



Emily Erickson

BS in Biochemistry from Purdue University (2014) and MPhil in Pathology from the University of Cambridge (2015)

What have you been doing since the publication of your article in *JPUR*, volume 4?

After graduating from Purdue in 2015, I spent a year at the University of Cambridge where I studied breast cancer and earned a master's degree in pathology. From there, I began my PhD at Harvard University where I continue to research breast cancer.

What are your career goals?

I am strongly considering a career in academia, though at this point I am also open to other career options such as science writing, editing, and several options within industry.

How did the research you did as an undergraduate at Purdue impact your current endeavors? What is the value of undergraduate research?

My undergraduate research experience at Purdue directly influenced my career path by convincing me to pursue graduate school. With the help of my advisor and lab members at Purdue, I developed practical lab skills and gained experience designing experiments. These skills have been essential for success in graduate school. However, beyond the immediate impacts on my graduate career, my undergraduate research experience helped develop a host of important life skills. I learned how to manage my time more effectively by balancing both schoolwork and lab work. It also taught me how to think critically about problems and how to communicate more effectively. Undergraduate research can be an extremely rewarding experience and offers many opportunities for academic and personal growth.

THE REGULATION OF MAMMARY CELL GROWTH

Student Author

Emily C. Erickson is a junior in biochemistry at Purdue University. She has participated in Purdue's Summer Undergraduate Research Fellowships (SURF) program in Dr. Karen Plaut's mammary gland biology lab, has interned at the National Institutes of Health in a mammary stem cell biology lab, and interned at Mayo Clinic studying fungal infections of the lungs in immunocompromised patients. Erickson has plans to pursue a career in medical research.



Mentors

Karen Plaut is a professor in the Department of Animal Sciences, and she serves as the director of Agricultural Research Programs and associate dean of agriculture at Purdue University. Plaut received her BS from the University of Vermont, MS from Pennsylvania State University, PhD from Cornell University, and completed postdoctoral studies at the National Institutes of Health. She is a leader in mammary gland and lactation biology research, and is passionate about both research and teaching.



Theresa Casey is an assistant professor in the Department of Animal Sciences at Purdue University. Her research has focused on mammary gland and circadian rhythm biology. Casey holds a BS from the University of Connecticut and an MS and PhD from the University of Vermont.



Abstract

Changes in modern lifestyle such as lack of sleep, stress, and light exposure late at night are associated with increased rates of breast cancer. Most physiological processes, including growth, development, and metabolism, are controlled by circadian clocks. Circadian clocks respond to environmental cues to synchronize internal physiological processes, and thus, the disruption of this system may be responsible for this connection. The master clock in the brain coordinates peripheral circadian clocks located in every tissue of the body, including the mammary gland, and the core circadian component CLOCK regulates circadian oscillation of gene expression. Currently, the physiological function of the mammary clock, and the role of CLOCK in mammary cell growth and differentiation, are unknown. Our objective was to determine if the molecular clock controls mammary epithelial cell growth. shRNA specific for *Clock* was transfected into a normal mouse mammary epithelial cell line, HC-11. Q-PCR and western blot analysis showed shRNA transfection significantly reduced *Clock* mRNA and protein abundance. Temporal analysis of molecular clock gene *Per1* showed loss of circadian oscillation in sh*Clock* transfected cells, indicating loss of molecular clock function. Cyclin D1 (*Cdcl1*) expression was elevated in sh*Clock* transfected cells, and growth curve analysis revealed that sh*Clock* transfected cells had significantly shorter doubling time than HC-11 control cells. These findings support that CLOCK regulates mammary epithelial cell growth and suggests that disruption of circadian clock mechanisms may lead to cancer by altering cell growth regulation.

Erickson, E. (2014). The regulation of mammary cell growth: Determining the role of Clock. *Journal of Purdue Undergraduate Research*, 4, 2-9. <http://dx.doi.org/10.5703/jpur.04.1.01>

Keywords

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How did the faculty-mentor relationship impact you during your time at Purdue?

My faculty mentors, Dr. Karen Plaut and Dr. Theresa Casey, were instrumental in my development as a scientist. They taught me how to think critically about experiments and to identify gaps in the literature and in my own understanding of a problem. Dr. Plaut always made time to meet with her students and was eager to share everything from hands-on lab techniques to higher-level research theories. Together, these two advisors taught me what it means to be a good mentor and have continued to advise and support me to this day. Without their support, I could not have envisioned standing where I am today!

How did the experience of publishing an article in *JPUR* benefit you? What advice would you give to other undergraduates at Purdue who are interested in contributing to the journal?

It was fantastic to experience the publishing process firsthand as an undergraduate, a feat that is rarely achieved until graduate school in many fields without an opportunity such the one provided by *JPUR*. Publishing in *JPUR* will give you a taste of what it's like to publish a paper – a major aspect of graduate school and a career in academics. I would strongly encourage undergraduates to publish their research in *JPUR*, especially those interested in pursuing graduate school.

What advice would you give to other undergraduates at Purdue who are interested in doing research?

Research is incredibly exciting! There's no substitute for the feeling you get when you look down the microscope and discover something that nobody has ever seen before. I wholeheartedly encourage undergraduates to pursue their interest in research.

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