Marquette University: Biomedical sciences professor receives $1.8M grant to study sex differences in brain mechanisms of seasonality

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MILWAUKEE — Dr. Jennifer Evans, associate professor of biomedical sciences in Marquette University's College of Health Sciences, has been awarded an R01 research grant from the National Institutes of Health, with an expected value of about $1.8 million over five years, to study the differences in how men and women are impacted by seasonal affective disorder, a disturbance that disproportionately affects women.

With their project, "Sexual Dimorphic Circuits in Photoperiodic Encoding and Photic Processing," Evans' research team will conduct studies to generate novel insights into how light alters the function of neural circuits in both sexes and comprise the basic foundations for identifying novel ways to combat seasonal pathology.

"Seasonal changes in day length modulate sleep, attention, appetite, metabolism, mood and immune function occur in a large number of people," Evans said. "These physiological and psychiatric disturbances relapse every year with a large gender disparity, as women are at least twice as likely as men to be adversely affected. Understanding the basis of seasonal disease and why women are affected so disproportionately is an area of critical unmet need."

The suprachiasmatic nucleus (SCN) in the brain's hypothalamus drives circadian and photoperiodic responses to light, but there is a large gap in the understanding of sex differences in SCN photic and photoperiodic processing. Preliminary data indicates that circadian and photoperiodic responses differ by sex, with females

displaying larger behavioral responses to light mediated by divergent SCN circuits. Independent of sex differences, successful completion of these studies will provide novel insights into neural mechanisms of photic processing and photoperiodic encoding to advance understanding in both sexes.

“This research award creates an exciting opportunity for Dr. Evans and underscores the quality of research conducted in the College of Health Sciences and at Marquette University,” said Dr. William Cullinan, dean of the College of Health Sciences. “Dr. Evans and her team will address a disorder which affects so many people and has an outsized impact on women. The result of these studies will not only benefit those suffering from seasonal affective disorder, but also similar diseases caused by light-induced disruption, such as shiftwork and jetlag.”

This research project will benefit from the collective expertise of this collaborative research team, which specializes in retinal physiology, SCN network properties, cellular imaging and computational analyses. Dr. Alex Savtchouk, assistant professor of biomedical sciences, will serve as co-principal investigator on the grant, as will Dr. Tiffany Schmidt, associate professor of neurobiology at Northwestern University. Dr. Tanya Leise, the Brian E. Boyle Professor in Mathematics and Computer Science at Amherst College, will serve as a consultant.

The National Institutes of Health’s Research Project Grant (R01) is the original and historically oldest grant mechanism used by the NIH. The R01 provides support for health-related research and development based on the mission of the NIH. R01s can be investigator-initiated or can be solicited.