GSK's electric frontier

By Lev Osherovich, Senior Writer

Today, **GlaxoSmithKline plc** launched an academic partnering program and announced plans for a \$1 million cash prize to spark technology development in the new field of electroceuticals. The pharma's goal is to manipulate nerve impulses to treat a range of diseases in the periphery.

Electroceuticals are an emerging class of therapeutics that consist of nanoscale electrical circuits delivered to specific tissues by implantation or targeted delivery. The class, which includes optogenetic materials and remotely controlled nanoelectronic circuits, aims to control neuronal activity more precisely than is possible with conventional small molecule neuropharmaceuticals.

The [GSK Bioelectronics Exploratory Funding Program](#) will fund up to 40 postdoctoral researchers or their equivalents in up to 20 academic laboratories for 12–18 months to test hypotheses about neurological control of peripheral tissue function. The company did not disclose the specific amount committed to the program.

Kristoffer Famm, VP of bioelectronics R&D at GSK, said the pharma aims to “get in on the ground floor” in miniaturized electrophysiological and optogenetic technologies for manipulating neural activity.

Famm is the corresponding author of a Comment in *Nature* that outlines the funding scheme.¹ The other coauthors are researchers at the **University of Pennsylvania**, **The Feinstein Institute for Medical Research** and the **Massachusetts Institute of Technology**, as well as GSK chairman of R&D Moncef Slaoui.

Famm said the company is looking for new approaches to treat diseases of peripheral tissues in which neurological functions such as endocrine secretion and control of fine muscle activity become impaired. The objective is to develop nanoscale electronic arrays that could be used as implantable therapeutic devices.

“We imagine that we will introduce these electroceuticals at a peripheral nerve close to the organ you want to control,” said Famm. “For example, if you want to affect function of the lung, you would implant in the nerves around the lung.”

What is missing is a detailed understanding of how neurophysiological control becomes compromised in disease and how best to correct these defects. The new funding scheme will help academics gather these data and design appropriate therapeutic strategies.

“In this funding program, we want researchers who have a hypothesis about neural control in a disease process to be able to map those neural components,” said Famm. “The researchers will formulate an

exploratory research proposal that they can start up quickly in their lab with one or two postdocs.”

The pharma will help connect grant recipients to other academic researchers who are developing technologies for neural manipulation such as optogenetic or nanoelectronic arrays. Famm's group will coordinate collaborations between these academic teams through nonexclusive research licensing agreements.

Academics and their institutions will retain IP rights to their discoveries.

Famm said the cash prize will go to a team that meets a grand challenge to be decided after a symposium of grant recipients and GSK representatives this year. The date has not yet been decided.

He added that the GSK-sponsored program will likely use technologies that are being developed as part of the Brain Activity Map (BAM) project and Brain Research through Advancing Innovative Neurotechnologies (BRAIN) initiative.

BAM is a proposed project to measure and model the complete set of neuronal connections in the CNS.² BRAIN is a funding scheme announced last week by the White House to support technology development in neuroscience.

Unlike the BAM and BRAIN projects, which ultimately aim to characterize the function of the normal human CNS, GSK's program will start with animal models to understand the neurophysiological consequences of disease in the periphery.

“The difference between us and BAM is our focus in looking

in disease models,” said Famm. “It's an effort to measure the targeted neuronal activity in the disease settings. Knowing the specific neural interface will hopefully allow us to manipulate the disease process.”

Although the goals and timelines of large-scale brain-mapping projects like BAM are far off, Famm thinks that therapeutic manipulation of peripheral disease could be reached in a few years.

“In the periphery, there are already means of recording or even introducing signals into large sets of neurons,” said Famm. “This is used to control prosthetic limbs and is now starting to be done in the central nervous system with electrode arrays and optogenetics. However, we're not yet in a space where we can read and write to the brain.”

The call for proposals opens today.

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COMPANIES AND INSTITUTIONS MENTIONED

The Feinstein Institute for Medical Research, Manhasset, N.Y.
GlaxoSmithKline plc (LSE:GSK; NYSE:GSK), London, U.K.
Massachusetts Institute of Technology, Cambridge, Mass.
University of Pennsylvania, Philadelphia, Pa.

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