

Mentor: Professor Earl Thomas

Research has shown a connection between the dorsal raphé nucleus' mediation of fear and anxiety and the amygdala and lateral septum. This research examines the serotonin 5-HT 2A autoreceptor and how its negative feedback system gives us insight into the relationship between the dorsal raphé nucleus and the amygdala and lateral septum. With an increase in neuron firing in the dorsal raphé, serotonin is secreted in the amygdala and lateral septum. Biogenic amines in general tend to have both excitatory and inhibitory properties, depending on the location of the postsynaptic receptor; in fact one neuron could be inhibitory, and the one adjacent to it excitatory. Through injection of an agonist and antagonist into the amygdala and lateral septum, we aim to determine how these drugs affect the neuron activity and rate of firing in the brains of rats.

Anesthetized albino male rats undergo stereotaxic brain surgery in order to record and examine the activity in the amygdala and lateral septum after a drug is administered in the dorsal raphé. A cannula is placed in the dorsal raphé and a recording electrode in either the amygdala or the lateral septum. After fifteen minutes of single-cell baseline recording, 1 micron of artificial cerebrospinal fluid (ACSF) is administered through the cannula, followed by an additional fifteen minutes of recording. Following this, 1 micron of either 1.5 µg of an autoreceptor antagonist (WAY 100635) mixed with 0.5 µL of ACSF or 1 micron of an autoreceptor agonist (8-OH-DPAT) is administered, followed by a final fifteen minutes of recording. After recording, the brain is harvested for analysis. Recorded results are then verified with histology.

Recorded results shown in a histogram format that have been verified with histology show a decrease in activity in the amygdala in some subjects after administering the antagonist, but an increase in activity in other subjects. Only a decrease in activity was seen in the lateral septum. Not all data recorded is viable for comparison, however, as for multiple subjects either a loss of unit throughout all three fifteen-minute recordings is evident or there is no change with the administration of the drug, an indication of a problem with the cannula. No data has yet been recorded after administering the agonist. The recorded data that has been verified with histology is consistent with the knowledge of how biogenic amines generally work. The collection and analysis of further data from subjects will aid in determining any trends in neuron activity and

rate of firing in the amygdala and the lateral septum given the addition of an agonist or antagonist. The data from this research has the potential to further knowledge in the field of psychopharmacology regarding the anxiolytic affects of drugs and how serotonin levels in the brain affect anxiety and behavior.