Columbia Neuroscientist Rui Costa Joins International Consortium to Decode How the Brain Moves the Body

~ Emory University-led effort to develop innovative technologies; deepen understanding of movement in both health and disease ~

Rui Costa, DVM, PhD, Director and CEO of Columbia's Zuckerman Institute, has been named to an international consortium that will tackle the complex brain mechanisms that guide movement and behavior. The consortium, led by researchers at Emory University and supported by a $2.5 million grant from the Simons Foundation, encompasses eight of the world's leading experts across varied fields including biology, engineering, neurosurgery and pharmacology.

By working together to develop cutting-edge tools and technologies to better understand the brain, the consortium aims to strengthen scientific understanding of movement, and use that knowledge to inform treatments for devastating motor disorders, such as Parkinson's disease.

"If we want to understand how movements are produced, and the root causes of movement disorders, we must investigate the relationship between the activity of particular types of neurons in the brain and spinal cord, and the activity of muscles," said Dr. Costa, who is also a professor of neuroscience and neurology at Columbia's Vagelos College of Physicians and Surgeons. "By breaking down barriers between disciplines, and forming collaborations with researchers around the world, this consortium can push the envelope of what is possible when it comes to understanding movement."

The consortium will kick off with a virtual symposium on Friday, June 26, from 10 am to 1 pm ET. Eight neuroscientists — each a consortium member — will give 10-minute talks about a not-yet-invented tool that, if

developed, could transform the field. The talks will stream live on YouTube (register here), and viewers from around the world can ask questions in real-time via an online chat feature.

In addition to researching movement, the Consortium hopes to expand their investigations into broader questions of behavior.

“Motion and movement are the basic building blocks of behavior,” said Gordon Berman, PhD, codirector of the consortium and an Emory assistant professor of biology. “I view the consortium’s work as a critical, early component to ultimately map what you’re thinking in your head to actually producing a movement. Such insights could help in the design of prosthetic limbs that move in response to a person’s thoughts or computer interfaces that assist people with spinal cord injuries.”

As one of the world’s leading experts in movement and behavior, both in health and in disease, Dr. Costa brings a wealth of expertise to this effort. He has developed powerful new approaches and methodologies that harness genetics to isolate specific neural populations, cutting-edge recording and imaging technology, and brain-machine interfaces. Using these tools, his laboratory identified the mechanism by which the brain initiates a movement, such as taking a first step. Because problems with movement initiation are a hallmark sign of Parkinson’s disease, deciphering how this process goes awry in Parkinson’s is critical for developing more effective treatments. These findings were published in *Nature*.

Dr. Costa’s research has also shed light on how the brain combines distinct movements into a seamless sequence, called ‘action chunking.’ Recently, he and his team published research in *Science* revealing new insight into how the brain learns to repeat movements that elicit a feeling of pleasure. This research provides a deeper understanding of psychiatric disorders

characterized by compulsive or repetitive movements and actions, such as autism and obsessive-compulsive disorder.

“The movements our bodies make, from our very first step as toddlers to mastering a piano concerto, exemplify what I see as the brain’s ultimate purpose: to act,” said Dr. Costa. “I am looking forward to learning and being challenged by my fellow consortium members to transform our understanding of the mind, the brain and behavior.”

###

In addition to Drs. Costa and Berman, Consortium members include:

Samuel Sober, PhD, Consortium codirector and associate professor of biology at Emory University;
Chethan Pandarinath, PhD, assistant professor of biomedical engineering and of neurosurgery at Emory University and assistant professor of biomedical engineering at Georgia Tech;
Ilya Nemenman, PhD, professor of physics and of biology at Emory University;
Megan Carey, PhD, principal investigator at the Champalimaud Centre for the Unknown in Portugal;
Abigail Person, PhD, associate professor of physiology and biophysics at the University of Colorado, Denver; and
Andrew Pruszynski, PhD, assistant professor of physiology and pharmacology at Western University in Canada.

To learn more about the Consortium, please visit: Simons-Emory International Consortium on Motor Control.

***Columbia University’s Mortimer B. Zuckerman Mind Brain Behavior Institute** brings together a group of world-class scientists and scholars to pursue the most urgent and exciting*

challenge of our time: understanding the brain and mind. A deeper understanding of the brain promises to transform human health and society. From effective treatments for disorders like Alzheimer's, Parkinson's, depression and autism to advances in fields as fundamental as computer science, economics, law, the arts and social policy, the potential for humanity is staggering. To learn more, visit: zuckermaninstitute.columbia.edu.