

antigens to T cells, where the result is an activated T cell. In turn, the activated T cell proliferates, resulting in an increased population of T cells specific for that antigen, and where the activated T cell can respond extremely quickly the next time it encounters the antigen. Once stimulated with antigen, T cells can kill human cells that are infected with viruses or bacteria, thereby removing the infection, or the T cells can kill tumor cells. Regarding inflammatory disorders and autoimmune diseases, once stimulated with antigen, T cells can attack human cells, causing damage to human tissue.

A simple version of this scenario appears below (Fig. 26.1). In step 1, the DC takes up antigens. In step 2, the antigens are processed and mounted on a protein complex called

MHC, where the processed antigens are bound to the outside surface of the DC. In step 3, which involves the immune synapse, the DC presents the antigen to a T cell. The T cell can be either a $CD4^+$ T cell or a $CD8^+$ T cell. In step 4, as a consequence of events taking place at the immune synapse, the T cell becomes activated, and it proliferates. In step 5, the T cell after proliferation contacts a tumor cell or an infected cell. In step 6, the activated T cell encounters a cell that contains the same antigen on its surface, and the T cell kills the cell (indicated by the bolt of lightning). In a variation of this scenario, taking place during an autoimmune disease, the T cell inflicts damage on a healthy human cell. In a separate pathway, occurring at the same time, the DC presents processed

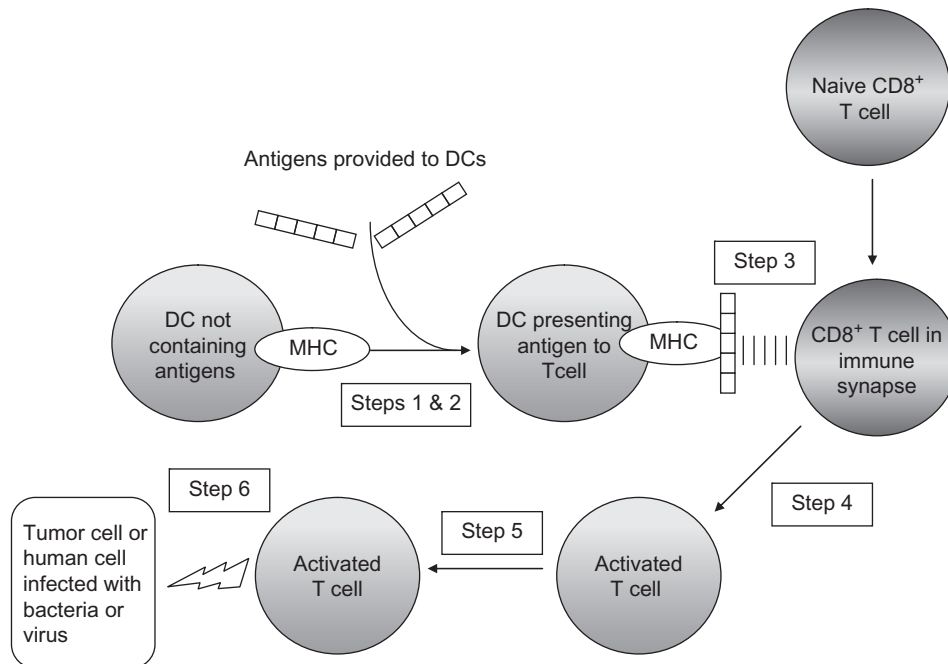


FIGURE 26.1 The immune response involves the introduction of antigens to a dendritic cell (DC), either by uptake from the environment or via biosynthesis by a bacterium or virus inside of the DC. The DC then processes the antigen to short peptides, and presents the peptides to waiting $CD4^+$ T cells or $CD8^+$ T cells. This results in the activation of the T cell. In the case of activated $CD8^+$ T cells, the T cell is then able to kill human cells where those human cells bear the same antigen on their outside surface.