# MHC class I and II

MHC (major histocompatibility complex) molecules are an important part of the immune system, used to present an antigen on the surface of a cell. In humans the MHC is called the HLA (human leukocyte antigen) complex (often referred to as simply ‘HLA’).

MHC class I molecules are found on the surface of all nucleated cells in the bodies of vertebrates. These molecules present an antigen to cytotoxic T cells (Tc cells) which, after activation by cytokines from helper T cells (Th cells), will bind to MHC class I molecules presenting and antigen on the surface of some cells. The Tc cells will also undergo clonal expansion, this increases the number of cells that can look for and destroy infected cells. Tc cells express the surface protein CD8, which serves as a co-receptor for the T-cell receptor (TCR). After binding, the Tc cells destroy the infected cell, killing the virus it was infected with.

MHC class II molecules are only found on professional antigen-presenting cells (APCs). The function of these molecules is to present the antigen to Th cells. After the release of cytokines from the APC helper T cells get activated. These helper T cells express the surface protein CD4, serving as a co-receptor for the Th cell’s TCR, allowing them to bind to the MHC class II molecules. After binding, the helper T cells will release cytokines activating the aforementioned cytotoxic T cells, initiating an immune response.

# Epitopes

The part of an antigen that binds to the antibodies is called an antigenic determinant or epitope. These epitopes are parts of a chain of amino acids that make up an antigen and bind to the paratopes of an antibody. The length of the epitope can differ, whereas T cell epitopes presented by MHC class I molecules are typically peptides between 8 and 11 amino acids in length, T cell epitopes presented by MHC class II molecules are between 13 and 17 amino acids in length. Epitopes can be divided into two categories, conformational epitopes and linear epitopes, depending on their structure and how they interact with the paratope.