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Paraneuronal gill NE cells in fishes: Probable bio-indicators

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Various kinds of paraneuronal cells have been identified in vertebrate body, outside central nervous system which is known to control various essential functions of the body through neurotransmitters produced by these cells. It is now well established that these cell systems act in an autocrine and/or paracrine mode of action and belong to the diffuse neuroendocrine cell systems as defined by Toni. Pseudobranchial neuro-secretory system in one such system which is very similar to the NECS reported on the gill filaments of certain fishes. The association of pseudobranchial neurosecretory system with the carotid labyrinth-a chemosensory structure derived from pseudobranch, reflects towards a chemosensory role of the systems in the biology of these fishes. Immunohistochemical investigations on carotid labyrinth and pseudobranchial neurosecretory cells have revealed the presence of several bioactive substances (NPY, TH, VIP, NO, Serotonin etc.) in these cells, suggesting multiple functional roles of these cells. The gills of the fish are known to be multi-functional. This novel gill NE system is described in detail and the cells belonging to this system are compared with the NECs observed in the gill filament of fish and glomus cells found in the carotid body of mammals. The functional significance of pseudobranchial neurosecretory cells in the vertebrate phylogeny of oxygen chemosensory complex is also discussed.

Recent Publications

1. Kelly S Regan, Michael G Jonz and Patricia A Wright (2011) Neuro-epithelial cells and the hypoxia emersion response in the amphibious fish *Kryptolebias marmoratus*. The Journal of Experimental Biology 214:2560-2568.
2. Nurse C A (2010) Neurotransmitter and neuromodulatory mechanisms at peripheral arterial chemoreceptors. Exp. Physiol. 95(6):657-667.
3. Zaccone G, Mauceri A, Maisano M, Giannetto A, Parrino V and Fasulo S (2008) Neurotransmitter localization in the neuro-epithelial cells and unipolar neurons of the respiratory tract in the bichir, *Polypterus bichir bichir*. Acta Histochem. 110(2):143-150.
4. Perry S F, Jonz M G and Gilmour K M (2009) Oxygen sensing and the hypoxic ventilatory response. In Fish Physiology 27:193-253.
5. S F Perry and V Tzaneva (2016) The sensing of respiratory gases in fish: Mechanisms and signalling pathways. Respiratory Physiology & Neurobiology, 224:71-79.

Biography

Anita Gopesh has 35 years of experience in research and teaching at a prestigious University of Allahabad, India. She has expertise in Neuroendocrine System and Noval Paraneuronal Cells in fish. She has the distinction of introducing the third and peripheral NE cell system of fish. She is the Head of Department of Zoology, University of Allahabad. The finding of ps neurosecretory system associated with carotid labyrinth in fishes is significant as it can be paralleled with the glomus cells and carotid body of mammals, including man.

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