendship. I love the Memphis landscape and made new friends. You can see Steve Goodman and Ken Brown have this magnificent leadership but they are humble which is amazing. You can see that they are really knowledgeable. Memphis and UTHSC are really lucky to have this kind of leadership team.”

**SRG:** “I tell them all the time that I’m amazed at the team we’ve been able to assemble. Other than being smart and good at what they do, they enjoy working together which is also very special.”

## 6 The Research Rainmaker

### Vice Chancellor for Research Named 2016 AAAS Fellow for Contributions to the Advancement of Science



During the American Association for the Advancement of Science's (AAAS) Annual Meeting in mid-February, UTHSC's Vice Chancellor for Research Steven R. Goodman, PhD, was officially inducted as a 2016 AAAS Fellow for his contributions to advancing science to serve society. Dr. Goodman was presented with an official certificate and a gold and blue rosette pin (representing science and engineering respectively) at a formal initiation ceremony held in Boston, Massachusetts. He is the first active UTHSC affiliated AAAS Fellow since 1972, and the first active member of the association from Memphis since 2009.

"As an academic health science center that prides itself on training the next generation of leaders for the health sciences, we also recognize the importance of maintaining top-tier faculty, staff and administrators," said UTHSC Chancellor Steve J. Schwab, MD. "Dr. Goodman's election as a 2016 AAAS Fellow demonstrates his commitment to continued professional and academic growth in the fields of science, innovation and education. I am pleased to have him serving as UTHSC's Vice Chancellor for Research."

Each year the AAAS Council elects members whose "efforts on behalf of the advancement of science or its applications are scientifically or socially distinguished." As part of the Section on Biological Sciences, Dr. Goodman was honored

"for distinguished contributions to the fields of cell biology, neurobiology and hematology for identifying the function of the spectrin membrane skeleton in normal and pathophysiology."

"We choose to perform research because of the thrill of discovery," Dr. Goodman said. "But being honored by this elite group of researchers for my contributions to science is most definitely gratifying."

Since 1874, AAAS members have had this prestigious honor bestowed upon them by their peers. Currently, members can be considered for the rank of Fellow if nominated by the steering groups of the Association's 24 sections, or by any three Fellows who are current AAAS members (as long as two of the three sponsors are not affiliated with the nominee's institution), or by the AAAS Chief Executive Officer. Fellows must have been continuous members of AAAS for four years by the end of the calendar year in which they are elected.

Each steering group reviews the nominations of individuals within its respective section, and a final list is forwarded to the AAAS Council, which votes on the aggregate list. This past year, the AAAS Council elected 391 members as Fellows in recognition of their contributions to innovation, education, and scientific leadership.

The council is the policymaking body of the association, chaired by the AAAS president, and consisting of the members of the board of directors, the retiring section chairs, delegates from each electorate and each regional division, and two delegates from the National Association of Academies of Science.

We congratulate Dr. Goodman on this prestigious recognition and thank him for his many contributions he has made thus far to the UTHSC community and beyond.

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## Writing to Win Grant Awards and Gain Publication: The Office of Scientific Writing

In order to better serve the UTHSC research community, the Office of Research announced in January 2017 the opening of the Office of Scientific Writing (OSW). Dr. Richard Redfearn was appointed as Director of this office. The OSW is designed to assist research faculty, postdoctoral fellows, and students in the writing of successful research grant proposals and scientific manuscripts. The office will support investigators on UTHSC's Memphis, Nashville, Chattanooga, and Knoxville campuses.

Following the creation of OSW, in February the Center for Health System Improvement (CHSI) and the Office of Research jointly announced additional editorial support for T3 (Translation to Practice) and T4 (Translation to Population Health) proposals and scientific manuscripts for UTHSC investigators. Patti Smith, MPH, joined CHSI as a scientific writer and is working closely with Rich assisting faculty, postdoctoral fellows, and students in the areas of population health and healthy systems research.

Rich has a PhD in Chemistry from Duke University, with a background in organic and polymer chemistry and a knowledge of biochemistry. He served as a faculty member at Rhodes College before refocusing his career on assisting faculty with crafting winning grant proposals. Most recently, he was the Grant Training Manager at the University of Arkansas. Rich has written a number of scientific articles and successful grant applications, and is a member of the Grant Professionals Association and the American Chemical Society. His education and experience as a bioorganic and materials science investigator is suited to T0-T1 projects, closer to fundamental research.

Patti earned an MPH from the University of Memphis after working as a journalist and nonprofit executive. She was a reporter for The Commercial Appeal and Vice President of the Community Foundation of Greater Memphis. Her most recent role was interim director for Healthy Shelby, a community health improvement initiative led by Shelby County Mayor Mark Luttrell, health system executives, and other community leaders.

The Office of Scientific Writing will provide investigators with: basic editorial services; specific aims development; project description and research strategy development; and educational resources



and expertise for improving the clarity and cogency of manuscripts and grant proposals. The investigator must provide a first draft of a manuscript or the project description portion of a grant application and fill out a request form found on the Office of Scientific Writing's website (<https://www.uthsc.edu/research/scientific-writing/forms.php>) to initiate the consultation process.

Additionally, in an effort to get to know our investigators better, Rich has made himself available for discussion about your favorite topic – your research – every Thursday at noon in the Madison Plaza lobby (920 Madison Avenue, Memphis, TN 38163) outside the Einstein Bros. Bagels shop. No advance notice is needed! Visiting investigators from other UTHSC campuses are especially invited.

Rich and Patti can be reached via e-mail, telephone, or Outlook meeting invitation. Full contact information for both Scientific Writers can be found below:

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## 8 The Research Rainmaker

### 雨在预测中 Yǔ zài yùcè zhōng- “The Rain is Coming” A Message from Dr. Steven R. Goodman



As you have learned from this issue of the *Research Rainmaker* a delegation of UTHSC research and education leaders visited Sichuan University in Chengdu, China in mid-February 2017. The group included Drs. Steph Cormier, Gabor Tigyi, Jeff Towbin, Ryan Yates, Don Thomason, Weikuan Gu and me.

We were visiting an old friend of mine, Dr. James Kang, who I have known for more than 10 years as we both serve on the Society of Experimental Biology and Medicine (SEBM) Council, James has been an Associate Editor of the journal that I lead, *Experimental Biology and Medicine* (EBM), and directs the EBM/SEBM China Outreach office.

While the friendship between James and myself initiated the interaction between UTHSC and Sichuan University, it was not the reason for the visit. James moved from the US to China as one of its first 1000 Talents, a program that drew many outstanding scientists of Chinese origin back to that country. In Chengdu, James Directs the Sichuan University West China Hospital Regenerative Medicine Research Center; and is Chief Scientific Officer of Sichuan Revotek Co., Ltd, that produces 3D bio-printed blood vessels. Our delegation discussed Research Collaborations with Sichuan University that includes a UTHSC-Sichuan University CORNET program to stimulate collaborations and a faculty/post doc/student research exchange program. We discussed a program where UTHSC students can take a course in 3D bio-printing from Dr. Kang and his colleagues. Of great importance, we discussed Revotek Inc. opening its first USA production site for 3D bio-printed blood vessels at UTHSC, leading towards future

human trials.

From April 17th through the 19th, Dr. James Kang and his colleague Nathan Kangpan, CEO of Revotek- North America visited UTHSC to continue all, and to finalize some, of these important discussions. We welcomed James Kang and the Chengdu



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delegation to Memphis and UTHSC. While it was mostly sunny this week, for their visit, the Rainmaker predicts “The Rain is Coming” when it comes to successful new research, educational and entrepreneurial collaborations between UTHSC and Sichuan University/West China Hospital. We have laid the groundwork for UTHSC in Memphis to become the first site for Revotek USA’s production of 3D bio-printed blood vessels.

-Steven R. Goodman, PhD  
Vice Chancellor for Research

**Have a story we should include?**

Submissions and ideas can be sent to:  
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