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Pediatric Nanomedicine Center Links Health Care and Engineering

First-of-its kind research center includes physicians and scientists from Georgia Tech, Emory, Children's Healthcare of Atlanta

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ATLANTA—Physicians and engineers within a new center devoted to pediatric nanomedicine will develop targeted, molecular-sized nanoparticles as part of a unique approach to treating pediatric diseases. Specific focus areas will include pediatric heart disease and thrombosis, infectious diseases, cancer, sickle cell disease and cystic fibrosis. The Center for Pediatric Nanomedicine (CPN) is the first of its kind in the world.

Nanomedicine involves the development of engineered nanoscale structures and devices for better diagnostics and highly specific medical interventions to treat diseases and repair damaged tissues. One nanometer is one billionth of a meter, and the nanoscale is typically on the order of 1-100 nanometers.

Directed by Gang Bao, PhD, the center will involve researchers from Emory University, the Georgia Institute of Technology and Children's Healthcare of Atlanta. Bao is the Robert A. Milton Professor of Biomedical Engineering in the Wallace H. Coulter Department of Biomedical Engineering at Georgia Tech and Emory University.

"Because nano-scale structures are compatible in size to biomolecules, nanomedicine provides unprecedented opportunities for achieving better control of biological processes and drastic improvements in disease detection, therapy and prevention," says Bao.

The CPN is part of the Emory-Children's Pediatric Research Center led by the two institutions, including partnerships with Georgia Institute of Technology and Morehouse School of Medicine. With the leadership of Paul Spearman, MD, Children's chief research officer and vice chair for research in the Emory University Department of Pediatrics, 14 key priority centers have been identified. These are hematology and oncology; immunology and vaccines; transplant immunology and immune therapeutics; pediatric healthcare technology

innovation; cystic fibrosis; developmental lung biology; endothelial biology; cardiovascular biology; drug discovery; autism; neurosciences; nanomedicine; outcomes research and public health; and clinical and translational research.

Emory and Georgia Tech already have had significant and successful research partnerships in nanomedicine funded by the National Institutes of Health. These have included nanotechnology center of excellence for the detection and treatment of cardiovascular disease, the development of personalized and predictive oncology, and the development of engineered protein machines for treating single-gene disorders.

“Nanotechnology can be applied to many diseases, and the application of nanotechnology could have a profound impact on improving children’s health,” says Bao.

Current centers located in the joint Georgia Tech-Emory biomedical engineering department include the Center for Translational Cardiovascular Nanomedicine (funded by a $14.6 million, five-year grant from NHLBI/NIH) and the Nanomedicine Center for Nucleoprotein Machines (funded by a $16.1 million, five-year grant from NIH).

The discoveries made in these centers also will be applied to research in pediatric diseases. For example, scientists in the center for nucleoprotein machines are focused on developing a technology to correct single-gene defects that lead to human disease. They hope to use this approach to treat and eventually cure sickle cell disease, first focusing on curing a mouse model of sickle cell. The new technology would then be applied to human sickle cell patients.

“Nanomedicine is expected to dramatically exceed what has occurred in the field thus far, and our belief is that it will revolutionize medicine,” says Bao. “We plan to make this new pediatric nanomedicine center a leader in applying these unique discoveries to treating and curing children’s diseases.”

Other investigators in the center from the biomedical engineering department at Georgia Tech and Emory include Tom Barker, PhD, Ravi Bellamkonda, PhD, Barbara Boyan, PhD, Michael Davis, PhD, Wilbur Lam, MD/PhD, Niren Murthy, PhD, Shuming Nie, PhD, and Phil Santangelo, PhD.

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