Submitter Name: Elizabeth Zuniga-Sanchez
Submitted email: Elizabeth.Zuniga-Sanchez@bcm.edu

# Illuminating the molecular mechanisms of drug-induced neuroplasticity using the mouse retina

Sahar Pourhoseini[1], Debalina Goswami-Sewell[1], Elizabeth Zuniga-Sanchez[1,2]

[1]Department of Ophthalmology, Baylor College of Medicine; [2]Department of Neuroscience, Baylor College of Medicine

Addiction is defined as the maladaptive changes that occur due to repeated exposure to drugs of abuse. These changes are often referred to as neuroplasticity and are seen at the synaptic level in neural circuits. However, the molecular mechanism of how substances of abuse alter synapses remains poorly understood. Cell adhesion molecules (CAMs) are known to play a pivotal role at the synapse during development. These molecules mediate adhesive and repulsive interactions among different neurons, and they also bind and recruit receptors to the synapse. Genetic mutations in CAMs have been linked to drug addiction; however, their role in drug-induced neuroplasticity remains unknown. To address this issue, we take advantage of a simple and well-described neural circuit, the mouse retina. Our data reveals drug-associated CAMs are indeed expressed in retinal neurons. Moreover, prior studies show dopamine is essential for normal retinal function. Alterations in dopamine levels such as in the case of cocaine use leads to the inability to distinguish between blue and yellow colors. Color discrimination occurs in the retina where defects in color perception is often attributed to synaptic changes. Taken together, we highlight how the mouse retina could serve as a powerful model to uncover the role of CAMs in drug-induced neuroplasticity. By identifying these molecular mechanisms, we will reveal why some genetic mutations are “protective” while others are “at-risk” for addiction. Our long-term goal is to elucidate novel molecular pathways that can then be used to devise new therapies for substance abuse.