



**Figure 25.4** Antigen processing and presentation by a dendritic cell that is highly activated. Dendritic cells can be activated by a number of naturally occurring agents, such as a CD40 ligand. The dendritic cell is activated by a CD4<sup>+</sup> T cell, where this activation involves contact of CD40 ligand of the CD4<sup>+</sup> T cell with CD40 receptor of the DC. The end-result, after formation of the immune synapse, is a highly activated CD8<sup>+</sup> T cell

is a *highly activated T cell*. **Figure 25.4** shows the activation of a dendritic cell by a CD4<sup>+</sup> T cell, where the consequence is a *highly activated T cell*. A property of a poorly activated CD8<sup>+</sup> T cell is that it may be stimulated to proliferate, but it will function poorly in killing target cells. A property of a highly activated CD8<sup>+</sup> T cell is that it is stimulated to proliferate, and that it can also function effectively in killing target cells. CD4<sup>+</sup> T cells are also called helper T cells. CD8<sup>+</sup> T cells function to kill other cells and for this reason are also called *cytotoxic T lymphocytes* (CTLs). The little arrays of lines represent the binding interaction between two proteins. This binding involves the formation of hydrogen bonds. It is conventional in organic chemistry to use an array of parallel lines to represent a hydrogen bond. The segmented ribbon represents a peptide, that is, an oligomer of about ten amino acids.

The following concerns NK cells and antibodies. NK cells kill cells by way of antibody-dependent cell cytotoxicity (ADCC). In ADCC, an antibody binds to the surface of a human cell that is infected with a virus or bacteria to form a complex. This complex mediates the binding of the NK cell to the infected cell, where the result is that the NK cell kills the infected human cell, thereby curing the infection. NK cells can kill tumor cells by the same mechanism, that is, where a tumor-specific antibody binds to the tumor cell. ADCC involves a sandwich of two cells, where the antibody resides inside the sandwich.