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Melano-macrophage centres in lymphoreticular organ as indicator of fish health state

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Sustainable aquaculture depends on a perfect balance between growth and healthy conditions of fish. The consumption of freshwater and salt water fish poses serious food security problems for both producers and consumers; hence, monitoring of the health status of these species could lead to a better understanding of the issues associated with improving fish production and generating results of considerable scientific and economic interest in a broad spectrum. Fish immune system comprises: head kidney, spleen, thymus, liver and mucosa-associated lymphoid tissues as in the gut and cells such as lymphocytes, monocytes, macrophages and granulocytes (1-2). Melano-macrophage Centers (MMCs) are defined as a group of pigmented macrophages or as a nodular cluster of macrophages characterized by heterogeneous inclusions such as degradation products of cells, foreign material and microorganisms. MMCs move freely inside the parenchyma of lymphoreticular tissue and, ultimately, become larger and encapsulated as a special type of granuloma-like formation (Fig. 1), playing an important role in terms of innate immune defense against pathogens and elimination of exhausted cells, mainly erythrocytes. MMCs are often observed in close proximity of blood vessels and their amount can increase in case of protozoal, bacterial and mycete infections. Noteworthy, number, size and pigment distribution of MMCs depends on the fish species, organs, age, sexual activity, nutritional status and fish health. In our studies, MMCs were morphologically characterized by haematoxylin-eosin; their chemical content was revealed by Mallory's method for lipofuscin/ceroid and Perl's stain for hemosiderin; lysosomal activity was demonstrated by α-naphthyl acetate esterase and peroxidase for macrophages. Furthermore, an increase of MMCs has been associated to the expression of biomarkers (Cyp1A and vitellogenin) exposure to a variety of pollutants. MMCs role as metabolic dumps and their utility as indicator of fish health state are discussed.

Biography

Letizia Passantino completed her Graduation in Biology and PhD in Morphology of Aquatic Species. She works as an Associate Professor in Veterinary Anatomy at University of Bari Aldo Moro, Italy. Her fields of interest are focused on teleost fishes: Morpho-functional and immunological aspects of the lymphoreticular tissues, as head kidney, spleen, liver and mucosa-associated lymphoid tissues, and immune response by macrophage and "non-immune" cells such as nucleated erythrocytes and platelets. Furthermore, she described important aspects regarding Melano-macrophage centres-their origin, the possible role and relationships they may have with macrophages and/or other cells, confirming the hypothesis that they can act as metabolic dumps. Her morphological, functional and immunological evaluations can represent a useful tool for diagnosis and therapies in fish farming.

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