Abbas: Cellular and Molecular Immunology, 9th Edition

Effector Mechanisms of Humoral Immunity

Test Bank

Matching

Questions 1-4
For each of the following descriptions in questions 1-4, select the Fc receptor (A-G) that best matches it.

A. FcγRI (CD64)
B. FcγRIIB (CD32)
C. FcγRIIIA (CD16)
D. FcεRI
E. FcεRII (CD23)
F. FcαR (CD89)
G. FcRn

1. High-affinity Ig receptor on mast cells important in immediate hypersensitivity reactions

ANS: D. FcεRI is a high affinity IgE receptor expressed on mast cells and basophils. Although serum IgE levels are relatively very low, FcεR1 receptors are fully occupied by IgE due to the high affinity of the receptor. Cross-linking of this receptor by allergen binding to the IgE leads to mast cell activation, which includes granule exocytosis with release of mediators such as histamine, as well as production of lipid mediators and cytokines.

2. High-affinity Ig receptor on macrophages and neutrophils important for phagocytosis and activation

ANS: A. FcγRI (CD64) is a high-affinity IgG1 and IgG3 receptor that mediates phagocytosis of opsonized organisms and delivers signals that enhance microbicidal activity of the phagocytes.

3. Low-affinity Ig receptor on natural killer cells that mediates antibody-dependent cell-mediated cytotoxicity

ANS: C. FcγRIIIA (CD16) is a low-affinity IgG receptor that targets natural killer (NK) cells to bind and destroy IgG-opsonized target cells and signals the NK cell to release cytotoxic granules.

4. Ig receptor on B cells that mediates feedback inhibition

ANS: B. FcγRIIB (CD32) is a low-affinity IgG receptor expressed on B lymphocytes. When antigen-IgG complexes simultaneously bind to membrane Ig and to FcγRIIB,

phosphatases activated by FcγRIIB block activating signals from the B cell antigen receptor complex.

Questions 5-9
For each of the functions described in questions 5-9, select the complement system protein (A-F) that best matches it.
A. C3b
B. iC3b
C. C3d
D. C5b
E. C5a

5. Generated by factor I–mediated proteolysis, this complement fragment binds to complement receptor 2 (CR2) on B cells and enhances B cell activation.

ANS: C. C3d is covalently bound to cell surface and is produced by sequential factor I–mediated proteolytic processing of C3. It binds to CR2 on B cells simultaneously with antigen binding to membrane Ig. CR2 is part of a coreceptor complex, which also includes CD19 and CD21. CD19 transduces signals that synergize with the B cell receptor complex signals to activate the B cell.

6. Generated by factor I–mediated proteolysis, this opsonizing complement fragment binds to CR3 on phagocytes.

ANS: B. iC3b is covalently bound to cell surfaces and is produced by sequential factor I-mediated proteolytic processing of C3. iC3b binds to CR3 and CR4, which are integrins expressed by phagocytes.

7. Produced by C3 convertases, this opsonin promotes phagocytosis of microbes.
ANS: A. C3b is the larger fragment of C3 convertase-mediated cleavage of C3, which becomes covalently bound to cell surfaces and is recognized by complement receptor 1 (CR1) on phagocytes.

8. This complement fragment is a chemoattractant for neutrophils.

ANS: E. C5a is a small soluble fragment generated by C5 convertase-mediated cleavage of C5. C5a binds to a G protein–coupled serpentine receptor on neutrophils and stimulates chemokinesis. The C5a receptor is also expressed on other cell types, and C5a has several proinflammatory functions, including mast cell and endothelial cell activation. C3a and C4a have similar biologic activities as C5a, but they are not as potent. Together, C5a, C4a, and C3a are called anaphylatoxins.

9. This complement fragment is a component of the membrane attack complex.
ANS: D. C5b is the larger fragment of C5 generated by C5 convertase. It is the initial component in the formation of the membrane attack complex, which includes C5, C6, C7, C8, and several C9s.

Multiple Choice

10. Which of the following anatomic regions is normally protected from pathogens only by humoral immune responses and not by cell-mediated immune responses?

A. Skin
B. Intestinal lumen
C. Intestinal epithelium
D. Central nervous system
E. Spleen

ANS: B. The lumen of mucosal lined tissues, such as the intestinal and bronchial lumen, are protected by IgA, which is actively secreted at these sites. T cells do not normally migrate into these lumen and are usually involved in immune responses to organisms that breach the surface linings of these structures. The epithelial linings of mucosal tissues and the skin do contain lymphocytes that protect against invading pathogens. Both antibodies and T cells are involved in responses to infections within most other tissues.