

Phylogeny and Mucosal System of Gnathostomes and Agnathans

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Editorial

All animals, vertebrate or invertebrates, faces the challenges of combating pathogens while maintaining a tolerant relationship with symbiotic microorganisms. Tolerance to symbiotic is not a static or inert interaction but rather, required continuous active regulation of the front lines for these interactions with the mucosal surfaces. A fundamental question is whether or not specialized immune cells or organs have evolved in all animals to cope with the unique problems of mucosal defence, or whether specialized mucosal immunity is unique to vertebrates such as mammals [1]. This question can be answered by investigating the phylogeny of the mucosal and systemic immune system, from invertebrates to fish, amphibians, reptiles and birds to prototherians, the metatherians and eutherians. There is also, an extremely practical reason for studying phylogeny of many species and suffer from diseases of mucosal surfaces so that producing mucosal vaccines against fish pathogens is arguably as important to humankind as producing vaccines against the mucosal pathogens of mammals. Most of the paradigms for immune defences and symbiosis were established from studies of humans and a few other mammalian species such as rodents. Although these studies have provided more than a century of discovery and progress, much has also been learned from non-mammalian vertebrates as well as invertebrates, particularly over the past two decades [2-4].

The unique aspect of adaptive immune system is the generation of diverse receptors from germ line DNA. Among the animal phyla, the chordates arguably exhibit the greatest diversity in immune systems. Vertebrates are divided into Gnathostomes and Agnathans. These two lineages have adaptive immune systems that followed very different evolutionary paths while maintaining some common features. Both lineages use lymphocytes as the major cell type mediating adaptive immunity [5].

T cell receptors in Gnathostomes

These lymphocytes express cell surface, antigen specific and clonally unique receptors. In all gnathostomes, the T-cell antigen receptors are composed of a heterodimers. The genes encoding these four chains are highly conserved both in sequence and organization from sharks to mammals, leading to the conclusion that the TCR performs common functions across all the gnathostomes lineages, principally as recognition, Unlike antibodies that serve both as signalling receptors and are also secreted, the TCR serves solely to recognize antigenic epitopes when they meet a threshold of binding affinity. The requirement of recognizing antigenic peptides and glycolipids presented on molecules encoded by the major histocompatibility complex has further contained the evolution of T cell receptors. The relationship between Tcell receptor and major histone compatibility complex is also ancient in the gnathostomes and conserved in all living species [6].

T cells in Agnathans

In agnathans there are discrete lymphocyte subsets. One subset does not secrete its antigen receptor but is capable of producing cytokines that regulate other cell types. In gnathostomes these are the T cells whereas in agnathans they are lymphocytes. Also present

is subset that is capable of producing its antigen receptor both as cell surface receptor and as a secreted molecule, often in a polymeric form. These are the B cells in gnathostomes and lymphocytes in agnathans. Therefore, the paradigm of the dichotomy between B and t cells in mice and humans probably arose in a common vertebrate ancestor more than 500 million years ago, before the evolution of the thymus, spleen, TCR, Immunoglobulin's, and other structures with which most immunologists are familiar [7].

Agnathans and Gnathostomata are two groups of organisms that live in aquatic environments. The primitive forms of both groups are extinct, they are vertebrates, both have a cartilaginous skull, and they show great importance in determining the evolutionary relationships of higher organisms.

Agnathans and Gnathostomata are two varied groups of fish that show very early evolutionary patterns. The key difference between agnathans and Gnathostomata is the possession of a jaw. Agnathans do not possess a jaw while Gnathostomata possesses true jaws. Besides, a further difference between agnathans and Gnathostomata is that the Gnathostomes possess paired appendages and fins, while the Agnathans do not possess paired appendages and fins [8].

Agnathans and Gnathostomata are two groups of fish. Both are vertebrates, and they live in aquatic environments. Importantly, they show great significance in evolutionary patterns. Thus, they are very important in determining the phylogenetic relationships of higher organisms. However, the earliest species of both groups are extinct. Nevertheless, concerning the differences between both fish, the key difference between Agnathans and Gnathostomata is the presence or absence of the jaw. That is; the Agnathans do not possess jaws, while the Gnathostomata possess jaws. They also differ in the fact that only Gnathostomata possess appendages as fins. So, this is the summary of the difference between Agnathans and Gnathostomata [9, 10].

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Conflict of Interest

None

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