

Triacylglycerol Estimation

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Introduction

Various types of lipids occur in the human body:

- Triacylglycerol
- Cholesterol
- Polar lipids: Phospholipids and sphingolipids

Introduction

- Triacylglycerol is essentially confined to fat tissue, which stores and releases it, and to the cells in the intestine and the liver that synthesize and degrade it
- Triacylglycerol is the most abundant lipid species, and the only one with an important role in energy metabolism.

Introduction

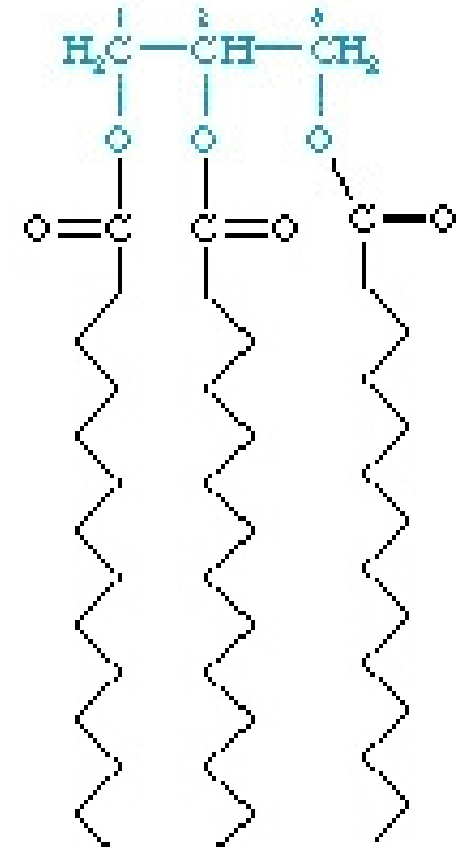
Triacylglycerol is important in human metabolism in two functions:

- As a foodstuff. A significant fraction of our caloric intake is triacylglycerol.
- As an endogenous storage of metabolic energy. This storage can be replenished from dietary fat, or by endogenous synthesis of fat from carbohydrates or proteins.

Triacylglycerol Structure

Triacylglycerol are composed of two types of molecules:

- Glycerol (a 3 carbon molecule)
- Fatty acids which attach to the glycerol at the alcohol unit



Sources of Triacylglycerols

Triacylglycerols are derived from three primary sources:

(1) the diet;

(2) *de novo* biosynthesis, particularly in liver

(3) storage depots in adipocytes.

Whatever their source, these lipids must eventually be transported in blood

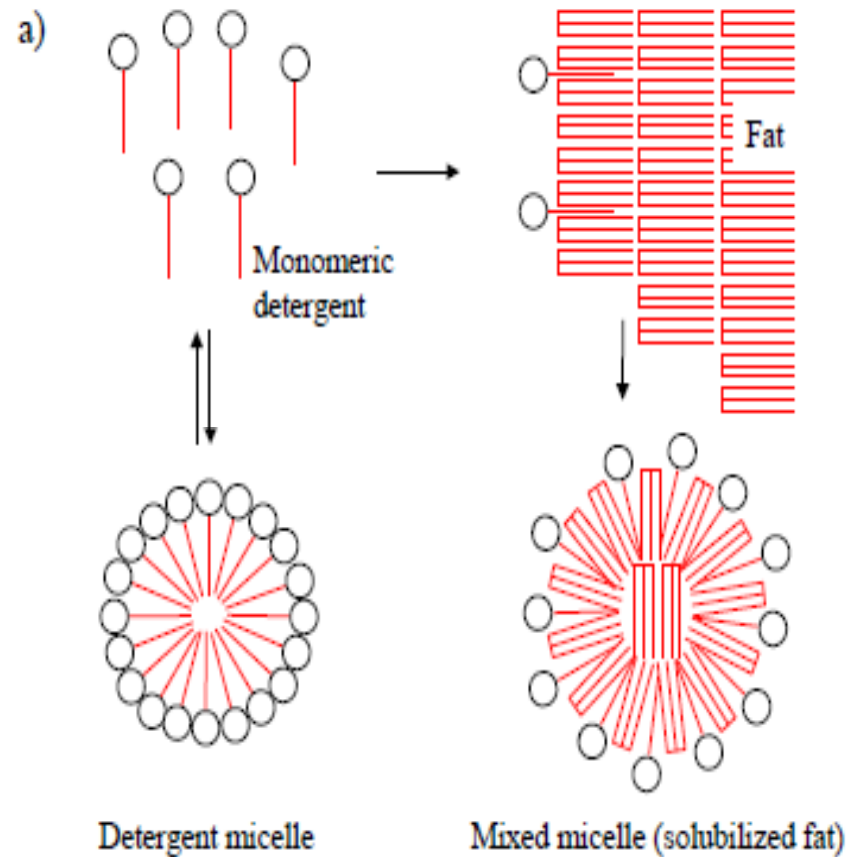
Digestion of triacylglycerol

Digestion of triacylglycerol depends on two components:

1. Bile acids.
2. Lipase.

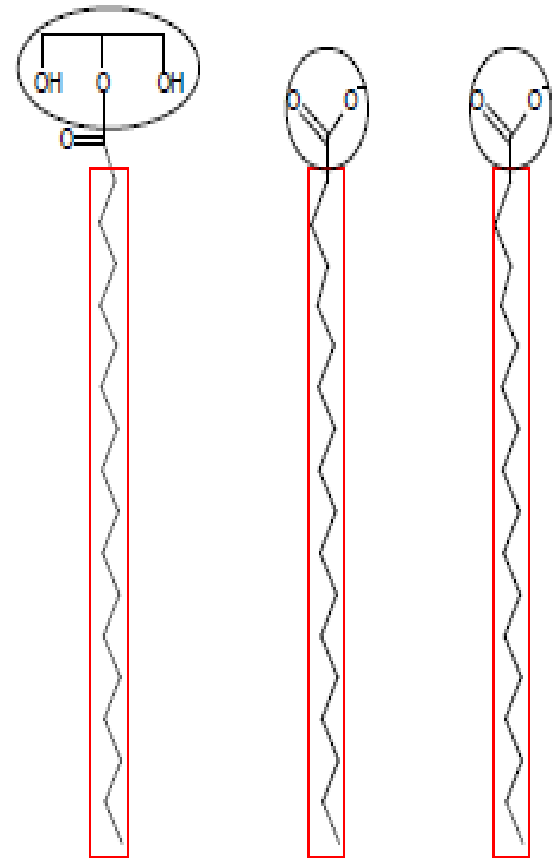
Bile acids

- These molecules use their hydrophilic and hydrophobic regions to emulsify the lipid so they can be acted on by the pancreatic lipases



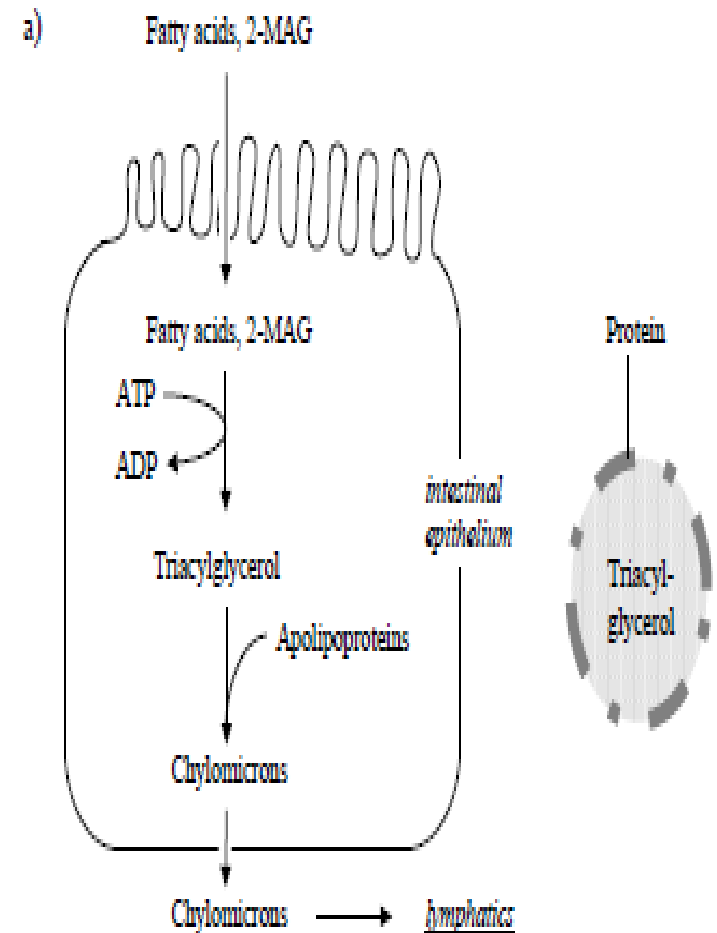
Lipase.

- This enzyme is an esterase that is secreted by the pancreas and hydrolyses triacylglycerol to 2-monoacylglycerol and two molecules of free fatty acids



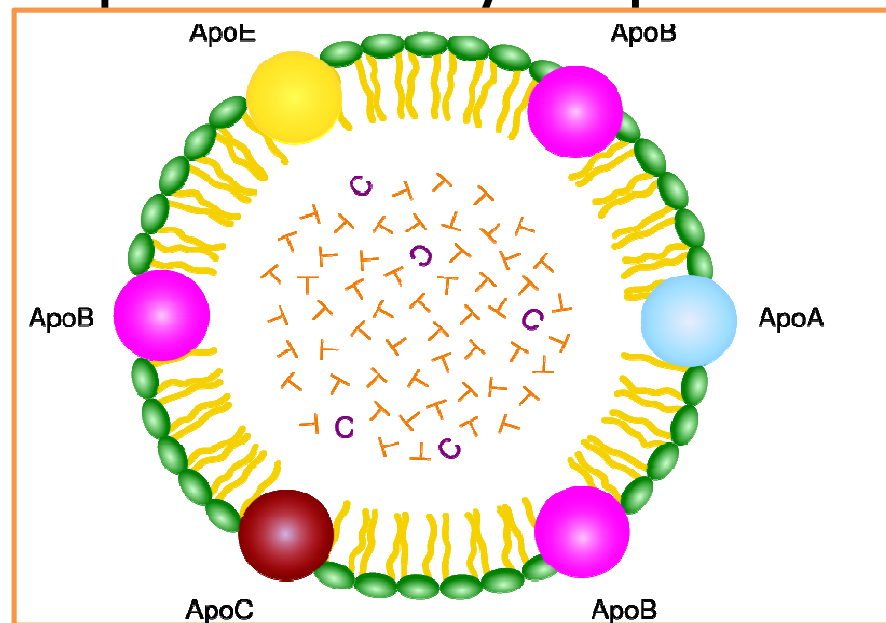
Formation of chylomicrons

- The fatty acids and monoacylglycerol are converted back to triacylglycerol directly within the intestinal epithelial cell.
- The newly formed fat is then combined with protein molecules called *apolipoproteins* into *lipoprotein particles*,



Formation of chylomicrons

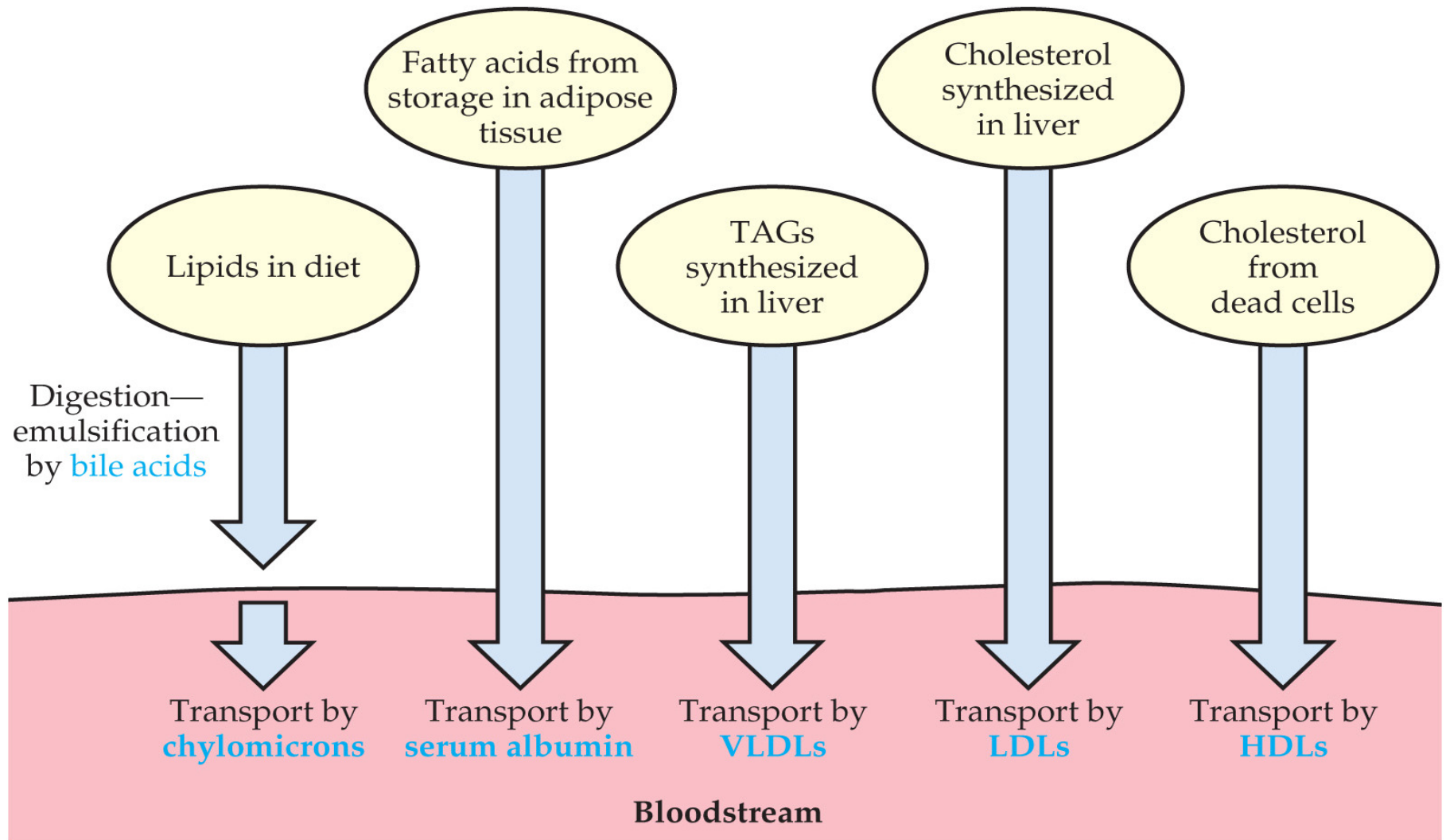
- The proteins provide a hydrophilic shell around the lipid core.
- Some phospholipids are present as well and complete the hydrophilic shell.

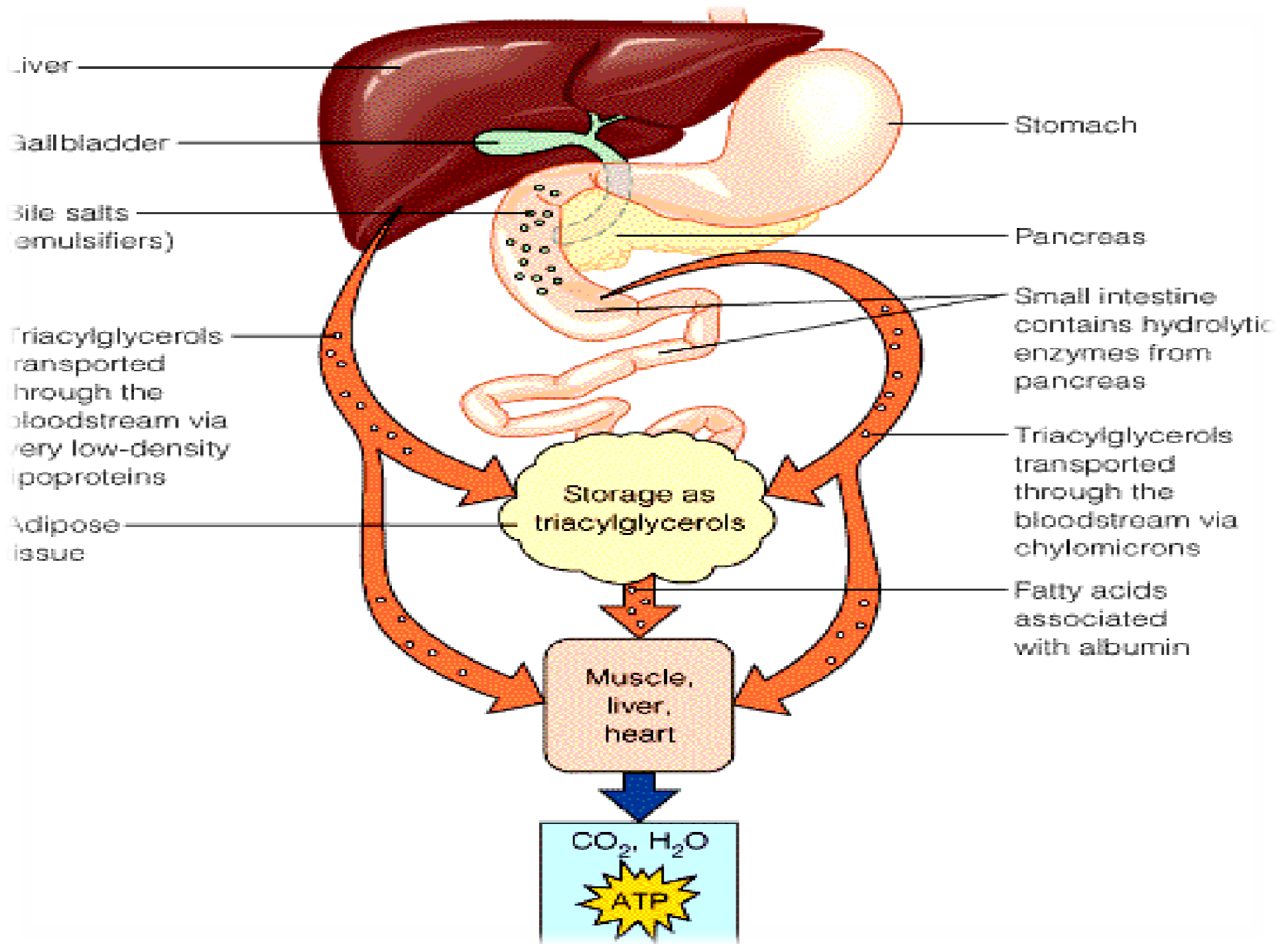


Utilization of chylomicrons

- The triacylglycerol contained in the chylomicrons can be utilized in various ways:
 1. It can be stored in fat cells
 2. it can be utilized directly for the purpose of ATP production by muscle cells and other tissues.

Fat Transport





Triglycerides level:

The National Cholesterol Education Program guidelines for triglycerides are:

Normal	40- 150 mg/dL
Borderline-high	150 to 199 mg/dL
High	200 to 499 mg/dL
Very high	500 mg/dL or higher

These are based on fasting plasma triglyceride levels.

Causes high triglycerides

Hyper triglycerides may be due to genetically disorder, abnormal dietary intake and it can be due to any diseases in which lipid metabolism is affected such as:

- Obesity.
- Poorly controlled diabetes.
- An underactive thyroid (hypothyroidism).
- Kidney disease.

Causes high triglycerides

Conditions that also may cause high triglycerides include

- Regularly eating more calories than you burn.
- Drinking a lot of alcohol.

Certain medicines may also raise triglycerides.
These medicines include:

- Tamoxifen.
- Steroids.
- Estrogen.
- Birth control pills.

Material and methods

- A kit will be used in this experiment and its manual will be followed

Question

- Why is the triglyceride level higher in plasma than in serum
- How would the state of nutrition and general metabolic state of a person affect the serum triglyceride level ?