The Summer Undergraduate Research Fellowship (SURF) Symposium
2 August 2018
Purdue University, West Lafayette, Indiana, USA

Does STAT5a Have an Effect on BMAL1 Levels in Mammary Epithelial Cells?

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ABSTRACT

The mammary gland is a very important organ for reproduction in mammals because it produces milk which serves as the primary source of nutrients for newly-born offspring. Previous studies suggest that its development is regulated by circadian clocks, biochemical oscillators that generate circadian rhythms (the body's internal clock). The circadian system plays a major role in homeostasis, coordinating the body's internal physiology and synchronizing it with the external environment. Our lab showed that levels of the BMAL1 protein, a core clock component, increased in the mammary gland at the onset of lactation. Treatment of mammary epithelial cells (HC11) with the hormone prolactin significantly increased BMAL1 levels. We hypothesize that the secretion of prolactin during lactogenesis induces expression of BMAL1 in the mouse mammary gland through the STAT5a signaling pathway. The objective of the project was to determine the effect of different amounts of STAT5a protein on BMAL1 levels with and without prolactin treatment. For this experiment, western blot analysis was used to measure STAT5a and BMAL1 levels in wild type HC11 cells and in HC11 cell lines that were genetically modified to: 1) express very high levels of STAT5a (STAT5a-OE), 2) express a mutant form of STAT5a that is inactive (STAT5a-dnl), and 3) delete the BMAL1 gene (BMAL1 KO). Our first round of analysis showed that overexpressing STAT5a increased BMAL1 protein levels, especially in cells differentiated by prolactin. Results from this experiment would allow us to better understand the relationship between mammary gland development and the circadian system.

KEYWORDS

Mammary gland development, lactation, circadian system, and prolactin.