Lactation is a period of heavy energy and calcium demands in all mammals, requiring significant adaptations by the mammary gland that are regulated in large part by the monoamine serotonin (5-hydroxytryptamine; 5-HT). Our lab has demonstrated that 5-HT regulates parathyroid hormone related protein (PTHrP) production by differential methylation of transcriptional start sites within the sonic hedgehog gene. This PTHrP produced from the mammary gland acts at the site of the bone to regulate mineralization and, therefore, calcium homeostasis. Animals such as the dairy cow that have been bred to produce large quantities of milk often cannot meet the mammary gland’s calcium requirements and therefore are predisposed to hypocalcemia, a condition that causes major losses at production and animal welfare levels. Conversely, women who are breastfeeding mobilize significant amounts of bone to meet calcium demands. When these women are concurrently taking the commonly-prescribed class of antidepressants known as selective serotonin reuptake inhibitors (SSRIs), which maintain elevated circulating 5-HT levels and have been shown to cause bone mineral loss, they may be predisposed to bone-related diseases such as osteoporosis later in life. My project focuses on looking at the molecular and physiological mechanisms regulated by 5-HT that control calcium homeostasis during lactation. I am currently completing a study that examined two different breeds of dairy cow (Jersey and Holstein) and their response to IV administration of 5-HT’s precursor (5-hydroxytryptophan; 5-HTP) as a therapeutic means of preventing hypocalcemia. Future projects will examine 5-HT receptor profiles in the mammary gland and the effects of SSRIs on lactating mothers’ bone density, particularly with respect to methylation.

Publications:


National Presentations:


**Oral:** Laporta J., S.A.E. Moore, S.R. Weaver, and L.L. Hernandez (2014). Full paper: Serotonin (5-HT) and calcium homeostasis during the transition period. Proceedings of the Southwest nutrition and management conference (SWNC), Phoenix, AZ.

**Poster:** Laporta J., S.R. Weaver, C.M. Cronick, K.P. Keil, C.M. Vezina, and L.L. Hernandez (2014). Serotonin regulation of parathyroid hormone-related protein (PTHrP) and calcium homeostasis in the mammary gland involves the sonic hedgehog pathway. Gordon Research Conference: Molecular and Cellular Basis of Breast Development and Cancer Progression, Lucca, Italy.