WASHINGTON STATE UNIVERSITY
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READING GUIDE

PART 4: CHOLESTEROL AND STEROID METABOLISM

Objectives

1. Describe the structure, synthesis, and degradation of cholesterol and the control of these processes
2. Describe the synthesis and function of bile acids and bile salts
3. Describe the metabolism of chylomicrons, VLDL, LDL, HDL, and explain how these lipoproteins impact health
4. Describe how steroids are synthesized and utilized by the body

Cholesterol and Steroid Metabolism is covered in Chapter 18.

CHOLESTEROL: STRUCTURE, SYNTHESIS, AND DEGRADATION

What is cholesterol? (Fig. 18.2) Where is it synthesized? What are sterols and cholesteryl esters? (Fig. 18.2)

How is cholesterol made? What is HMGCoA? (Fig. 18.3) What is mevalonate and why is it important during the synthesis of cholesterol? (Fig. 18.4) Be able to identify how the following are important in cholesterol synthesis: IPP, DPP, GPP, FPP, squalene, lanosterol, and cholesterol. What enzymes are important? (Fig. 18.5)

How is cholesterol synthesis regulated? Gene expression? Sterol-accelerated enzyme degradation? Phosphorylation/dephosphorylation? Hormonal regulation? (Fig. 18.6)

BILE ACIDS AND BILE SALTS

What are bile acids? (Fig. 18.8) Bile salts? (Fig. 18.9) How are they synthesized? How are they circulated from the liver? (Fig. 18.11) What is Cholelithiasis? Why does it occur? What are the outcomes? Is there a treatment available?

PLASMA LIPOPROTEINS

What are plasma lipoproteins? What are VLDLs? What are LDLs? What are HDLs? What are chylomicrons? How are these different lipoproteins different? How are they similar? What are apolipoproteins and how do they relate? (Fig. 18.13, 18.14, and 18.15)

Explain the metabolism of chylomicrons; including the synthesis, assembly, modification, and the degradation of TAGs by lipoprotein lipase and its regulation. (Fig. 18.16)

Be able to explain the metabolism of VLDL; including the release, modification and production of LDL. (Fig. 18.17)

Be able to explain the metabolism of LDL. How does it fit into endocytosis (and why is this important)? Be able to explain this endocytosis and why it is important. How do macrophages take up LDL? (Fig. 18.22)

Be able to explain the metabolism of HDL. How does it relate to apolipoproteins? How does it uptake unesterified cholesterol? How does it esterify cholesterol? (Figure 18.23) What is its role in cholesterol transport?

What is the role of lipoprotein (a) in heart disease?

Identify the following: apoA-I, Lipoprotein lipase (LPL), apoB-48, apoB-100, apoE, LCAT, ACAT.

STEROID HORMONES

How are steroid hormones synthesized? (Fig. 18.25) How are they secreted from the adrenal gland? What are the different types of adrenal cortical steroid hormones? How are hormones secreted from the gonads? (Fig. 18.27) What is the mechanism of action of steroid hormones? (Fig. 18.28)