Mimosa pudica as Indicator for Comparative Adverse Effects of Topical Anesthetics

Gates, Makayla (School: Valencia High School)

This project sought to determine if the similarities in transduction of mammalian and plant action potentials through ion channels could allow use of a unique plant indicator, the Mimosa pudica, to compare severity of any adverse effects of anesthetics. Lidocaine 4%, Benzocaine 20% and Praxomine 1%, common topical anesthetics available to the general public, were used for comparison. Prediction was that seismonastic movements of leaves and petioles would be temporarily retarded with no lasting effects on movements or root growth. Three trials were carried out using one plant for control, one for both petiole and leaf application per anesthetic with thorough distilled water washing and one hour recovery time between, and one per anesthetic for root application, for a total of nine plants per trial. .025 grams Lidocaine Hydrochloride 4% cream, Benzocaine 20% gel and Praxomine 1% cream were applied to the main pulvinus of the petioles and reaction recorded over 24 hours with follow up application on tertiary pulvinus of the leaves after washing. Each anesthetic was applied to root tips of remaining plants. Mechanical stimulation using metal rod was instituted immediately on petioles and leaves and every 5 seconds thereafter along affected pulvini until seismonastic movement was seen. Root tips were observed for 30 days and results recorded. Results displayed reaction in all trials at all application sites, suggesting blockage of transduction through ion channels with enough similarity to mammalian action potential interruptions for Mimosa pudica to be used to determine adverse effects of mammalian anesthetics.

Awards Won: