(19), and *Listeria monocytogenes* (expressing recombinant tumor antigens) (20,21,22). In the case of bacterial adjuvants, the bacterium as a whole may be called an immune adjuvant. But the bacterium as a whole is not required for stimulating a toll-like receptor. What stimulates the toll-like receptor is the various components of the bacterium, such as flagellin, peptidoglycan, and bacterial DNA.

Immune adjuvants can take the form of a reagent that activates $CD4^+$ T cells. Knutson et al. (23) and Disis et al. (24) describe the use of reagents that activate $CD4^+$ T cells, in the treatment of breast cancer. Where $CD4^+$ T cells are stimulated, either by infecting bacteria or viruses or by an administered drug, the $CD4^+$ T cells serve as Mother Nature's immune adjuvant. The activated $CD4^+$ T cells are Mother Nature's immune adjuvant because, without them, $CD8^+$ T cells are not able to reach their full potential for mediating an attack against infections.

Manegold et al. (25) provides an excellent diagram showing a DC that is activating a $CD8^+$ T cell, and showing the activated $CCD8^+$ T cell attacking a tumor cell.

After activation by DCs, $CD8^+$ T cells leave the lymph nodes and enter the circulatory system, where they may encounter tumors. When the $CD8^+$ T cells encounter tumors, they may find that chemotherapy or irradiation has enhanced the ability to kill the tumor cell (by mechanisms in addition to activation of the DC).

For example, chemotherapy or irradiation can enhance immune response against tumors by stimulating the living tumor cells to express Fas-receptor (26). Fas-receptor is targeted by $CD8^+$ T cells (which bear Fas-ligand), when the $CD8^+$ T cells kill tumor cells. Moreover, chemotherapy (27), radiation (28), or

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