About: Faculty Speakers

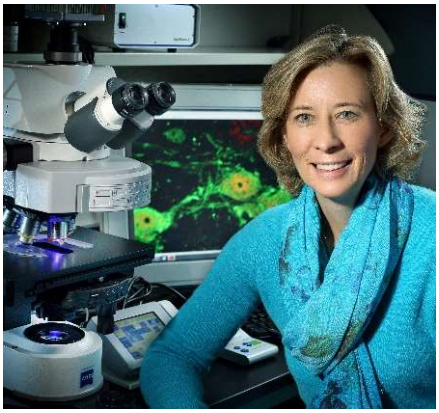
Andrew P. Somlyo Honorary Lectures

Lukas C. Kapitein, PhD
Professor of Molecular and Cellular Biophysics,
Utrecht University
Navigating microtubule diversity in neurons

Dr. Lukas Kapitein is full professor of Molecular and Cellular Biophysics and director of the Biology Imaging Center at the Department of Biology at Utrecht University. His research focuses on the architecture and dynamics of cellular structures, particularly in neurons. His work addresses a fundamental question in neurobiology: how do neurons develop and sustain their complex morphology?

Lukas studied Experimental Physics at the VU University in Amsterdam, where he earned his Master's degree in 2002. He remained at VU to pursue his PhD in Biophysics, which he completed in 2007 with a thesis on the motility of mitotic kinesins. Bridging the gap between physics and biology, he then undertook postdoctoral research in Neurobiology at the Erasmus Medical Center, supported by a ALW-VENI grant from the Netherlands Organisation for Scientific Research (NWO) and an Erasmus MC Fellowship. There, he started to investigate cytoskeletal organization and polarized cargo transport in neurons.

In 2011, Kapitein joined Utrecht University as an assistant professor and became a full professor in 2018. His approach to cellular biology integrates principles of physics with cutting-edge technologies such as advanced light microscopy—including super-resolution techniques—cellular engineering, and optogenetics. His lab develops and applies active control strategies to study and manipulate intracellular transport, cellular architecture, and cell function in real-time. Over the years, his research has been recognized with several major grants and fellowships. These include VENI, VIDI and VICI grants from NWO, as well as a Starting Grant (2013) and a Consolidator Grant (2018) from the European Research Council (ERC). He also codirects the Gravitation project IMAGINE! (2022–2032), aimed at pioneering innovative microscopy and cellular guidance in native environments. With a career at the intersection of physics, biology, and advanced imaging, Kapitein continues to explore the fundamental principles of life at the cellular level, thereby contributing to our understanding of neuronal form and function.



Charlotte J. Sumner, MD
Professor of Neurology, Neuroscience, and Genetic Medicine,
Johns Hopkins University
The role of the mechanosensitive TRPV4 channel in motor neuron disease

Dr. Charlotte Sumner is a Professor of Neurology, Neuroscience and Genetic Medicine at Johns Hopkins University School of Medicine. She is a Daniel Nathans Scientific Innovator and the Vice Chair for Clinical Research in the Department of Neurology. She is also President of the Peripheral Nerve Society. She received her B.A. from Princeton University and M.D. from the University of Pennsylvania. She completed internal medicine internship and neurology residency at the University of California San Francisco and further clinical and scientific fellowship training at Johns Hopkins and the

National Institute of Neurological Disorders and Stroke. Dr. Sumner cares for patients with genetically-mediated neuromuscular diseases and co-directs the Johns Hopkins Muscular Dystrophy Association Care Center, the Spinal Muscular Atrophy (SMA), and the Charcot-Marie-Tooth (CMT) clinics, which deliver multidisciplinary clinical care, engage in international natural history studies, and provide cutting edge therapeutics. Dr. Sumner's laboratory research focuses on the genetic and cellular pathogenesis of motor neuron and peripheral nerve disorders with particular attention to identification of disease genes, characterization of molecular and cellular disease mechanisms, and preclinical development of therapeutics. Her work contributed to the scientific foundations leading to three new approved gene directed therapeutics in SMA. Her work has been recognized by receipt of a NINDS R35 Research Program Award and elected membership in the American Society of Clinical Investigators (ASCI), the Interurban Clinical Club, and the American Association of Physicians (AAP). She serves as an advisor to multiple SMA, CMT, and peripheral neuropathy nonprofit foundations, government, and private companies. Dr. Sumner's teaching and mentorship have been recognized with awards from medical students, residents, and research mentees including the NINDS Landis Award for Outstanding Mentorship.

Jean and Joseph Sanger Honorary Lecture in Muscle Biology

Rachelle H. Crosbie, PhD
Professor and Chair, Integrative Biology and Physiology, University of California, Los Angeles
Targeting Cell-Matrix Interactions for the Muscular Dystrophies

Dr. Rachelle Crosbie is Professor and Chair of the Department of Integrative Biology and Physiology at UCLA. The Crosbie group focuses on investigating cell-matrix interaction in the context of muscular dystrophy and cardiomyopathy. The lab has developed methods for on-slide decellularization of biological tissues to generate acellular scaffolds that can be used for interrogating cell-matrix interactions using live cell imaging and correlating these findings to the mechanical and biochemical characteristics of the matrix. This platform enables observation and quantification of cell adhesion, proliferation, differentiation, gene expression, matrix remodeling, and motility on biologically relevant matrices. Using acellular scaffolds from dystrophin-deficient muscle as a model system with mechanically distinct regions of the matrix, the lab demonstrated that stiff fibrotic scars inhibit all cell function and are resistant to remodeling. The Crosbie team has focused on the function and therapeutic potential of sarcospan, a myoprotective gene that mediates cell-matrix interactions. Sarcospan is a transmembrane scaffolding protein that regulates cell surface expression of mechanosensors, including integrins. Loss of sarcospan diminishes expression of the laminin-binding complexes and renders skeletal and cardiac muscles susceptible to injury. Overexpression of sarcospan in dystrophin-deficient *mdx* mouse model of Duchenne muscular dystrophy and the gamma-sarcoglycan deficient limb-girdle muscular dystrophy (LGMDR5) murine model restores myofiber binding to the matrix, preventing muscle damage and ameliorating muscle degeneration and cardiomyopathy. Dr. Crosbie is Director of the NIH NIAMS T32 "Muscle Cell Biology, Pathogenesis, and Therapeutics" Training Program that supports pre- and postdoctoral fellows at UCLA. She is a recipient of the UCLA Chancellor's Distinguished Teaching Award for innovations in the classroom.

New Perspectives

Ewa Bomba-Warczak, PhD
Assistant Professor of Physiology,
University of Pennsylvania
Long-lived mitochondrial cristae proteins in mammalian brains and hearts

Dr. Ewa Bomba-Warczak received her PhD in Neuroscience from the University of Wisconsin – Madison in 2017 in the laboratory of Dr. Edwin Chapman, and HHMI Investigator, followed by postdoctoral studies under the mentorship of Dr. Jeffrey Savas at Northwestern University. She received her B.S. in Biological Sciences with honors from University of Illinois at Chicago. She is a recipient of a Jerzy Rose Award for most outstanding graduate thesis in Neuroscience at the University of Wisconsin-Madison, NIH F32 Fellowship and NIH MOSAIC K99 Pathway to Independence Fellowship to Promote Diversity. She has been named a Leading Edge Fellow (class of 2023) and recently a Keystone Fellow (class of 2025). She is also a co-founder of MITOchats, an online seminar series featuring graduate students and postdoctoral fellows working in the field of mitochondria.

Dr. Bomba-Warczak's research investigates how cells with exceptionally long lifespans – neurons and oocytes - establish and maintain their mitochondrial networks throughout their life, and how the stability of mitochondrial components contributes to cell's health and age-dependent degeneration. In her laboratory she combines in vitro cell and in vivo mouse models with mass spectrometry-based proteomics, biochemistry, genetics, and fluorescent imaging to define the mechanisms governing the lifelong mitochondrial homeostasis in health and disease.

About: Honorary Lectures

Andrew P. Somlyo Honorary Lectures

Andrew P. Somlyo, MD (1930 – 2004)

Professor of Physiology and Pathology and founding Director of the Pennsylvania Muscle Institute, Dr. Somlyo was a luminary in the field of smooth muscle physiology. His research (in collaboration with Dr. Avril Somlyo) played a key role in showing that actin-myosin interactions are responsible for force generation in smooth muscle. With colleagues at the University of Pennsylvania, Dr. Somlyo developed electron probe microanalysis to determine local ion concentrations in tissues at nanometer resolution. Additionally, his pioneering work in signaling revealed the mechanisms that regulate contraction of smooth muscle independently of the membrane potential – a process he termed pharmacomechanical coupling. Dr. Somlyo had a passion for science that is evident in the remarkable imprint that he left on the field of muscle physiology and on his students and colleagues. He was also a noted collector of Asian art. Dr. Somlyo left Penn Medicine in 1988 to chair the Department of Molecular Physiology and Biological Physics at the University of Virginia School of Medicine.

Jean and Joseph Sanger Lecture in Muscle Biology

Jean M. Sanger, PhD
Professor, Department of Cell and Developmental Biology
SUNY Upstate Medical University

Joseph W. Sanger, PhD
Professor, Department of Cell and Developmental Biology
SUNY Upstate Medical University

Drs. Jean and Joseph Sanger are pioneers in the development and use of fluorescently labeled proteins to examine the architecture and dynamics of a range of biological processes in developing and mature cells. As former members of the Department of Cell and Developmental Biology, they were founding members of the Pennsylvania Muscle Institute. The Sangers were among the first cell biologists to take advantage of probes to follow the assembly and changing localizations of cytoskeletal components in living cells. Their research led to impactful new discoveries about cell division, actin based bacterial infections, and assembly and maintenance of myofibrils in muscle cells. Importantly, the Sangers were the first scientists to visualize and quantify the kinetics of sarcomeric proteins entering newly developing and mature myofibrils. In real time, they followed key components of the contractile machinery during myofibrillogenesis. The revolutionary models they formulated for how Z-bands, thick and thin filaments, and other sarcomeric components are templated during development are still the standards in the field. More recently, the Sangers were the first to determine the role of the ubiquitin–proteasome system in the progression of nascent myofibrils to maturity, and possible mechanisms for the off-target effects on hearts by chemotherapeutics. In addition to their scientific achievements, the Sangers have been leaders and role models in the Cell Biology community as educators, mentors to trainees and faculty, editors, reviewers, conference organizers, and administrators. Dr. Joseph Sanger served as interim chair of PSOM's Department of Cell and Developmental Biology. The Sangers left Penn in 2006 for SUNY Upstate Medical University, where Dr. Jean Sanger became Professor and Dr. Joseph Sanger became Professor and Chair of Cell and Developmental Biology. They were and are parts of the soul of the Pennsylvania Muscle Institute.