The Atlanta Clinical and Translational Science Institute

Clinical and Translational Science Education and Training Partnership

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The opportunity created by the NIH Clinical and Translational Science Awards (CTSAs) prompted the leadership of Emory University (Emory) and its two closest academic partners, Morehouse School of Medicine (MSM) and Georgia Institute of Technology (GT), to develop an innovative model for transforming clinical and translational science. These academic institutions along with other Atlanta and Georgia partners established the Atlanta Clinical and Translational Science Institute (ACTSI) to create and accelerate clinical and translational science discovery, training, and community engagement in Atlanta and the state of Georgia.

The ACTSI partnership creates compelling, unique, and synergistic advantages. Emory is a national leader in education, healthcare, biomedical research, and product development.[1] MSM is a leading, historically black institution focused on social mission[2] that brings ethnic diversity to the biomedical research community, addresses health disparities through translational and clinical research and successful community engagement, and serves as a pipeline for training minority investigators. GT is a national leader in biomedical engineering,[3] nanomedicine, computation, and application of innovative systems engineering to healthcare solutions. These institutions, historic partners in healthcare, education, and cutting-edge, interdisciplinary research, are now catalyzed by the ACTSI partnership.

The creation of the ACTSI led to many accomplishments: establishment of a city-wide, multitiered (hospital, clinic, office) integrated network conducting clinical and translational research; establishment of an interinstitutional and innovative collaborative education and training program in clinical and translational research with enhanced curricula (highlighted in this communication); development of a citywide infrastructure for pediatric-focused clinical and translational research; dissemination of new clinical and translational infrastructure and technologies through the ACTSI Web portal—www.ACTSI.org; the creation and/or support of new cutting-edge cores and centers—the Georgia Research Alliance (GRA) Genomics Core; Center for System Imaging (CSI); a Heath Innovation Program, Center for Health Discovery and Well Being; and development of new interdisciplinary, innovative clinical and translational science through pilot projects, new interinstitutional collaborations, seminars, and direct support.

A key theme of the endeavor is ACTSI's leveraging of multiple diverse assets to enhance clinical and translational research in Atlanta and Georgia. ACTSI is a catalyst exceeding the sum of the parts.

ACTSI Organization

ACTSI facilitates and supports the overarching themes of Discovery, Training, and Community Engagement and creates an academic home for investigators engaged in interdisciplinary clinical and translational research. To implement and achieve strategic goals, ACTSI organized 11 key function programs: Administration and Communications (including Public–Private Partnerships); the Clinical Interaction Network (CIN—providing clinical research management and clinical services); Research Education, Training, and Career Development (RETCD); Tracking and Evaluation, Biomedical Informatics Program (BIP); Ethics, Regulatory Knowledge, and Support (ERKS); Translational Technologies and Resources (TTR); Pilot and Collaborative Translational and Clinical Studies Program (PiCoTraCS); Community Engagement and Research Program (CERP); Biostatistics, Epidemiology, and Research Design (BERD); and Pediatrics. To achieve overall synergy, coordination and implementation of the strategic goals, the programs coordinate with each other through program committees, a program leadership council, and executive committee structures. Programs also contribute subject matter knowledge and content expertise to the ACTSI through topic and scientific review committees. Governance is accomplished by internal and external advisory committees, an engaged community advisory board, and annual NIH program visits.

Research Education, Training, and Career Development (RETCD) Program

RETCD truly illustrates the synergy of ACTSI. RETCD was built upon a foundation of individual programs (e.g., Emory K30 and K12, MSM R25, GT Engineering) that existed prior to the establishment of ACTSI but often worked in isolation. Through ACTSI collaboration, RETCD enhanced and expanded clinical and translational research training opportunities to a broad and diverse spectrum of trainees including Ph.D. graduate students (Ph.D./MSCR track), medical students (M.D./MSCR track), Ph.D.-level scientists (postdoctoral trainees and junior faculty), physicians, (residents, clinical fellows, and junior faculty), and other health sciences professionals.

Masters of Science in Clinical Research (MSCR) programs

The cornerstones of the ACTSI RETCD program are the Masters of Science in Clinical Research (MSCR) degree programs at Emory and MSM. The MSCR programs provide a mechanism for formal didactic and mentored clinical and translational research training in Atlanta at the predoctoral, postdoctoral, and junior faculty level. The Emory and MSM MSCR programs are funded through separate mechanisms (Emory-ACTSI and MSM-NIH R25 grant), but the programs collaborate closely and have several joint activities and classes. Program leadership of each academic institution rotates sites for their monthly meetings. Former MSCR graduates, who established successful careers in clinical and translational research,

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coordinate a joint MSCR Journal Club, and joint seminars with students from all three academic institutions are held. Course evaluations, baseline surveys, and follow-up surveys are also conducted across all three institutions. Additionally, MSCR programs leverage educational and training support by partnering with other ACTSI cross-institutional programs that teach courses or provide rotational opportunities.

Mentoring is also a major focus of the RETCD programs in recognition that "influential" mentoring is critical to career success. Mentoring workshops are held for all MSCR mentors, mentoring materials including a *Mentoring Handbook* are provided to all mentors, and a *Mentoring Agreement* is signed by all mentors, trainees, and scholars.

The number and diversity of trainees in the ACTSI MSCR program expanded thanks to the ACTSI. Prior to the ACTSI, training was provided exclusively to physicians. With the establishment of ACTSI, training now includes Ph.D. graduate students, medical students, Ph.D.-level scientists (postdoctoral trainees and junior faculty), as well as physicians (junior faculty and fellows/residents). Since the establishment of the MSCR program at Emory in 1998, there have been 168 students including 80 in the "CTSA era" during the last 4 years. Two-thirds of MSCR students in the CTSA era are women, 44% are minorities, and 17% are underrepresented minorities.

The quality of the MSCR program is highlighted by funding success of MSCR graduates and participants as well as the scholarship record of the 80 MSCR participants (including current students). Ten trainees who completed training in the MSCR program since the inception of ACTSI (i.e., over the past 4 years) are currently PIs on 15 NIH grants (totaling $34M), and trainees who completed the program over the past 4 years are PIs on 42 non-NIH awards including federal awards (CDC, DoD), foundation, pharmaceutical, or other. The 80 CTSA-era trainees have published 334 peer-reviewed articles, 60 book chapters, and two books.

Mentored Clinical/Translational Research Scholars (MCTRS) KL2 Program

Prior to ACTSI, a K12 program focused on clinical and translational research scholars was established at Emory in 2000. With ACTSI funding, this program expanded in 2007 to include MSM and GT and offers didactic and mentored clinical and translation research at the collaborating academic institutions to junior faculty with exceptional potential and commitment to careers as clinical investigators including both Ph.D.-level junior faculty in addition to physician investigators. Currently, there are five funded KL2 positions (four Emory/GT and one MSM). The KL2 program is a cross-institutional program with a single, cross-institutional application and review process using an NIH study section type format. Evaluation of KL2 scholars' progress is standardized across institutions. There have been 18 KL2 scholars (with six K12 carryovers) of which 59% are women, 44% are minorities, and 28% are underrepresented minorities. KL2 scholars include 15 M.D.s, two Ph.D.s, and one M.D./Ph.D. Since the inception of the K12, nearly 75% of scholars who completed training have obtained NIH funding as a PI.

Predoctoral clinical and translational research training TL1 program

ACTSI funding allowed the establishment of the RETCD TL1 program that supports didactic and mentored clinical and translational research training for predoctoral trainees, including Ph.D. graduate students at all three institutions and medical students at Emory and MSM. Thirty-two predoctoral trainees have been admitted to the TL program (20 Emory, 10 MSM, and two GT). Trainees are 38% female, 62% male, and 47% underrepresented minorities. Two dual-degree programs were established for long-term trainees including a Ph.D./MSCR track for Ph.D. students and a M.D./MSCR track for medical students—the MSCR degree is awarded at the time of the doctoral degree. The dual-degree program represents a historic milestone for MSM with its first M.D./MSCR graduate in May 2011.

Howard Hughes Medical Institute (HHMI) MED into GRAD grant

Through support of a $700,000 HHMI MED into Grad grant, RETCD initiated a certificate program in Translational Research. The initial focus of the certificate program is training Ph.D. graduate students in the biomedical sciences and engineering programs from the three collaborating ACTSI partner institutions. Emory in collaboration with MSM and GT is one of 23 programs funded by HHMI that seeks to develop a cadre of racially and ethnically diverse Ph.D. investigators who translate fundamental biomedical discoveries to benefit human health and guide them to conduct research at the interface between basic science and clinical medicine. This program was initiated in August 2010, and the first class includes 11 trainees from Emory, MSM, and GT.

Discovery program

Emory University School of Medicine's new curriculum includes a required 5-month Discovery program focused on all third-year medical students and their engagement in a hypothesis-driven research proposal. RETCD played a major role in the development and implementation of Discovery. A majority of the Emory medical students in Discovery (68 of 88) worked on clinical and/or translational research projects. All students in Discovery have a research mentor, many of whom are ACTSI investigators. During Discovery, RETCD conducts a 1-week course called SoCRATES (Short Course on Clinical Research and Translational Experience in Science) led by two Emory faculty members who are former ACTSI KL2 scholars. Plans are underway to replicate the course for MSM medical students and GT students and develop a similar short course for other trainees—undergraduates, nurses, and research coordinators.

Georgia Tech Translational Research Institute for Biomedical Engineering and Science (TRIBES)

ACTSI is a part of GT's TRIBES. The mission of TRIBES is to link biomedical research and educational activities with precommercial requirements for IND, license, and transition to products. TRIBES addresses its mission by involving undergraduate and graduate engineering students in the product-development process through capstone design projects in the senior year and advanced management of new technologies in graduate school in the joint GT/ACTSI TI:GER program (Technologic Innovation: Generating Economic Results). These projects are driven by clinician need, and there are over 30 capstone design projects presently underway within the ACTSI, all involving a clinician mentor and teams of 3–5 GT undergraduate engineering students. Moreover, at the graduate student level, there are a number of projects developing technologies conceived by ACTSI investigators and their Ph.D. students. Recently, an ACTSI interdisciplinary team of biomedical and mechanical engineering seniors won the 2011 GT

Inventure Prize Competition and top prize in the 2010 Mechanical Engineering Capstone Design Expo with a design for a surgical instrument for cataract surgery.

Other interdisciplinary and interinstitutional programs include support of the Summer Undergraduate Research Program at Emory (SURE), which provides biomedical science research and education (with a special focus on underrepresented minority undergraduate students), development of Bachelor of Nursing Senior Clinical Research rotations, a Nutritional Trainee education program, and a translational model education program with Yerkes National Primate Research Center.

The future

Future development and evolution of RETCD will emphasize the quality of clinical and translational research education and research training activities; the creation of new programs to include a new Global Health Track and a Translational Informatics Track; and the further integration and development of clinical and translational research education and training activities across the three institutions and our community partners.

Summary

Atlanta is a rapidly expanding international city with an extraordinary pool of talent and resources. The three distinguished academic institutions represented by the ACTSI link educational excellence, groundbreaking multidisciplinary research, and ethical and effective community engagement. The proximity of these institutions, the intellectual strength of the scientists, the additional partnerships, and the integration of resources at crucial junctures are providing a fertile environment for a transformative CTSA. Other strategic advantages include a growing number of innovative education, research and clinical facilities, rapidly emerging biotechnology industry, and a congenial community-oriented educational culture. As outlined above, ACTSI has been able to build upon a longstanding tradition of successful cross-disciplinary and cross-institutional training and research among the institutions to create a new interdisciplinary, interinstitutional training model. CTS

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