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Lipoproteins

Thursday, January 17, 2008

10:00 AM

4. Be familiar with the general structure of lipoproteins.
 - a. Neutral lipid core
 - b. Single layer of phospholipid membrane
 - c. Apoproteins in membrane
 - d. Cholesterol in membrane
5. Know the characteristics of lipoproteins and the function of the apoproteins.
 - a. Chylomicrons - least dense, least protein, most triglyceride content, largest size, ApoB-48, ApoC-II
 - b. VLDL - ApoC-II
 - c. IDL - ApoC-II
 - d. LDL - ApoB-100
 - e. HDL - most dense, most protein, least triglyceride content, smallest size, ApoA-I, ApoC-II
6. Know the source and function of the different lipoproteins.
 - a. Chylomicrons - carry fat from intestines to liver and to adipose tissue
 - b. VLDL - carry newly synthesized triglycerides from liver to adipose
 - c. IDL - ?
 - d. LDL - carry cholesterol from liver to cells of body
 - e. HDL - collect cholesterol from body tissue to liver
7. Know the pathways involved in the transport of triglycerides and cholesterol by lipoproteins.
 - a. Small intestine cells absorb lipid from diet
 - b. Assembled w/ B-48 into chylomicrons
 - c. Chylomicrons travel in bloodstream
 - d. Lipoprotein lipase liberates free fatty acids to adipose and muscle
 - e. Remnants get to liver and interact w/ remnant receptor
 - f. Remnants hydrolyzed
 - g. Liver reassembles triglycerides into VLDLs w/ ApoB-100
 - h. VLDLs can undergo lipoprotein lipase rxn
 - i. VLDL remnants (IDLs) hydrolyzed to LDLs
 - j. LDL binds to target tissue via LDL receptors
 - k. LDLs hydrolyzed in tissue to HDLs
8. Understand the lipoprotein lipase reaction.
 - a. Lipoprotein lipase sits on cell membranes
 - b. When it interacts w/ ApoC-II (required), it hydrolyzes the triglyceride (1 and 3 FA) to 2 FA + 1 monoglyceride
 - c. The monoglyceride is then further hydrolyzed to a FA and glycerol molecule
9. Know the sequence of events involved in the uptake of LDL and the release of cholesterol.
 - a. ApoB-100 in LDL binds to LDL receptors
 - b. Receptor mediated endocytosis w/ coated pit
 - c. LDL receptors recycled
 - d. Lysosome forms; cholesterol and amino acids released
 - e. Increase in cholesterol increases synthesis of ACAT
 - f. Increase in cholesterol decreases HMG-CoA reductase synthesis and LDL receptor synthesis
10. Know the mechanism for the feedback regulation by cholesterol.
 - a. See above
11. Know the function of HDL.
 - a. HDL takes cholesterol off tissues
 - b. LCAT esterifies the cholesterol w/ phosphatidylcholine (abundant in HDL)
 - c. The cholesterol ester is then either sent to the liver to be excreted as bile or transferred to other lipoproteins to eventually end up in the liver

- d. HDL is the good cholesterol because of this function
12. Know the LCAT reaction.
- a. Lecithin-Cholesterol Acyltransferase
 - b. Takes the FA2 off phosphatidylcholine and transfers it to the 1-OH on cholesterol
 - c. Creates the cholesterol ester
 - d. Requires ApoA-I for the reaction
13. Know the general pathway for the synthesis of bile acids and how the synthesis is regulated.
- a. 7-alpha-hydroxylase is rate limiting enzyme
 - i. Found only in liver
 - ii. Induced by glucocorticoids, thyroid hormone and cholesterol
 - b. Products are taurine and glycine