DAVID GEFFEN SCHOOL OF MEDICINE CHAIR IN NEUROSCIENCE

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2023 UPDATE

UCLA Health | David Geffen School of Medicine

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2023 UPDATE

The David Geffen School of Medicine at UCLA is pleased to announce the appointment of Jack Feldman, Ph.D., as the inaugural chair holder of the David Geffen School of Medicine Chair in Neuroscience. This endowed chair is an essential resource that will help advance trailblazing research into respiration and the teaching activities of Dr. Feldman. Concurrently, the David Geffen School of Medicine Recruitment and Retention Fund has helped bring outstanding faculty to UCLA by providing research and salary support. This past year, the fund enabled the school to offer congenital cardiac surgeon, Ming-Sing Si, M.D., a startup package that brought him to UCLA and enabled him to replicate his cardiac fibrosis research lab. In addition, thanks to the David Geffen School of Medicine Recruitment and Retention Fund, neuroscientist Gero Miesenböck, M.D., will join UCLA from the University of Oxford for a six-month sabbatical during which he will research and write a seminal work on sleep, with a focus on optogenetics. The university and the David Geffen School of Medicine are grateful for its philanthropic partners and their dedication to the health sciences. The research funded will benefit generations to come.

THE DAVID GEFFEN SCHOOL OF MEDICINE CHAIR IN NEUROSCIENCE

Dr. Jack Feldman joined UCLA in 1986 as a professor of neuroscience in the Department of Physiological Science, and is now a distinguished professor in the Department of Neurobiology in the David Geffen School of Medicine. He served as chair in both departments. He also is a member of the UCLA Brain Research Institute.

Dr. Feldman and his colleagues have developed a model system whereby they can study the complex interplay of the molecular, synaptic, and cellular properties of individual neurons within densely interconnected networks that produce various behaviors. In particular, Dr. Feldman's research focuses on the various neural mechanisms responsible for different phases of breathing. Insight into how the brain controls the breath may lead to discoveries of mechanisms that produce more complex behaviors.

Early in his career, Dr. Feldman identified a cluster of nerve cells that were key to how the brain is wired to breathe. He named this area of the brain the Bötzinger Complex. Dr. Feldman later showed that an adjacent area of the brain, a small network of neurons, was the main engine of breathing rhythm and termed it the preBötzinger Complex. This work is foundational for the current understanding of the neural control of breathing.

More recently, Dr. Feldman and his colleagues discovered that neurons in the preBötzinger Complex synchronize to produce breathing rhythm. This research has implications for breath

disorders such as sleep apnea and in opioid use disorder. Dr. Feldman also is investigating how different types of breath—such as sighs, yawns, sniffs, or coughs—are produced. As an extension of this work, Dr. Feldman is deeply invested in studies to understand how breathing practices, such as in meditation and mindfulness, can exert powerful, beneficial changes in emotions, cognition, and physiological processes.

Dr. Feldman was awarded the prestigious Hodgkin-Huxley-Katz Prize Lecture from The Physiological Society (2016), the National Institutes of Health (NIH) Outstanding Investigator Award (2017-2023), and the NIH Merit Award (1991-2001). He also gave the 125th Faculty Research Lecture at UCLA in 2018. Dr. Feldman received his bachelor's and master's degrees in physics from the New York University Tandon School of Engineering. After receiving his Ph.D. degree in physics from The University of Chicago, he conducted postdoctoral studies in neurobiology at the Université de Paris VI. He then held professorial positions at Albert Einstein College of Medicine and Northwestern University Feinberg School of Medicine before joining UCLA.

THE DAVID GEFFEN SCHOOL OF MEDICINE RECRUITMENT AND RETENTION FUND

Thanks to the David Geffen School of Medicine Recruitment and Retention Fund, UCLA was able to bring **Dr. Ming-Sing Si** and his exciting research back to the school. Dr. Si, a congenital cardiac surgeon and avid researcher, received his medical degree from the David Geffen School of Medicine at UCLA. He completed his surgical residency at the University of California, San Francisco, and his fellowship in thoracic surgery at the University of Michigan Health System.

Dr. Si then established a laboratory at the University of Michigan, where he was a faculty member for nine years. The startup package Dr. Si received from the Recruitment and Retention Fund offered him the opportunity to move his lab to the David Geffen School of Medicine and be closer to his family. Dr. Si has replicated his lab at UCLA, using the funding for equipment and personnel. Through his research, he secured additional funding for the lab from the NIH.

Dr. Si's investigations focus on heart failure and scarring of the heart, also known as cardiac fibrosis. In particular, his lab studies the molecular pathways that lead to heart failure and cardiac fibrosis, focusing on the SLIT3-ROBO1 signaling pathway. Dr. Si notes that while structural cardiac issues must be addressed surgically, surgery is not curative and patients may continue to experience cardiac stress and subsequent heart failure post-surgery. Therefore, a nonsurgical, medical treatment—whether a biologic, small molecule treatment, or gene therapy—is

necessary for comprehensive cardiac care. By understanding the molecular details of how heart failure and cardiac fibrosis develop, Dr. Si hopes to create strategies to inhibit specific pathways and take a preventive approach to heart failure.

Dr. Si's lab also investigates regenerative therapies, such as neovascularization and cardiac regeneration, as loss of vasculature is a principal pathophysiological mechanism in heart failure associated with complex congenital heart disease. "Finding solutions other than mechanical support or transplant could be beneficial to patients because not everyone can get a transplant," he said.

During fiscal year 2022, Dr. Si authored numerous papers, commentaries, and discussions that were published in peer-reviewed journals.

"I'm very grateful for this donation that makes it possible for me to carry out this work," Dr. Si said. "It is our hope that our work will turn into treatments that will then help patients."

GERO MIESENBÖCK, M.D.

Thanks to the generosity of the David Geffen School of Medicine Recruitment and Retention Fund, Dr. Gero Miesenböck will join UCLA for a six-month sabbatical. The Waynflete Professor of Physiology and founding director of the Centre for Neural Circuits and Behaviour at the University of Oxford is a pioneer in the field of optogenetics, the use of light to control the activities of nerve cells in the brain. Dr. Miesenböck's work has transformed the study of the brain and he has received many awards, including The Brain Prize from the Lundbeck Foundation; the Massry Prize, administered by the Keck School of Medicine of the University of Southern California; The Shaw Prize in Life Science and Medicine 2020; the Louisa Gross Horwitz Prize in 2022; and the 2023 Japan Prize from the Japan Prize Foundation. Dr. Miesenböck is a member of the Royal Society (the United Kingdom's national science academy); the German National Academy of Sciences (the Leopoldina); and the Austrian Academy of Sciences.

During his sabbatical, Dr. Miesenböck will write a review on how insight into the neuronal control of sleep is offering clues to its still enigmatic purpose. He plans to interact with UCLA's distinguished sleep scientists, from fruit fly (Drosophila melanogaster) researchers to clinicians and theorists, as well as the neuroscience community at large.

Dr. Miesenböck has used optogenetics and other experimental approaches to explore the cellular and molecular mechanisms that regulate sleep in the fruit fly. Most recently, his work has exposed

a direct connection between energy metabolism, oxidative stress, and sleep—three processes that previously had been implicated only separately and independently in aging, degenerative disease, and mortality.

Dr. Miesenböck has spent a significant portion of his scientific career in the United States. After receiving his medical degree from the University of Innsbruck, he conducted postdoctoral research at Memorial Sloan Kettering Cancer Center in New York. He was a faculty member there and at Yale University before joining Oxford in 2007.