Welcome to the FIT Board Review Corner, prepared by Miriam Samstein, MD PhD, and Timothy Chan, MD, senior and junior Fellows-in-Training (FIT) representatives to the College’s Board of Regents. The FIT Board Review Corner is an opportunity to help hone your Board preparedness.

Review Questions
Allergy and Immunology Review Corner: Middleton’s Allergy Principles and Practice, 8th Edition N. Franklin Adkinson Jr., MD, Bruce S Bochner, MD, A Wesley Bruks, MD, William W Busse, MD, Stephen T Holgate, MD, DSc, FMedSci, Robert F Lemanske, Jr., MD and Robyn E O’Hehir, FRACP, PhD, FRCPPath

Chapter 15: Biology of Basophils
Prepared by: Diana Rangel, MD

1. Where do the basophils develop?
   a. Liver
   b. Thymus
   c. Fetal Liver
   d. Bone marrow

2. Which precursor cells differentiate into cells that morphologically and functionally resemble basophils?
   a. CD4+
   b. CD8+
   c. CD19+
   d. CD34+

3. Which of the following cytokines play a significant role in the survival and activation of mature basophils?
   a. IL-3
   b. IL-4
   c. IL-5
   d. IL-13

4. If there is an exposure to an allergen, the bone marrow activates and increases the production of the following cells:
   a. Basophils and eosinophils
   b. Basophils and mast cells
   c. B cells and eosinophils
   d. B cells and mast cells
5. Basophils have the ability to infiltrate into tissue sites. These “rolling” events are mediated through the expression of which of the following?
   a. L-selectin (CD62L)
   b. β1- and β2-integrin
   c. β1-integrin very late antigen (VLA)-4
   d. Intracellular adhesion molecules (ICAMs)

6. Which of the following cytokines inhibits the priming effects that IL-3 has on basophil function?
   a. TNF
   b. IFN-γ
   c. IFN-β
   d. GM-CSF

7. How do basophils provide signals for B cells to produce IgE?
   a. Expressing CD63 and secreting IL-4 and IL-13
   b. Expressing CD32 and secreting IL-4 and IL-13
   c. Expressing CD40L and secreting IL-4 and IL-13
   d. Expressing CD203c and secreting IL-4 and IL-13

8. Which of the following markers has been used as a means for determining basophil activation?
   a. CD63 and CD203c
   b. CD117 and CD32
   c. CD40L and CD23
   d. CD11c/CD18

9. Which of the following basophil receptors is associated with innate immunity?
   a. CCR3
   b. IL-1 like receptor
   c. Toll-like receptors
   d. Receptors for prostacyclin

10. Mast cells and basophils differ with respect to the mediators they release. Which of the following is not secreted by basophils on FcεRI-mediated activation?
    a. Histamine
    b. PGD2
    c. LTC4
    d. IL-3
Answers:
1. D. Page 252. Like all granulocytes, basophils are of myeloid origin, developing from pluripotent stem cell precursors found in the bone marrow.

2. D. Page 252. CD34+ precursor cells, when cultured in the presence of IL-3, differentiate into cells that morphologically and functionally resemble basophils.

3. A. Page 252. IL-3 plays a significant role in the survival and activation of mature basophils. This is a functional consequence of these cells’ retaining the expression of IL-3 receptors (CD123) at remarkably high levels.

4. A. Page 253. The frequencies of these precursor cells are increased in asthmatics and in subjects who have undergone experimental allergen provocation, suggesting a positive feedback mechanism by which exposure to allergen results in bone marrow activation and increased production of both basophils and eosinophils.

5. A. Page 253. As with other leukocytes, the initial steps of basophil attachment to endothelium occurs during “rolling” events, in which selectins play a critical role. This is mediated through the expression of L-selectin (CD62L), which attaches to the ligands CD34 and MAdCAM-1.

6. C. Page 254. Basophils express the major receptor (IFNαR1) that binds these cytokines, and both IFN-α and IFN-β inhibit the priming effects that IL-3 has on basophil function.

7. C. Page 254. By expressing CD40L and secreting IL-4 and IL-13, basophils have the potential to provide the two necessary signals for B cells to produce IgE.

8. A. Page 254. In recent years, the increased surface expression of CD63 and CD203c has been widely used as a means for determining basophil activation.

9. C. Page 255. Basophils have recently been found to express two additional types of innate immunity-associated receptors: (1) Toll-like receptors (e.g., TLR1, -2, -4, -6, -9), which bind a variety of microbial products, and (2) leukocyte immunoglobulin-like receptors (e.g., LIR3, -7), for which the natural ligands have not yet been identified.

10. B. Page 260. Ultimately, in vitro studies showed that mast cells and basophils differ with respect to the mediators they release and the way in which they respond to various stimuli. For example, mast cells secrete PGD2 on FcεRI-mediated activation, whereas basophils do not.