Illuminating the Root of Ion Channel Disease

Alfred George, Jr., MD, chair of Pharmacology, director of the Center for Pharmacogenomics and the Magerstadt Professor of Pharmacology

Alfred George, Jr., MD serves as chair of Pharmacology, director of the Center for Pharmacogenomics and the Magerstadt Professor of Pharmacology. The center studies how an individual's genetic makeup affects their response to drugs, in a bid to provide targeted therapies and improve the efficacy of a variety of drugs. George's own research focuses on the structure, function and genetics of ion channels — specifically with a group of genetic diseases called channelopathies.

Q&A

What are your research interests?
My research seeks to elucidate the pathogenesis of a group of genetic diseases called channelopathies, which are disorders caused by mutations in ion channel genes. In addition to discovering the causes and underlying mechanisms, we also work to discover novel pharmacological approaches to treat these disorders.

Our major efforts are devoted to investigating genetic disorders of heart rhythm that can cause sudden death in young children and genetic forms of epilepsy and related neurological conditions that can have devastating effects on brain development. In addition, we investigate the genetic and genomic basis for inter-individual variability in drug responses, an area called pharmacogenomics.

Our multidisciplinary research operates at a nexus among several fields including human genetics, electrophysiology, pharmacology and neuroscience with implications for the diagnosis and treatment of patients in various clinical specialties including cardiology, neurology and pediatrics.

What is the ultimate goal of your research?
We would like to translate what we learn about the molecular basis of channelopathies into therapeutic strategies for these orphan diseases, and for more common disorders having shared mechanisms.

What types of collaborations are you engaged in across campus (and beyond)?
We have an extensive network of collaborations with faculty at Northwestern, at other institutions within the U.S. and in other countries. Since my arrival to Northwestern in March 2014, I've become involved in productive collaborations with more than a dozen other faculty members in 10 departments in the Feinberg School of Medicine and McCormick School of Engineering. These collaborations have led to publication of scientific papers and funding of new grants.

Our multidisciplinary research requires collaboration to achieve scientific advances having the greatest impact. Further, collaboration with other scientists is one of the most enjoyable aspects of a career as a biomedical researcher. Collaboration across traditional departmental boundaries also fosters a better environment for training young scientists.

How did you become interested in this area of research?
For a long time, I have been interested in learning how cells move charged ions across their membranes. This led naturally to the study of ion channels and other ion transporting mechanisms. In my postdoctoral training, I was introduced to the hypothesis that mutations in human ion channel genes may be the molecular basis for genetic disorders of the nervous system and other organs. This led to opportunities to investigate some of the very first channelopathies, and the work hasn't stopped since that time.

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George

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Now there are more than 60 known channelopathies involving thousands of ion channel gene mutations. Feinberg will host an international conference this summer on channelopathies that will bring together experts from several fields, called Channelopathy 2018. I encourage anyone interested in the topic to register and attend.

How is your research funded?
My laboratory receives funding from a variety of sources including the National Institutes of Health, disease-focused foundations and pharmaceutical companies. This diverse portfolio of research funding has helped preserve a stable workforce during times when federal funding for research was less available.

Who makes up your research team and what role does each individual play in your research?
My research team is composed of graduate students, postdoctoral fellows, senior research technicians and research-track faculty members. Everyone has their own projects or tasks, but each contributes to at least one other active area of research. The more senior members of the laboratory provide supervision and training to the more junior members of the research team including students. I am fortunate to work with such a professional and dedicated group.

Omnibus Spending Bill

At a press conference at the Shirley Ryan AbilityLab March 28, U.S. Sen. Dick Durbin (D-Ill.) announced new federal investments included in the recent omnibus spending bill that will help Chicago's biomedical research institutions continue their important work creating new technologies and finding ways to treat and cure disease. Several Northwestern University Feinberg School of Medicine faculty members spoke at the event, such as Thomas Shanley, MD, chair and professor of Pediatrics, pictured above.

Funding

Johnson & Johnson Lung Cancer Innovation Science Grants

More information

Sponsors: American Association for Cancer Research

Submission deadline: May 2

Upper amount: $1.5 M over three years

Synopsis: Simple yet accurate diagnostic tools that can improve the detection of early lung cancers are urgently needed. The AACR-Johnson & Johnson Lung Cancer Innovation Science Grants represent a joint effort to address this need by promoting and supporting pioneering cancer research.

Non-Pharmacological Interventions for Gait and Balance Disturbances

More information

Sponsors: Michael J. Fox Foundation

Pre-Proposals Due:: May 31

Upper amount: **U**p to $500,000 for one to two years

Synopsis: The Michael J. Fox Foundation will award one-to-two-year grants to test non-pharmacological interventions for the treatment of gait and balance disturbances in people with Parkinson's disease. They are particularly interested in proof-of-concept, validation and data-analysis projects.

Grand Challenges Explorations

More information

Sponsors: Gates Foundation

Submission deadline: May 2

Upper amount: $100,000 (Phase I; successful projects have an opportunity to receive an additional $1M)

Synopsis: The Gates Foundation's Grand Challenges aims to solve key global health and development problems. Funding is available for three challenge areasm including innovations in immunization data management, use and improved process efficiency.

View more funding opportunities