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Dissecting the holothurian nervous system with antibody probes

Carlos Antonio Díaz-Balzac , José Enrique San Miguel-Ruiz , Karen Tossas , Marisela Rives-Sánchez and José Enrique García-Arrarás

Biology, University of Puerto Rico- Río Piedras Campus, Department of Biology, Box 23360, University of Puerto Rico, San Juan, 00931-3360, Puerto Rico

ABSTRACT

The echinoderm nervous system is one of the least studied of the metazoans. The main focus of previous studies has been the ectoneural and hyponeural components of the nervous system that lie within the nerve ring and radial nerves. Our group has presently identified a nervous plexi located within the connective tissue, which lie outside of the two traditional subdivisions. Its description was made using the monoclonal antibody, RN1, which appears to label the nervous system component of holothurians. In the present work we have used RN1, together with other known markers of nervous elements, such as neuropeptides and neuron-specific tubulins, to describe different components of the nervous system. Double labeling experiments show that fibers and cells can be grouped into various subpopulations according to the expression of the neural markers, suggesting a larger complexity in the echinoderm nervous system than previously thought. The divisions delineate anatomical circuits of echinoderm neuroanatomy that possibly correlate with particular functions. They also show the connection and possible interactions between the individual components. This description of the echinoderm nervous system, a key group in the evolutionary scale of the deuterostomes, provides important information for comparative neurobiology and evolutionary studies that can enhance the understanding of the nervous system.

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