

## **B-CELL GENERATION, ACTIVATION, AND DIFFERENTIATION**

- I. B-Cell Maturation
  - A. Bone-Marrow Environment
  - B. Ig-Gene Rearrangements
  - C. Pre-B-Cell Receptor
  - D. Transcription-Factor Activity
  - E. Cell-Surface Markers
  - F. B-1 and B-2 Cells
  - G. Selection of Immature Self-Reactive B Cells
  - H. Negative Selection
  - I. Rescue by Editing of Light-Chain Genes
- II B-Cell Activation and Proliferation
  - A. Thymus-Dependent and Thymus-Independent Antigens
  - B. Origin of Activating Signals
  - C. Transduction of Activating Signals
  - D. B-Cell-Coreceptor Complex
  - E. Role of T<sub>H</sub> Cells in Humoral Responses
    - 1. Formation of T-B Conjugate
    - 2. Contact-Dependent Help Mediated by CD40/CD40L Interaction
    - 3. Signals Provided by T<sub>H</sub>-Cell Cytokines
  - F. Negative Selection of Mature Self-Reactive B Cells
- III. The Humoral Response
  - A. Primary and Secondary Responses
    - II The Humoral Response to Hapten-Carrier Conjugates and the Role of Helper T Cells
- IV *In Vivo* Sites for Induction of Humoral Response
- V. Germinal Centers and Antigen-Induced B-Cell Differentiation
  - A. Affinity Maturation
    - 1. The Role of Somatic Hypermutation
    - 2. The Role of Selection
  - B. Class Switching
  - C. Generation of Plasma Cells and Memory B Cells
- VI. Regulation of B-Cell Development
- VII. Regulation of the Immune Effector Response
  - A. Antigen-Mediated Regulation
  - B. Antibody-Mediated Suppression