

Objectives

1. To be introduced to the basic concepts and terminology that will be built on throughout the course.
2. To appreciate the layered nature of immune defenses, in terms of both temporal response, and specificity of response. Recognize the difference between innate and adaptive systems.
3. To become familiar with the basic immune system players: complement, macrophages, neutrophils, dendritic cells, NK cells, B & T lymphocytes. Understand how they are distinguished from one another both in function and phenotype (appearance).
4. Understand the essential role of cytokines in the immune response. Become familiar with some of them: IL-1, TNF- α , IL-2, IFN- γ , IL-4
4. Begin to appreciate the geographic localization of immune events: peripheral tissues, secondary lymphoid tissues.
5. Understand the concept of antigen presentation, and the general rules of Class I and Class II peptide origin. Begin to appreciate the implications of T cell antigen recognition requiring peptide binding by MHC.

Summary

1. We are protected from dissolution at the hands of microbes by an army of specialists each of which provides an essential piece of a complex defense.
2. The innate arm, the most ancient, is the first to respond. Its cells utilize evolutionarily conserved pathogen characteristics to recognize "danger" and act rapidly to tag, engulf, lyse, or wall off the invader.
3. The innate system simultaneously provides pathogen-specific information (in the form of MHC/peptides) and essential activation signals (in the form of CD80 and CD86) to the adaptive system resulting in helper T cell activation and differentiation.
4. a) CD4⁺ T cells provide cytokine and contact-dependent help to B cells, resulting in a highly specific, high-affinity antibody response.
b) CD4⁺ T cell help and immunoglobulins provide reciprocal signals to the innate system, greatly facilitating phagocytosis and killing.
5. The adaptive system utilizes a unique gene rearrangement technique to generate awesome diversity and subtlety in antigen recognition: the lymphocyte repertoire.
6. T cell direction, required for the optimal immune response, is completely dependent on the peptides presented. Highly polymorphic MHC genes, and co-dominant expression of multiple MHC molecules helps ensure that every individual can make a response to some part of every pathogen. However, not all MHC's are alike - some are better than others at engendering a particular response. This may be anti-bacterial, antiviral, or anti-self.