

Proteomics in Comparative Physiology: Use of Immunoblotting to Study Tryptophan Hydroxylase 2 and 5HT1A Receptor Levels in the Bullfrog Brainstem

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Bullfrog, *Lithobates catesbeiana*, is a vertebrate animal model that can be used to study toxicology and developmental physiology. My research aims to examine the brainstem and serotonin rich (serotonergic) neurons in humans using bullfrog as a comparative model. Past studies have demonstrated that caudal raphe neurons send their serotonergic fibers to respiratory neurons in the brainstem. Classically, 5-HT_{1a} receptor (5HT_{1a}R) is a receptor for the signaling molecule serotonin while tryptophan hydroxylase 2 (TH₂) is responsible for enzymatic recycling of serotonin. Additional research suggests that late metamorphic tadpoles change their lung burst activity with exposure to low serotonin concentrations mediated by 5HT_{1a}R and TH₂. I propose that the bullfrog, which develops in an aqueous environment and transitions to land based air respiration, can provide insight into the pathways of respiratory development. To examine the similarities and differences between humans and bullfrogs, I used the NIH BLAST reference to compare the DNA and amino acid sequences of 5HT_{1a}R and TH₂. I am performing quantitative western blot analysis of both proteins in adult bullfrog and tadpoles to determine a baseline of protein concentration. Repeating the analysis with the addition of toxins on developing bullfrogs may show shifts during metamorphosis. Early impairments to serotonin networks have been studied in the respiratory based pathology of sudden infant death syndrome (SIDS). Use of the bullfrog's rapid maturation and ease of environmental exposure to toxins can provide a method for easily studying developmental diseases.