**LIPOPROTEIN METABOLISM**

Problem

What are lipids?

If so, how are these water insoluble molecules transported from one tissue to other through an aqueous environment?

Mark the hydrophobic and hydrophilic parts on these molecules

**Phospholipid**

**Proteins have both hydrophobic and hydrophilic regions**

Composition of aminoacids

Proteins are absolutely essential for forming the LP particles

**Lipoproteins**

Core of TG and CE

Surface of phospholipids and some cholesterol

Apolipoproteins (regulators of LP metabolism)

CM, VLDL, IDL, LDL, HDL

**Lipid metabolism occurs in three major areas**

Intestine

Liver

Extrahepatic tissues (Muscle and adipose tissue)

**Enzymatic hydrolysis of TAG yields fatty acids and diacylglycerol, monoacylglycerol and free glycerol**

**Chylomicron assembly**

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Assembled in enterocyte Golgi/ER

Apolipoprotein (Apo) B organizes assembly

 B48

Requires

 Phospholipids for surface

**Chylomicron Assembly**

2 forms of apo B

* B100, large- liver
* B48, smaller – intestine

Picks up apo A,C and E in plasma

TG composition closely resembles dietary intake

Chylomicrons are released from the intestine into the *lymphatics,* bypassing the liver

**Questions**

What are the lipids carried by CM?

Where is CM formed?

What is the source for lipids in CM?

How does the CM release FFA?

What is the fate of the FFA and Glycerol?

Where is the LPL found?

What are the components of Remnant CM?

VLDL Assembly

**Endogenous Lipid Transport**

**This animation shows how VLDL are metabolised once they enter the circulation from the liver**

**LPL “Metabolic Gatekeeper”?**

**LPL deficiency (chylomicronaemia)**

 **Massive accumulation of chylomicron -TG in plasma**

 **Cannot clear TG normally**

 **Normal fat storage and body weight ???!?!?**

Regulation of Lipoprotein Lipase

**QUESTIONS**

Where is VLDL formed?

What are the lipids Carried by VLDL?

Which lipid is delivered by VLDL?

What is the mechanism of FFA release from VLDL?

What is the fate of Remnant VLDL?

What are the lipids present in excess when VLDL becomes VLDLR?

**Nobel Prize 1985**

**Endogenous Lipid Transport**

Function of LDL receptor

Endocytosis of LDL and other LP

Release free cholesterol into liver

* Incorporate into plasma membrane
* Inhibit new LDL receptors
* Inhibit cholesterol synthesis
* Promote ACAT activity (FC -> CE)

• Regulated by SREBP

 monitors free cholesterol

**Cholesterol uptake down regulates the cells own production of cholesterol and down regulates LDL receptor synthesis**

**Questions**

How is LDL formed?

What is IDL?

What is HTGL?

How is CE transferred from HDL to IDL?

What is CETP?

**HYPERLIPIDEMIA**

**Effect of Exercise**

Increases LPL activity in muscle.

Reduces TGL from the particle.

Reduction in weight

Increases HDL

Effect of diet

Vegetarian diet – Cholesterol intake less

Reduced Carbohydrate – VLDL TG Reduced

Reduced Fat – Reduces CM TG

Unsaturated fats ( Mono and Poly)- Reduction in Plasma cholesterol

Fiber – decreases cholesterol absorption

 **Postprandial Changes in Plasma Lipid Metabolism**