Dr.Reem.S.Naim.

Lect.3.

**Triglycerides**: (GPO-PAP)

### What are triglycerides

Triglycerides are a type of fat, They are the most common type of fat in your body. They come from foods, especially butter, oils, and other fats you eat.

Triglycerides also come from extra calories. These are the calories that you eat, but your body does not need right away. Your body changes these extra calories into triglycerides and stores them in fat cells. When your body needs energy, it releases the triglycerides. Your VLDL cholesterol particles carry the triglycerides to your tissues.

## Lect.3. Second stage Bio Chemistry Dr. Laboratory Reem.S.Najm.



#### Lect.3.

#### What causes high triglycerides?

#### Factors that can raise your triglyceride level include

- Regularly eating more calories than you burn off, especially if you eat a lot of sugar
- Being overweight or having obesity
- Cigarette smoking
- Excessive alcohol use
- Certain medicines
- Some genetic disorders
- Thyroid diseases
- Poorly controlled type 2 diabetes
- Liver or kidney diseases

### How are high triglycerides diagnosed?

There is a blood test that measures your triglycerides, along with your cholesterol. Triglyceride levels are measured in milligrams per deciliter (mg/dL). The guidelines for triglyceride levels are Levels above 150mg/dl may raise your risk for heart disease. A triglyceride level of 150 mg/dL or higher is also a risk factor for metabolic syndrome.

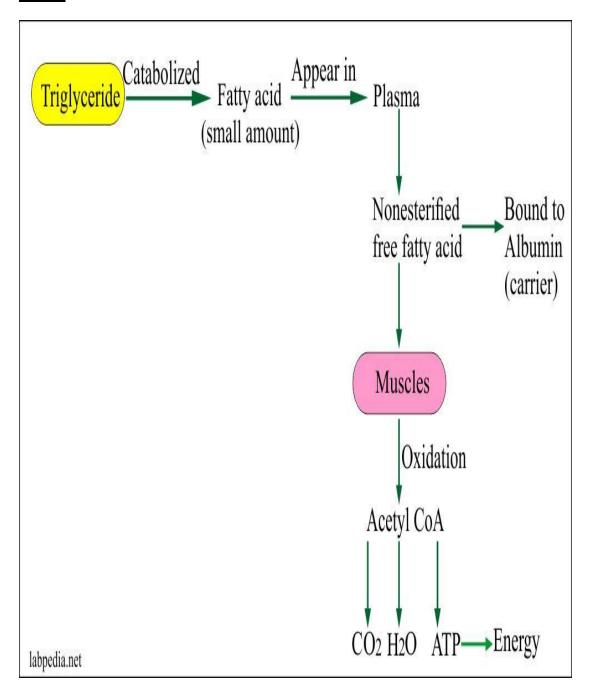


Lect.3. Second stage . Bio Chemistry Laboratory



Dr. Reem.S.Najm.

#### Lect.3.





Lect.3.

### **PRINCIPLE:**

The trigly cerides are enzymatically hydrolyzed to glycerol according to the following reactions .

Lipoprotein Lipase(catalyst )
Triglycerides → Glycerol + Fatty acids
Glycerol kinase Mg <sup>++</sup> ( catalyst )
Glycerol+ ATP→ Glycerol-3-phophate +ADP
3-Glycerol phosphate oxidase (catalyst)
Glycerol-3-P+ $O_2 \rightarrow Dihydroxyacetone$ -P+ $H_2O_2$
peroxydase(catalyst)
$H_2O_2 + 4-A$ aminophenazone + P-chloro phenol $\rightarrow H2O2+$
Quinonimi
esis (o

### Lect.3. Second stage. Bio Chemistry Laboratory



Dr.Reem.S.Najm.

Lect.3.

#### **ASSAY PROCEDURE**

Wavelength	505nm (490-550)
Cuvette	1cm.light path .
Temperature	<b>9</b> 1

Sample Blank Standard 10ml \_ **Standard** Sample **10ml** Work reagent 1ml 1ml 1ml

### **CALCULATIONS**

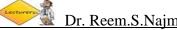
conc. = O.D Sample  $\setminus$  O.D Standard x n

**Mg\dl** :n=200

 $g \mid l : n = 2$ 

gu: n= 2 mmol\l: n=2.28

# Lect.3. Second stage Bio Chemistry Laboratory Dr. Reem.S.Najm



	Lipid Profile	
Test	Result	Reference Range
S. Cholesterol		100 - 230 mg/dl
	410	45 - 180 mg/dl
S. Triglycerides	410	20 - 60 mg/dl
S. HDL		40 - 130 mg/dl
S.LDL		10 - 30 mg/dl
S. VLDL		10 30
1	Lipid Profile	ı
Test	Result	Reference Range
S. Cholesterol		100 – 230 mg/dl
S. Triglycerides	39	45 – 180 mg/dl
S. HDL		20 – 60 mg/dl 40 – 130 mg/dl
S. VLDL		10 - 30 mg/dl
	Lipid Profile	
Test	Result	Reference Range
S. Cholesterol	1103	100 - 230 mg/dl
S. Triglycerides S. HDL S.LDL		20 - 60 mg/dl 40 - 130 mg/dl
S. VLDL		10 – 30 mg/dl
	Lipid Profile	
Test	Result	Reference Range
S. Cholesterol		100 - 230 mg/dl
S. Triglycerides	170	45 – 180 mg/dl
S. HDL S.LDL		20 – 60 mg/dl 40 – 130 mg/dl
S. VLDL		10 – 30 mg/dl
	Lipid Profile	
Test		
S. Cholesterol	Result	Reference Range 100 – 230 mg/dl
S. Triglycerides	209	45 – 180 mg/dl
S. HDL		
S. HDL S.LDL S. VLDL		40 – 130 mg/dl
S.LDL	Lipid Profile	40 - 130 mg/dl
S.LDL S. VLDL	Lipid Profile  Result	40 – 130 mg/dl 10 – 30 mg/dl Reference Range
S.LDL S. VLDL Test S. Cholesterol	Result	40 – 130 mg/dl 10 – 30 mg/dl Reference Range 100 – 230 mg/dl
S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides		40 – 130 mg/dl 10 – 30 mg/dl Reference Range 100 – 230 mg/dl 45 – 180 mg/dl
S.LDL S. VLDL Test S. Cholesterol	Result	40 – 130 mg/di 10 – 30 mg/di Reference Range 100 – 230 mg/di
S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL	Result 345	Reference Range 10 – 30 mg/dl Reference Range 100 – 230 mg/dl 45 – 180 mg/dl 20 – 60 mg/dl
S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S.LDL	Result 345 Lipid Profile	Reference Range 10 – 30 mg/dl 10 – 30 mg/dl 20 – 230 mg/dl 20 – 60 mg/dl 40 – 130 mg/dl 10 – 30 mg/dl
S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S.LDL S. VLDL	Result 345	Reference Range 10 – 30 mg/dl 10 – 230 mg/dl 45 – 180 mg/dl 20 – 60 mg/dl 40 – 130 mg/dl 10 – 30 mg/dl
S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides	Result 345 Lipid Profile	Reference Range 10 – 30 mg/dl 45 – 180 mg/dl 45 – 180 mg/dl 40 – 130 mg/dl 10 – 30 mg/dl 10 – 30 mg/dl 10 – 30 mg/dl 10 – 30 mg/dl
S.LDL S. VLDL  Test S. Cholesterol S. HDL S. VLDL  Test S. Cholesterol S. Triglycerides S. Triglycerides S. HDL	Result  345  Lipid Profile  Result	Reference Range 100 - 230 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 20 - 60 mg/dl 20 - 60 mg/dl 45 - 180 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl
S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. Cholesterol S. Triglycerides S. HDL S. HDL	Result  345  Lipid Profile  Result	Reference Range 100 - 230 mg/di 45 - 180 mg/di 20 - 60 mg/di 40 - 130 mg/di 10 - 30 mg/di 10 - 30 mg/di 20 - 60 mg/di 45 - 180 mg/di 45 - 180 mg/di 40 - 130 mg/di 20 - 60 mg/di 40 - 130 mg/di
S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  S. Cholesterol S. Triglycerides S. HDL S. Cholesterol S. Triglycerides S. HDL S. VLDL	Result  345  Lipid Profile  Result	Reference Range 100 - 230 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 20 - 60 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl
S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  S. VLDL  S. Cholesterol S. Triglycerides S. HDL S. LDL S. HDL S. VLDL S. VLDL	Result 345 Lipid Profile Result 75 Lipid Profile	Reference Range 100 - 230 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 20 - 60 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 45 - 180 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 10 - 30 mg/dl
S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. LDL S. VLDL  Test Test Test Test	Result  345  Lipid Profile  Result  75	Reference Range 100 - 230 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 20 - 60 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 45 - 180 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl
S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL S. VLDL S. VLDL S. VLDL S. VLDL S. VLDL S. Triglycerides S. Triglycerides S. Triglycerides	Result 345 Lipid Profile Result 75 Lipid Profile	Reference Range 100 - 230 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 45 - 180 mg/dl 10 - 30 mg/dl 45 - 180 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 10 - 30 mg/dl
S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. ULDL S. VLDL S. HDL S. Triglycerides S. HDL S. HDL S. HDL	Result  345  Lipid Profile  Result  75  Lipid Profile  Result	Reference Range 100 - 230 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 45 - 180 mg/dl 40 - 130 mg/dl 20 - 60 mg/dl 10 - 30 mg/dl 40 - 130 mg/dl 40 - 130 mg/dl 40 - 130 mg/dl 20 - 60 mg/dl 20 - 60 mg/dl
S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL S. HDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL	Result  345  Lipid Profile  Result  75  Lipid Profile  Result	Reference Range 100 - 230 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 45 - 180 mg/dl 45 - 180 mg/dl 45 - 180 mg/dl 10 - 30 mg/dl 45 - 180 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 40 - 130 mg/dl 45 - 180 mg/dl 45 - 180 mg/dl 40 - 130 mg/dl 40 - 130 mg/dl
S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  S. VLDL  S. VLDL  S. VLDL  S. VLDL  S. Cholesterol S. Triglycerides S. HDL S. VLDL S. VLDL	Result  345  Lipid Profile  Result  75  Lipid Profile  Result	100 - 230 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 20 - 60 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 230 mg/dl 45 - 180 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl
S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL	Result  345  Lipid Profile  Result  75  Lipid Profile  Result  123  Lipid Profile	Reference Range 100 - 230 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 20 - 60 mg/dl 20 - 60 mg/dl 10 - 30 mg/dl 20 - 60 mg/dl 20 - 60 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 20 - 60 mg/dl 20 - 60 mg/dl 20 - 60 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl
S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL	Result  345  Lipid Profile  Result  75  Lipid Profile  Result  123	Reference Range 100 - 230 mg/dl 45 - 180 mg/dl 45 - 180 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 20 - 60 mg/dl 20 - 60 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl Reference Range 100 - 230 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 10 - 30 mg/dl Reference Range
S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL S. VLDL  Test S. Cholesterol	Result  Ads  Lipid Profile  Result  75  Lipid Profile  Result  123  Lipid Profile  Result	Reference Range 100 - 230 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 20 - 60 mg/dl 20 - 60 mg/dl 10 - 30 mg/dl 20 - 60 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl Reference Range 100 - 230 mg/dl 10 - 30 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl Reference Range
S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  S. Cholesterol S. Triglycerides S. HDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL S. Triglycerides	Result  345  Lipid Profile  Result  75  Lipid Profile  Result  123  Lipid Profile	Reference Range 100 - 230 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 20 - 60 mg/dl 20 - 60 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl Reference Range 100 - 230 mg/dl 10 - 30 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl
S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL	Result  Ads  Lipid Profile  Result  75  Lipid Profile  Result  123  Lipid Profile  Result	Reference Range 100 - 230 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 20 - 60 mg/dl 20 - 60 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 10 - 30 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 20 - 60 mg/dl
S.LDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  S. Cholesterol S. Triglycerides S. HDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL  Test S. Cholesterol S. Triglycerides S. HDL S. VLDL S. Triglycerides	Result  Ads  Lipid Profile  Result  75  Lipid Profile  Result  123  Lipid Profile  Result	Reference Range 100 - 230 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 20 - 60 mg/dl 20 - 60 mg/dl 45 - 180 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl Reference Range 100 - 230 mg/dl 10 - 30 mg/dl 20 - 60 mg/dl 40 - 130 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl 10 - 30 mg/dl

Lect.3. Second stage. Bio Chemistry Laboratory Dr. Reem.S.Najm Lect.3

	Lipid Profile	
Test	Result	Reference Range
S. Cholesterol		100 – 230 mg/dl
S. Triglycerides	197	45 – 180 mg/dl
S. HDL		20 - 60 mg/dl
S.LDL		40 – 130 mg/dl
S. VLDL		10 – 30 mg/dl
	Lipid Profile	
Test	Result	Reference Range
S. Cholesterol		100 - 230 mg/dl
S. Triglycerides	60	45 – 180 mg/dl
S. HDL		20 – 60 mg/dl
S.LDL		40 – 130 mg/dl
S. VLDL		10 – 30 mg/dl
	Lipid Profile	
Test	Result	Reference Range
S. Cholesterol		100 - 230 mg/dl
S. Triglycerides	139	45 - 180 mg/dl
S. HDL		20 - 60 mg/dl
S.LDL		40 - 130 mg/dl
S. VLDL		10 - 30 mg/dl

## Lect.3. Second stage Bio Chemistry Laboratory Dr. Reem.S.Najm **Questions for Lec3**



Questions for Deep
Q1 \ How are high triglycerides diagnosed?
Q2 \ complete the sentences.
1-Triglycerides ( )>mg\dL Desirable range
2-Triglycerides v. High > ( ) mg\dl
Q3\ Defined
Triglycerides
O4\ What causes high triglycerides
O5\ Explain the principle of triglycerides?
Qu'Plumi une Plumerple of original or original
O6\ ASSAY PROCEDURE
Wavelength
Cuvotto
Town and true
Temperature
CALCULATIONS
2-Triglycerides v. High > ( ) mg\dl Q3\ Defined Triglycerides  Q4\ What causes high triglycerides Q5\ Explain the principle of triglycerides?  Q6\ ASSAY PROCEDURE Wavelength Cuvette Temperature
$\mathcal{O}_{\mathcal{K}}$ .
ani
Cuvette