The Sensory Potential of Synaptopodin: An Analysis of Synaptopodin within the Dorsal Root Ganglion

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The purpose of this study was to assess the possible role of Synaptopodin, a protein crucial to cellular development, within sensory neurons. This query was investigated within the context of the Dorsal Root Ganglion (DRG), a sensory neuron-dense tissue that specifically carries peptidergic cells. These nociceptors control human sensitivity to pain and are vital due to their position at the crossroads of the human endocrine, paracrine, and neurological systems. The first phase of research involved producing microtomic sections of Rat DRG. For the second phase, immunohistochemistry was performed on 3 trials of sectioned tissue. This process allowed for antibody detection indicating generalized sensory neurons (IB4 Lectin), peptidergic cells (anti-CGRP), and Synaptopodin (anti-SYNPO). Images were then captured with a fluorescent microscope and quantified using image analysis software. It was found that Synaptopodin is present in most cells of the DRG (~81%), specifically peptidergic cells (~84%), as proven by a strong correlation (~.985) between the presence of CGRP and Synaptopodin as well as sufficient evidence for dependency as shown by a chi-square test. It was concluded that Synaptopodin specifically plays a developmental role within sensory neurons of the DRG. The developmental function of Synaptopodin within Petidergic cells helps reveal an additional layer of the sensory abilities of these nociceptors. This research also introduces the possibility of using Synaptopodin-centered cellular therapies to aid patients suffering from Central Pain Syndrome.

Awards Won:
Air Force Research Laboratory on behalf of the United States Air Force: Glass trophy and USAF medal for each recipient
Air Force Research Laboratory on behalf of the United States Air Force: First Award of $750 in each Regeneron ISEF Category