



ELSEVIER

Fish & Shellfish Immunology 19 (2005) 253–267

**Fish & Shellfish
Immunology**

www.elsevier.com/locate/fsi

The rodlet cells of teleostean fish: their potential role in host defence in relation to the role of mast cells/eosinophilic granule cells

Ola B. Reite*

*Department of Basic Sciences and Aquatic Medicine, Norwegian School of Veterinary Science,
P.O. Box 8146 Dep., N-0033 Oslo, Norway*

Received 7 October 2004; accepted 7 January 2005

Available online 13 March 2005

Abstract

The distribution and potential function of the rodlet cells of teleosts were studied by microscopic observations on tissue samples from the digestive tract and adjacent tissues, including the bulbus arteriosus. Fish representing 3–5 genera from each of the families Salmonidae, Cyprinidae, Gadidae and Labridae were included in the study. Great individual variations in the distribution of rodlet cells were found in all species of salmonids, gadids and labrids. The cells seemed to be absent in some individuals of a species and were associated with different epithelial tissues in others, but were not found in vascular endothelia. Their occurrence was common in all salmonids caught in their natural environment, whereas those in aquaculture, kept under controlled conditions with respect to water quality, showed extremely few rodlet cells. In species of the cyprinid family, the picture was different. Rodlet cells were consistently present under the endothelium of the bulbus arteriosus, and were very numerous at this location in individuals infected with blood flukes. In other epithelial tissues of cyprinids, rodlet cells were encountered in fairly high numbers, but in some tissues of individuals from all species they were occasionally absent. In all of the studied families rodlet cells seemed to be recruited when helminths affected epithelial tissues. Mast cells/eosinophilic granule cells were consistently very numerous in tissues of the intestine of cyprinids and labrids. In gadids, mast cells/eosinophilic granule cells seemed to be absent. Present evidence points to a role for the rodlet cells in defence functions, e.g. in combating helminths, and the suggestion earlier made for mast cells/eosinophilic granule cells, that evolution has created a “standing force” in particular tissues of teleosts consistently exposed to pathogens, whereas an efficient “mobilization force” has been an advantage in those living in more pathogen-free environments, may also

* Tel.: +47 2249 0398; fax: +47 2296 4758.

E-mail address: ola.b.reite@c2i.net

be applied to rodlet cells, explaining the differences between teleostean families with respect to their distribution pattern.

© 2005 Elsevier Ltd. All rights reserved.

Keywords: Rodlet cells; Mast cells; Eosinophilic granule cells; Teleosts; Helminth infection

1. Introduction

In tissues of teleostean fish the structures now termed rodlet cells were first described in 1892 as “sporozoaires indéterminés” [1] and named *Rhabdospora thélohani* [2], reflecting the view that they were protozoan parasites. Plehn [3] claimed the same structures to be secretory cells (“Stäbchendrüsenzellen”) of the fish. Since that time opinions have been divided as to whether the rodlet cells are actually parasites [4–9], or a type of host cell [10–17].

The rodlet cells are associated with epithelial tissues. They have been observed in a large number of species [8,16]. The cells may be absent in some individuals of a species and present in different organs in other individuals [5,7,16], but no explanation of the differences in distribution pattern has been presented and they have not been demonstrated in vertebrates other than fish. The cells have remained an enigma in fish biology [18,19].

More than 60 years ago, Duthie [10] believed the rodlet cells were granulocytes modified to discharge their granules at epithelial surfaces, a view later supported by Catton [12]. Leino [14] suggested that rodlet cells may be involved in water or electrolyte transport or have functions similar to those of mucous cells, e.g. pH control, lubrication, antibiotic effects, and in his thesis he hypothesised that rodlet cells react to the presence of ectoparasites on epithelial surfaces and that an antibiotic substance secreted by these cells helps dampen the parasitic infections [20]. More recently, in a study in the bluegill, Leino [21] found evidence that in fish exhibiting the early stages of a myxosporidian infection involving the kidney tubules and the glomeruli, rodlet cell secretions may contribute to the elimination of the parasites.

During studies on the effects of noxious agents on tissue mast cells/eosinophilic granule cells (MCs/EGCs) in species from several genera of salmonids I found that these cells showed degranulation in response to acute tissue damage, whereas chronic inflammatory reactions in gills or intestinal tissues caused a local increase in their number. When the latter type of MC/EGC response was due to parasites, e.g. in intestinal tissues of the Arctic charr, brown trout and vendace affected by cestodes or trematodes, rodlet cells seemed to join the MCs/EGCs, but were localized to epithelial tissues of the affected region. In cases with extensive tissue damage some of the rodlet cells were lying free in the intestinal lumen together with other cells or cell debris. I suggested that the rodlet cells, like MCs/EGCs, are involved in host defence mechanisms in teleosts [22]. This suggestion was strengthened by results obtained during studies in cyprinids and labrids. Also in these species I found an association between the occurrence of trematodes or cestodes in the intestine and the presence of rodlet cells in the intestinal epithelium, and encysted larval specimens of trematodes, cestodes or nematodes in the intestine or adjacent tissues seemed to induce recruitment of rodlet cells to the mesothelium of the viscera and secretion of their products onto the mesothelial surface [23]. Subsequent observations by Dezfuli et al. [24,25] in the trematode-infected eel and the nematode-infected minnow, respectively, by Palenzuela et al. [26], studying myxosporean infections in the gilthead sea bream, and by Koponen and Myers [27], recording seasonal changes in the occurrence of rodlet cells in freshwater bream, also support the suggestion that rodlet cells play a role in host defence mechanisms in fish.

During further studies in salmonids, cyprinids, gadids and labrids I have made more extensive observations on the rodlet cells, focusing on their distribution in different fish (species, genus, family), their

Download English Version:

<https://daneshyari.com/en/article/8978801>

Download Persian Version:

<https://daneshyari.com/article/8978801>

[Daneshyari.com](https://daneshyari.com)