My laboratory is focused on identifying treatable targets in stroke and brain injury that lend themselves to realistic clinical opportunities. Our current interest is addressing our previous finding of multiple time points following stroke or brain injury in which damaging levels of oxidative species are released. Some of these bursts occur at later time points, providing a therapeutic opportunity if a suitable treatment is available. To that end, a collaboration between nanochemists at Rice University under the direction of James Tour, Ph.D., and biochemists at UT Health Science Center at Houston directed by Ah-Lim Tsai, Ph.D., and our laboratory, have characterized a novel form of carbon nanoparticle that possesses multiple attributes that suggests its promise as a potential treatment. Derived from larger carbon species, these nanoparticles have shown to be non-toxic both in cell culture and in-vivo, possess a remarkable high capacity for quenching superoxide radical in a catalytic manner and have nearly equal quenching ability of the hydroxyl radical. They do not interfere with nitric oxide, an oxygen radical that in the absence of superoxide possesses many valuable properties to protect the cerebral vasculature. With funding from the NIH, our group is investigating which formulation of nanoparticle works best in a stroke model of ischemia/reperfusion mimicking the clinical scenario of intravenous and endovascular intervention, and whether we can determine the mechanism by which this non-metal containing material can act with such a favorable profile while possessing enormous capacity for quenching superoxide. Our hope is that by identifying this mechanism, we can usher in a new class of potentially useful agents for acute brain injury.

Our second focus is improvement in the process by which discoveries are translated into clinical trials. Many failures in large, randomized Phase 3 trials of potential therapeutic agents have discouraged future large investments in this process. Through a careful analysis of these failures, we found that over-reliance on traditional biostatistics were at the root of the problem of inability to identify which agents may have the most promise in the clinic. We found that the complexity of brain diseases and their uncertain natural history have overwhelmed the ability of traditional statistics to accommodate complexity. In response, we developed a suite of computer programs that can determine whether early phase agents surpass the variance that is typically found in clinical trials and whether imbalances or other biases were responsible for results obtained. Together with Pitchaiah Mandava, M.D., Ph.D., MSEE, we founded the Stroke Outcomes Laboratory at Baylor College of Medicine where we developed new approaches to aid investigators in judging the potential success of a new agent or provide a post-hoc ability to identify potentially promising actions of medications after the trial has failed. We are expanding our models to include traumatic brain injury, intracerebral hemorrhage, subarachnoid hemorrhage and we will be soon testing our concepts in degenerative neurological disorders.
The clinical trial phase of our research is funded through the State of Texas and the Department of State Health Services. Through this funding, we, along with hub investigators at University of Texas sites in Houston, San Antonio, Austin and Dallas, and Texas Tech University in El Paso have established the Lone Star Stroke (LSS) Telemedicine Research Network to bring state of the art stroke research to regions of our state that traditionally have not participated. Research conducted through LSS will provide a means to test whether stroke interventions are beneficial outside of traditional medical centers. LSS has partnered with the NIH StrokeNet hub at UT Houston to provide expanded opportunities for recruitment.

Our research program maintains a direct translational focus by leveraging the clinical and research expertise of our clinician scientists who work in the VA’s largest Stroke Program and the only Joint Commission Certified Stroke Center, Drs. Pitch Mandava, M.D., Ph.D., MSEE, Roderic Fabian, M.D., Sharyl Martini, M.D., Ph.D., and Jane Anderson, Ph.D., APN. Our skilled laboratory manager William Dalmeida, M.S. maintains laboratories that include advanced microscopy imaging and multiple animal models. We emphasize collaboration within the vast Texas Medical Center and currently have projects with virtually every institution represented there.

EDUCATION

• M.D., University of Kansas Medical Center, Kan.

WEBSITE

• Translational Stroke Research journal
  (http://www.springer.com/biomed/neuroscience/journal/12975/PS2?detailsPage=editorialBoard)

CONSULT

713-798-6869

CLINICAL INTERESTS

Acute stroke therapy; diabetes and stroke; secondary prevention; interface of psychiatry with neurological illness

RESEARCH INTERESTS

• Development of carbon nano-particle as a treatment for oxidative reperfusion injury in stroke and traumatic brain injury
• Novel anti-thrombotic therapies for acute stroke
• Diabetes and stroke
• Analytical methods for stroke outcome analysis

GRANTS (FUNDING)

• U.S. Department of Defense (DOD)
• U.S. Department of Veterans Affairs (VA)
• VA Veterans Health Administration (VHA)
• VA Health Services Research and Development Service (HSR&D)
• National Institutes of Health (NIH)
• NIH National Institute of Neurological Disorders and Stroke (NINDS)
• NIH National Institute of Child Health and Development (NICHD)
• NIH National Institute of Mental Health (NIMH)
• Baylor College of Medicine (BCM)
• American Heart Association, Texas Affiliate
• American Diabetes Association
• Texas Neurofibromatosis Foundation

GRANTS (NIH FUNDING)

• Kent TA (Principal Investigator). Augmenting Carbon Nanoparticles as Novel Antioxidants for Ischemic Stroke. National Institute of Neurological Disorders and Stroke R21 grant (PA-11-261); $299,734 awarded in direct costs, April 1, 2014–March 31, 2016.

JOURNAL PUBLICATIONS


BOOK CHAPTERS AND OTHER PUBLICATIONS


POSTER and PLATFORM PRESENTATIONS


113. Stroemer RP, Hulsebosch C, Kent TA. Synaptophysin levels are altered after cerebral ischemia. Soc Neuro Sci. 1992;18:.


