Structural and functional diversity of the complement system, an innate immune factor, in fish

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The complement system is a major humoral factor of innate immunity and recognized as one of the most ancient clues fighting against microbial infection as suggested by its existence in wide range of vertebrate and invertebrate species. In bony fish, isotypic diversity of complement components is one of the striking features of the system. Multiple isotopes of several key components such as C3, C4, and factor B have been identified not only at the mRNA level but also at the protein level. The functional diversity and its biological significance in the bony fish immunity, however, are yet to be clarified. We will present several lines of functional evidence to assess a hypothesis that the complement diversity may enhance its pathogen recognition repertoire and effecter functions crucial for pathogen elimination, using carp, a pseudotetraploid model species. Especially, diversity in the binding specificity of C3 isotypes and mannose-binding lectin homologs, different mode of the complement activation involving factor B/C2 isotypes, and a big family of the regulators of complement activation will be discussed.