## The Role of IL-1 In The Immune Response And Its Potential To Serve As Adjuvant

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### Abstract

Robust immune responses, required for efficacious vaccines, do not occur in the absence of adjuvants. Unfortunately, “efficient” adjuvants such as CFA cannot be used in humans due to the severe inflammatory responses induced by these adjuvants. As a result, a very limited number of adjuvants are available in humans and, in consequence, many potentially useful vaccines, particularly those based on subunits (i.e. peptides, proteins, polysaccharides) of infectious organisms are of limited efficacy. Since pro-inflammatory cytokines are present at elevated levels in the course of inflammatory responses induced by adjuvants and in infections that are associated with robust immune responses, we queried whether any of these cytokines might have a direct impact on the so-called helper (CD4+) T cells. We have recently demonstrated that a likely candidate, IL-1, a prototypic pro-inflammatory cytokine known to play a major role in a great number of biologic responses, strikingly enhances immune responses to peptides and proteins. Its effect is particularly outstanding among the CD4 T cells and remarkably it directs helper cells to develop into effectors that are best adapted to deal with extracellular bacteria and fungi (Th17 cells) and to helminths and other parasites (Th2 cells). IL-1 also markedly enhances antibody production. IL-1 is substantially more effective than the commonly used experimental adjuvant lipopolysaccharide (LPS) and when added to LPS can improve the degree of priming of CD4 T cells by a factor of 10 or more. Although IL-1 has been studied *in vitro* and is known to be important in immune responses to microorganisms and in the development of human Th17 cells, its *in vivo* effects on T cell expansion have largely been neglected. While there has been much interest in IL-1’s possible role in immunity due to its known effects on antigen-presenting cells, there has been relatively little information on its role in the process of T cell activation and expansion in the course of immune responses.