

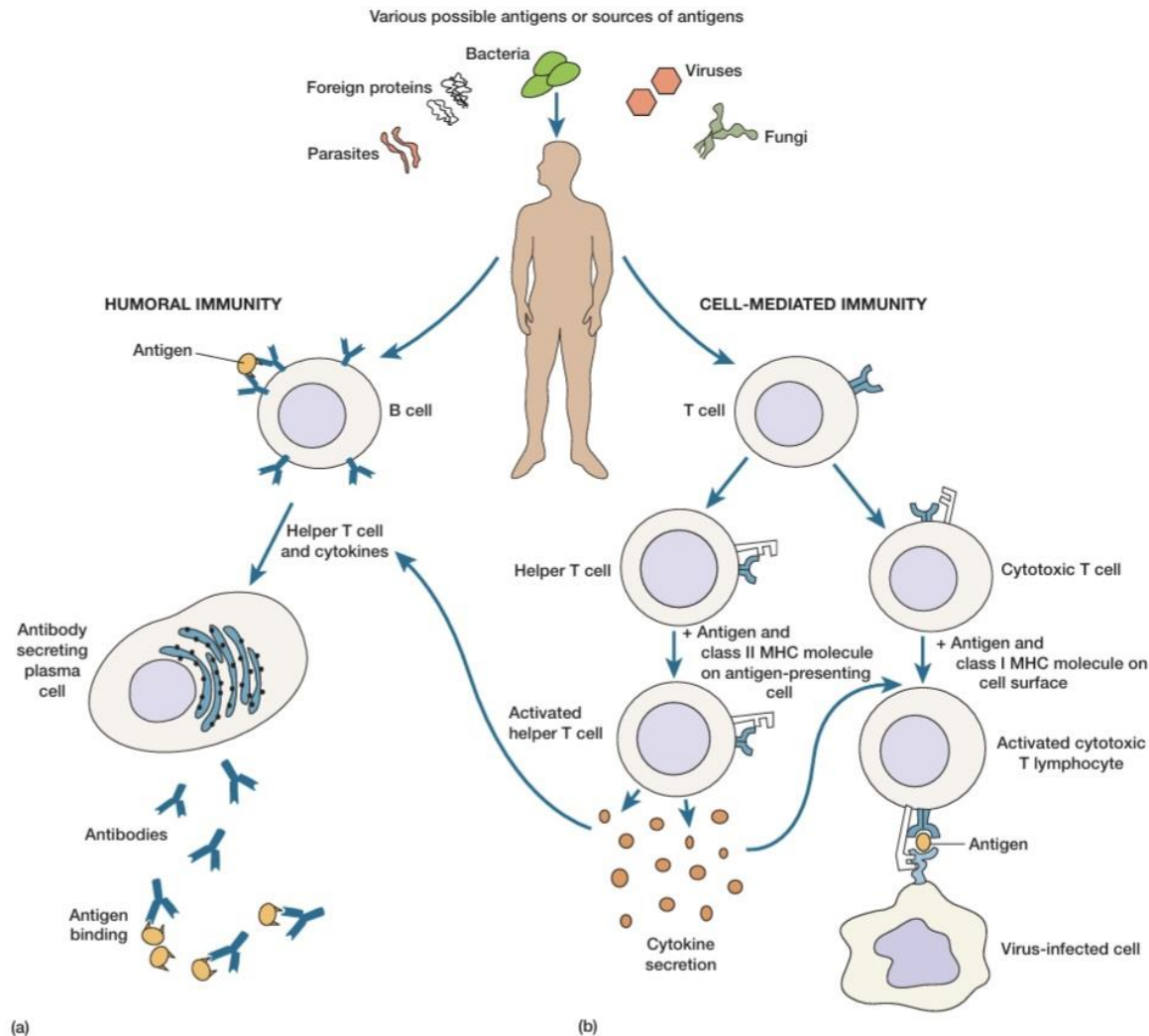


Figure 32.1 The Humoral and Cell-Mediated Branches of Immunity. (a) In the humoral branch, B cells interact with antigen and differentiate into antibody-secreting plasma cells. The antibody binds to the antigen and tags it for destruction by other mechanisms. (b) In the cell-mediated response, subpopulations of T cells are activated by antigen presented in the presence of a major histocompatibility complex (MHC). Activated helper T cells respond by producing a group of specific chemicals called cytokines that facilitate both the humoral and cell-mediated responses. Cytotoxic T cells respond to the antigen by developing into cytotoxic T lymphocytes that kill virus-infected cells and other altered cells. B cells and T cells also differentiate into memory cells (not shown) that are involved in subsequent responses.

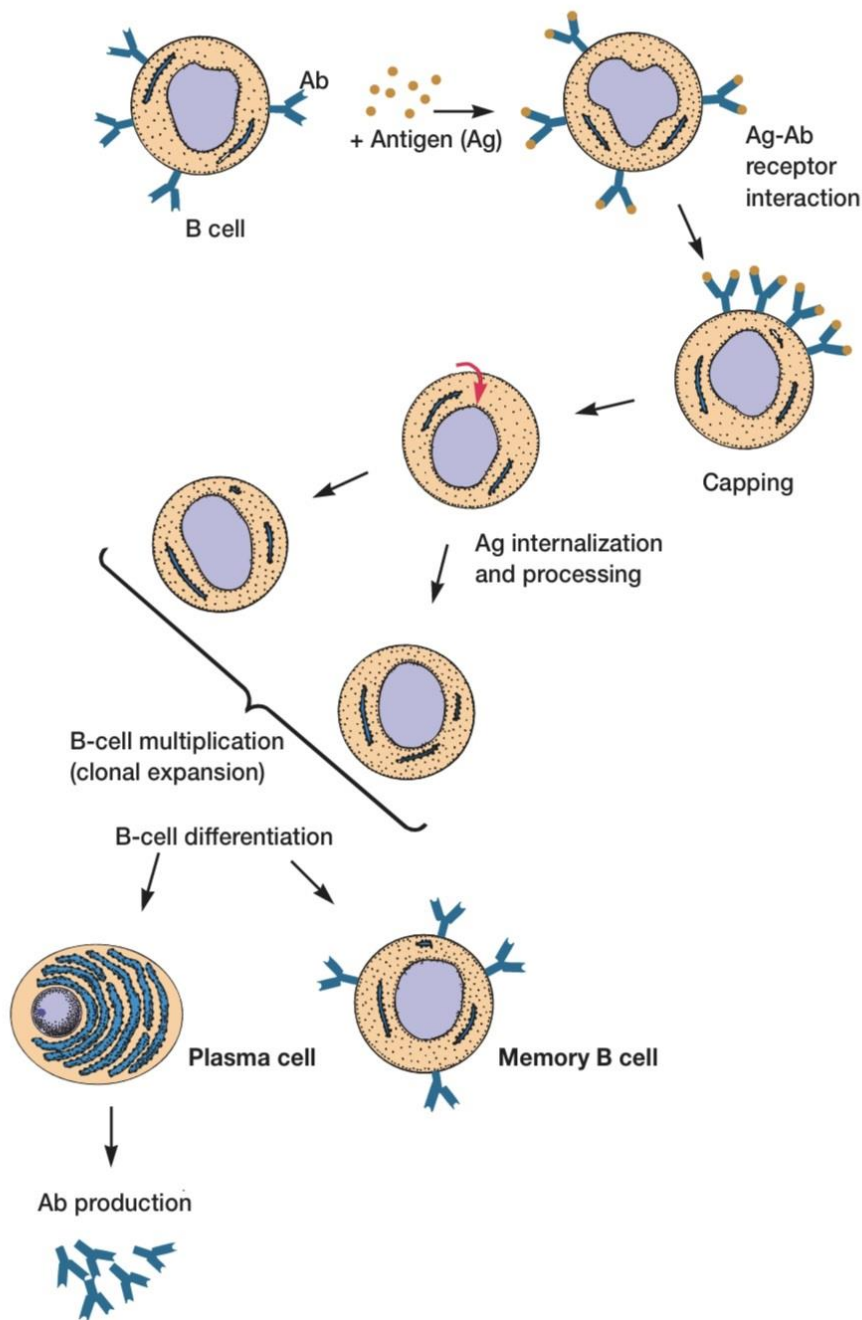
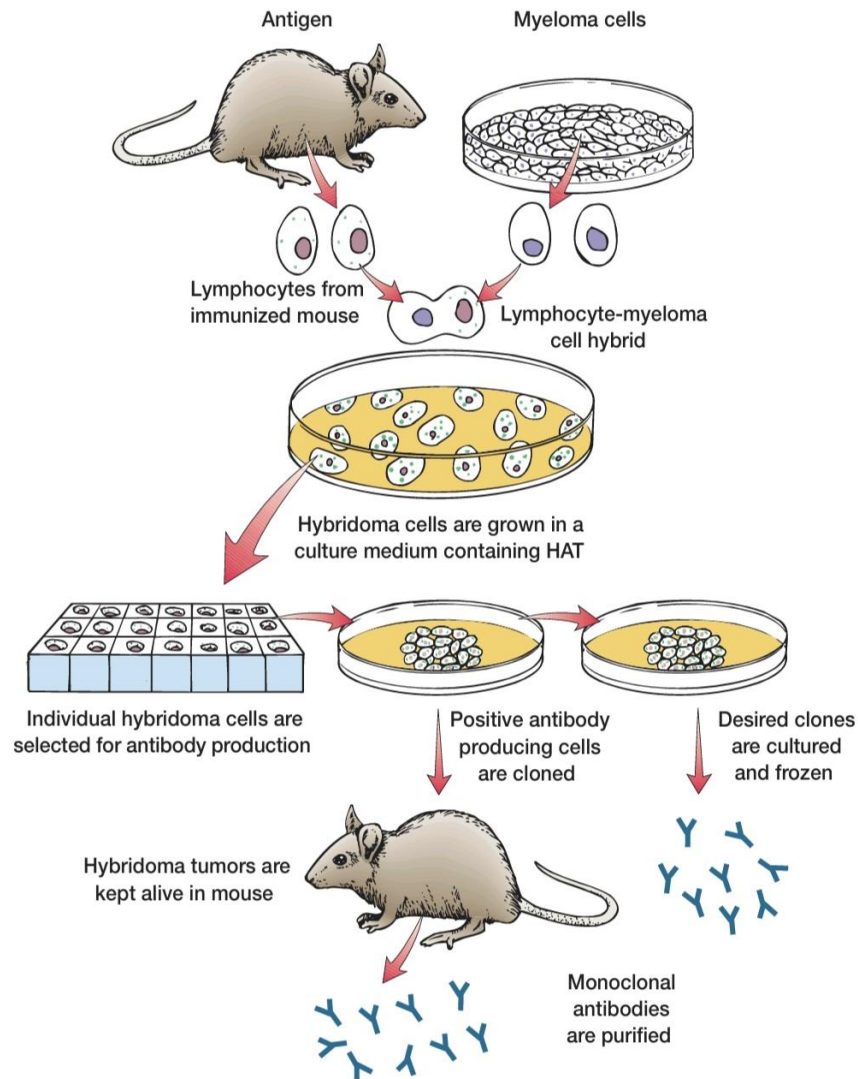


Figure 32.18 Clonal Selection. The immune system can respond specifically to a myriad of possible antigens, whether they are individual molecules or are attached to pathogens and abnormal cells such as cancer cells. B cells or B lymphocytes constantly roam the body, particularly the blood and lymphoid tissues. Each B cell synthesizes only one of the millions of possible antibodies and displays this antibody on its surface. When the antigen meets a B cell having a surface antibody of the proper specificity (top left), it complexes with the antibody and capping occurs. (Capping is the regional aggregation of antibodies on the surface of the cell following Ag-Ab interaction.) The antigen is then internalized; the B cell swells and begins to divide rapidly, producing a B-cell clone. The activated B-cell clone differentiates into plasma cells and memory cells. Plasma cells form the specific antibody that immediately attacks the antigen that provoked its formation. Memory B cells persist in the body and boost the immune system's readiness to eliminate the same antigen if it presents itself in the future. Most antibody responses also require signals from T helper cells (not shown).



32.19b). The affinity of the antibodies for the antigen's determinants is low to moderate during this primary antibody response.

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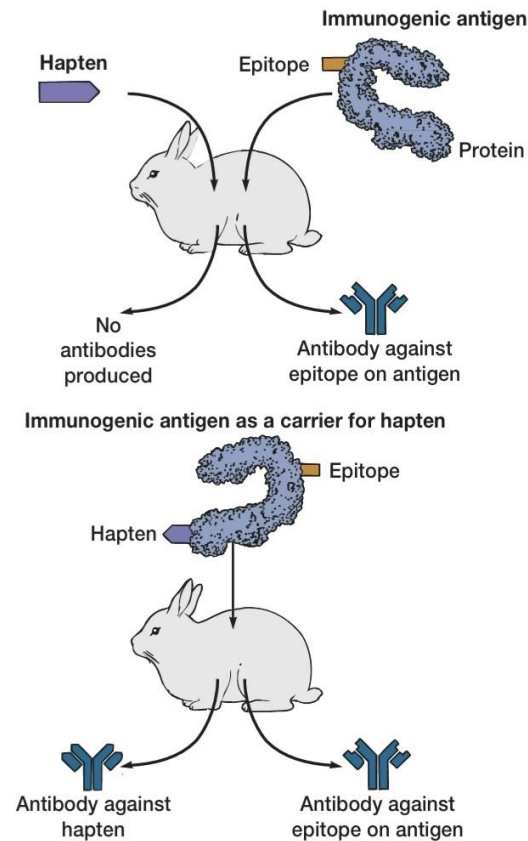


Figure 32.4 Effect of Carrier On Immunogenicity of Hapten.

Haptens, as small molecules, are incapable of inducing an immune response when presented alone. This is markedly different from what occurs when a more complex, immunogenic antigen is presented. In this instance antibody directed against the specific epitope(s) of that antigen can be produced. However, if hapten is linked to a large molecule (which is used as a carrier), the hapten may then be immunogenic. Under these conditions antibody is produced, not only against the epitope of the immunogenic carrier molecule but against the epitope of the hapten as well.