**Temple researchers receive grants to develop ALS therapy, EEG software**

by Preston M. Moretz

Temple researchers have been awarded two proof-of-concept grants from the University City Science Center for the development of a novel therapy for the treatment of amyotrophic lateral sclerosis (ALS) and creating a software program that will enhance a physician’s ability to read and diagnose electroencephalography or EEGs.

The grants are part of the Science Center’s QED Proof-of-Concept Program, which aims to bridge the funding gap between research grants and commercial seed investment by providing funds for life sciences and digital health technologies with high potential in the healthcare industry.

Ben Blass, an assistant professor of medicinal chemistry in the Moulder Center for Drug Discovery Research in Temple’s School of Pharmacy, will be the principal investigator on the grant that is funding the development of the treatment for ALS or “Lou Gehrig’s disease.”

Moulder researchers have developed a compound that has demonstrated ability to up regulate the expression of the protein glutamate transporter 1 (GLT-1) in the brain.

“Seventy-five percent of ALS patients have a significant down regulation of the GLT-1 protein,” said Blass, who came to Temple from Wyeth Pharmaceuticals. “If you down regulate it, you end up with cytotoxic levels of glutamate that kills brains cells, motonerurons and other things which eventually lead to the symptoms associated with ALS. So we believe that up regulation of GLT-1 is a viable path forward for the treatment of ALS.”

Blass said preliminary short studies in the SOD1 mouse model, the only accepted mouse model for ALS, have shown positive results. The QED grant will now allow the Moulder researchers to conduct more comprehensive studies using the difficult and expensive SOD1 mouse model.

“The SOD1 mouse model study is the only study that you can use for efficacy, which will then allow you to go to the Food and Drug Administration and say you have something that you believe will work in humans and would like to move it into clinical trials,” he said. “If it works, it will be a huge win, especially for ALS patients because there is a huge need for a therapy like this.”

The second QED grant, in the digital health technologies track, is awarded to Mercedes Jacobson, MD, a Professor of Neurology in Temple’s School of Medicine, Iyad Obeid and Joseph Picone, both faculty in Temple’s College of Engineering. This multidisciplinary team is developing computer software that automatically interprets EEGs, which are recordings of the brain's spontaneous electrical activity using electrodes mounted on the scalp. EEGs are used in the diagnosis of a variety of brain disorders including epilepsy and strokes.

“EEGs generate an intense amount of data,” said Obeid. “Clinical specialists, who are typically physicians with several years of special training, must manually review this data to make a diagnosis. The increasing use of EEGs to monitor patients for long periods of time is creating an abundance of data that is rapidly outpacing a specialist’s ability to analyze the data.”

Obeid said that automatic interpretation software has been under development for years. But these systems were developed based on heuristic approaches and have not delivered an acceptable level of accuracy for clinical applications.

The Temple team’s approach combines two emerging technologies – deep learning and big data. “Deep learning algorithms are a lot more powerful at finding trends and patterns than you could get if you attempted to concoct a list of ad hoc rules for the software to follow,” said Obeid. However, he added that they need large amounts of data to successfully model a specialist’s decision-making process. Hence, the second key component of the project is the use of a new big data resource being developed at Temple. In a related project, the team is developing a database of over 22,000 EEGs comprising over 10 years of clinical studies at Temple University Hospital to develop their algorithms.

“For the first time, researchers will have access to enough data to train these powerful systems. This data will enable the development of a new generation of EEG technology” said Obeid. “We have successfully applied these approaches to other fields, such as speech recognition, but this is our first attempt to apply these approaches to a large-scale bioengineering program. If successful, we expect there will be many other similar opportunities for commercialization in this market sector.”

Obeid added that they not trying to replace a physician but enhance his ability to isolate relevant events on the EEG and make a proper diagnosis.

Blass and his colleagues at Moulder will receive $200,000 through the QED ($100,000 from both the Science Center and Temple), while Picone and Obeid will receive $110,000 ($50,000 from the Science Center and $60,000 from the university).

The grants are two of four QED Proof-of-Concepts grants awarded by the Science Center, with researchers from Drexel and Rutgers universities receiving the other two. A total of 65 proposals were originally submitted for consideration, with 14 making finals, including all four Temple submissions.

Temple has received one previous grant through the QED program.

In 2011, George Tuszynski, now emeritus professor of neuroscience in Temple’s School of Medicine, was awarded a QED grant for Angiocidin, a novel tumor-inhibiting protein that has shown effectiveness against acute myeloid leukemia. Temple has spun Angiocidin out to a startup company, Diffregen LLC, which was recently awarded a small business innovation research Phase 1 grant by the National Cancer Institute to advance Angiocidin to the doorstep of human clinical trials.