

NON-TECHNICAL ABSTRACT: *(State in layman's terms the application's broad, long-term objectives and specific aims, making reference to the potential public benefits of the project.)*

The goal of any immune system is to protect the organism from foreign microbes that can cause disease. Several decades of investigation into this underlying principle has led to the categorization of the immune response into two components: a rudimentary “innate” immune response seen in all living organisms and a more complex “adaptive” immune response seen in only more evolved animals. For many years, it was believed that adaptive immune responses only existed in the jawed vertebrates, however recently this notion has been called into question. Studies have now shown that in fact the lamprey and hagfish, modern-day representatives of the class of jawless vertebrates, do in fact have an adaptive immune system and can mount an effective adaptive immune response. Interestingly, the cells and molecules that mediate the response in the jawless fishes are quite different from conventional adaptive immune responses seen in organisms such as mice and humans. One of the major limitations in studying the immune system of less “mainstream” model organisms is the lack of suitable reagents specific to the organism of interest. The overall goal of this proposal is to address these shortcomings by generating reagents specific to jawless fish to allow for a more comprehensive examination their unique immune system. The information gained through these studies will provide insight into our understanding of how different organisms have evolved various mechanisms of adaptive immunity to protect themselves from pathogens.