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REVIEW

Cell markers and determinants in fish immunology

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Abstract Despite the impressive increase in the cloning and expression of genes encoding fish immunoregulatory molecules, the knowledge on “in vivo” and “in vitro” functional immunology of the corresponding peptide products is still at an initial stage. This is partly due to the lacking of specific markers for immunoregulatory peptides, that represent an indispensable tool to dissect immune reactions and to trace the fate of cellular events downstream of the activation. In this review we summarise the available information on functional immune activities of some teleost species and discuss the obtained data in an evolutionary and applied context. © 2008 Elsevier Ltd. All rights reserved.

Introduction

Knowledge of immune defences is remarkably advanced in mammals, and this knowledge is generally taken as a basis for comparative studies in other vertebrates. This is mainly due to the similarity in the anatomical and functional organisation of the immune system among vertebrate species. However, in recent years some difficulties have emerged in transferring the experimental knowledge in immunology acquired in mammals to ectothermic vertebrates, particularly in fish.

These difficulties originated from the increasing number of fish species investigated, each one living in a unique environment and thus requiring unique handling conditions, from the use of outbred species with a high genetic variability in immune responses and, mainly, from the

lack of markers for cellular and molecular components of the immune system.

With respect to genetic variability, some difficulties have been diminished with the production of inbred strains of carp [1,2], trout [3], medaka [4] and zebrafish [5].

The great impetus in the discovery and cloning in fish species of genes coding for immunoregulatory peptides homologous to known mammalian ones is also particularly evident. In particular, the zebrafish model, whose genome has been sequenced, is becoming a powerful system for studies of vertebrate immune development and disease, since it is possible to perform large-scale genetic screening on transparent, readily accessible embryos, to identify novel genes involved in pathogenesis, and to study the fate and effects of introduced substances [6–8]. However, a major drawback in using zebrafish and other small-size

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