READING GUIDE

PART 3: PHOSPHOLIPID, GLYCOSPHINGOLIPID, AND EICOSANOID METABOLISM

Objectives

1. Describe the structure, synthesis, and degradation of phospholipids and explain their importance in biological functions
2. Describe the structure, synthesis, and degradation of sphingolipids and explain their importance in biological functions
3. Describe the synthesis of prostaglandins, thromboxanes, and leukotrienes and explain their importance in biological functions

Phospholipid, Glycosphingolipid, and Eicosanoid Metabolism are covered in Chapter 17.

PHOSPHOLIPIDS

What is a glycerophospholipid? Be able to identify the five Glycerophospholipids. (Figure 17.1) What is cardiolipin? (Fig. 17.2) What are plasmalogens? What is platelet-activating factor (PAF)? (Fig. 17.3) What is sphingomyelin? (Fig. 17.4)

PHOSPHOLIPID SYNTHESIS

How are phospholipids synthesized (including phosphatidic acid, phosphatidylethanolamine, and phosphatidyl choline)? (Fig. 17.5 and 17.6) Why is choline reutilized? What is surfactant and why is it important? How does this relate to "respiratory distress syndrome?" There is a special mechanism for producing PC in the liver form phosphatidyl serine, what is it? (Fig. 17.6)

What is phosphatidyl serine? What is phosphatidylinositol and how does it relate to cell signaling? How does PI relate to membrane protein anchoring? (Fig. 17.8)

How is sphingomyelin made, why is it important? How does phosphatidylglycerol relate to cardiolipin?

PHOSPHOLIPID DEGRADATION

There are four different phospholipases. What are they and where do they cut? (Fig. 17.11) Where are they present? How are sphingomyelin and phosphoglycerides degraded? How is Niemann-Pick disease related to sphingomyelin degradation? (Fig. 17.12)

GLYCOSPHINGOLIPIDS

Be sure to understand how ceramide, glucose, galactose, and N-acetylgalactosamine are important in glycosphingolipids. (Fig. 17.14, 17.15 and 17.18) How do these macromolecules relate to neutral glycosphingolipids?

What is a ganglioside? Where are they found? What is a sulfatide, and where are they found?

Understand the general synthesis and degradation of glycosphingolipids. Why is sulfotransferase used? How do you make sphingomyelin, sulfatide, glucocerebroside and ganglioside from ceramide? (Fig. 17.8)

What is sphingolipidosis? Tay-sachs disease? Gaucher disease? Metachromatic leukodystrophy? Krabbe disease? Sandhoff disease? Fabry disease? Farber disease? All of these diseases are related to sphingolipids. Have a good understanding of where in the degradation pathways there are problems for each one. (Fig. 17.20)

PROSTAGLANDINS, THROMBOXANES, AND LEUKOTRIENES

What are eicosanoids, prostaglandins, and thromboxanes? Why are they important? How are they synthesized? How is PGH_2 made? What is COX-1 and COX-2? (Fig. 17.22)

How can prostaglandins be inhibited? (Fig. 17.23) What are leukotrienes? How are they made?

Why are thromboxanes important in platelet homeostasis? (Fig. 17.24) What is prostacyclin?