

11. Cytotoxic T Cells and Natural Killer Cells

LEARNING OBJECTIVES:

1. Recognize shared mechanisms used by cytotoxic cells (CD8+ T cell vs. NK).
2. Appreciate how CD8+ T cells and NK cells recognize their respective targets, and the role of MHC class I-mediated peptide presentation.
3. Become familiar with the concepts of 'licensing' and 'memory' in T cell responses.
4. Recognize the roles of 'direct presentation' vs. 'cross-presentation' in the host defense against viruses and tumors.
5. Understand the types of signals that influence NK cell activation and inhibition.
6. Appreciate the respective roles of T cells and NK cells in physiologic immune responses and in pathogenic autoimmunity.

SUMMARY:

1. CD8+ T cells (adaptive immunity) and Natural Killer cells (innate immunity) cooperate to protect the host from viruses, intracellular bacteria and parasites, and in tumor surveillance.
2. Mechanisms of cellular cytotoxicity shared between CD8⁺ T cells and NK cells include triggering apoptosis in the target cell via the perforin/granzyme pathways or cell surface receptors (Fas, TRAIL).
3. Target recognition relies on either specific peptide presented in MHC class I (for CD8⁺ T cells) or the absence of MHC class I (for NK cells).
4. CD8⁺ T cells require a licensing step in order to acquire cytotoxic function and generate memory.
5. Cross-presentation allows the priming of CD8+ T cells against viruses that attempt to evade the immune response by shutting down direct antigen presentation.
6. NK cell activation is determined by the 'balance' of positive and negative signals received through an array of surface receptors.