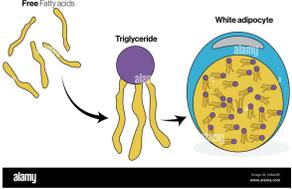





Central Nervous System (CNS) Module 2nd Year MBBS(SKL) Estimation Of Serum TAGS



Sana
H.O.D
Department of Biochemistry
Rawalpindi Medical University
Rawalpindi

Updated Date: 16-04-25

Presenter: Dr. Sana Latif (Senior Demonstrator)

1

Motto, Vision, Dream

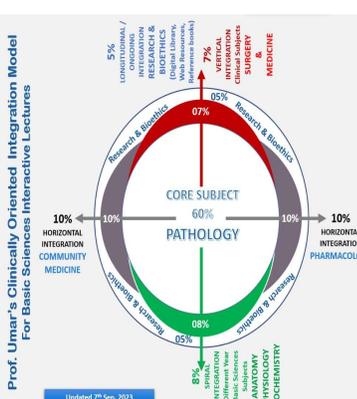


- To impart evidence based research oriented medical education
- To provide best possible patient care
- To inculcate the values of mutual respect and ethical practice of medicine

2

2

Professor Umar Model of Integrated Lecture



Model 3rd Year Pathology LGIS (=30 slides)

Core Subject – 60% (= 18-20 slides)

Pathology (= 18-20 slides)

Horizontal Integration – 20% (= 5-6 slides)

Same Year Subjects

- Pharmacology (10%) (= 2-3 slides)
- Community Medicine (10%) (= 2-3 slides)

Vertical Integration – 07% (= 2-3 slides)

Clinical Subjects

- Medicine (3-5%) (= 1-2 slides)
- Surgery (3-5%) (= 1-2 slides)

Spiral Integration – 08% (= 2-3 slides)

Different Year: Basic Sciences Subjects

- Anatomy (1-3%) (= 1-2 slides)
- Physiology (1-3%) (= 1-2 slides)
- Biochemistry (1-3%) (= 1-2 slides)

Longitudinal / Ongoing Integration – 05% (= 1-2 slides)

Research & Bioethics (= 1-2 slides)

3

3

Skill Lab Assessment

1. **The major storage form of fatty acids in adipose tissue is:**
 - A. Cholesterol esters
 - B. Free fatty acids
 - C. *Triglycerides*
 - D. Phospholipids
 - E. Sphingolipids
2. **Which lipoprotein is primarily responsible for transporting endogenous triglycerides from the liver to peripheral tissues?**
 - A. Chylomicrons
 - B. HDL
 - C. LDL
 - D. IDL
 - E. VLDL
3. **Which of the following enzymes hydrolyzes triglycerides in circulating lipoproteins to free fatty acids and glycerol?**
 - A. Hormone-sensitive lipase
 - B. *Lipoprotein lipase*
 - C. Acetyl-CoA carboxylase
 - D. Carnitine palmitoyltransferase
 - E. Lecithin-cholesterol acyltransferase
4. **Hormone-sensitive lipase is activated in adipose tissue during:**
 - A. Fed state
 - B. High insulin levels
 - C. *Fasting and stress conditions*
 - D. Low glucagon levels
 - E. Lipogenesis

4

4

Skill Lab Assessment

5. Which hormone most directly stimulates lipoprotein lipase activity in adipose tissue?
- Glucagon
 - Epinephrine
 - Cortisol
 - Insulin*
 - Thyroxine
6. Triglyceride synthesis in the liver requires which of the following key precursors?
- Glycerol and cholesterol
 - Glycerol-3-phosphate and fatty acyl-CoA*
 - Acetyl-CoA and malonyl-CoA
 - Citrate and oxaloacetate
 - Pyruvate and acetyl-CoA
7. Hypertriglyceridemia is most often associated with elevated levels of:
- HDL
 - LDL
 - VLDL*
 - IDL
 - ApoA-I
8. In the fed state, the liver packages newly synthesized triglycerides into:
- HDL
 - VLDL*
 - Chylomicrons
 - LDL
 - IDL

5

Skill Lab Assessment

9. Which of the following enzymes is required for triglyceride resynthesis in intestinal mucosal cells?
- Hormone-sensitive lipase
 - Acetyl-CoA carboxylase
 - Monoacylglycerol acyltransferase*
 - ATP citrate lyase
 - Thiolase
10. Which of the following statements about triglycerides is CORRECT?
- They are polar lipids
 - They cannot be used for energy
 - They are composed of three fatty acids esterified to glycerol*
 - They circulate freely in the blood
 - They are synthesized in the nucleus

6

Answer Key

- C
- E
- B
- C
- D
- B
- C
- B
- C
- C

7

Learning Objectives

At the end of this session students will be able to :

- Quantitatively estimate the serum Triglycerides after enzymatic hydrolysis with Lipases.
- Clinical interpretation of Atherosclerotic risk after the estimation of Triglycerides in a given sample.

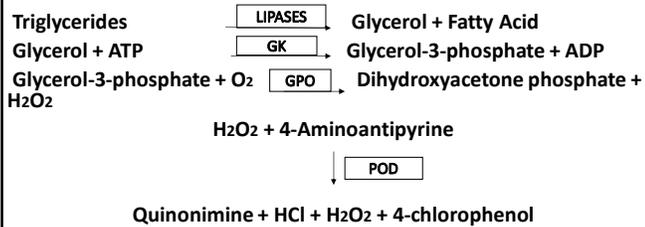
8

Core Concept

Principle of Estimation of Serum TGs

The Triglycerides are determined after enzymatic hydrolysis with lipases.

INDICATOR: QUINONEIMINE



9

9

Core Concept

Procedure OF Estimation of Serum TGs

• Reagents Required:

RGT : 15ml: 100 ml or 250ml monoreagent.

Pipes Buffer (pH 7.5)	50mmol/l
4-chlorophenol	5mmol/l
4-aminophenazone	0.25mmol/l
magnesium ions	4.5mmol/l
ATP	2mmol/l
Lipases	>1300 U/l
Peroxidases	500 U/l
Glycerol kinase	400 U/l
Glycerol-3-phosphate oxidase	1500 U/l
Sodium azide	0.05%

STD: 3ml Standard

Triglycerides	200mg or 2.28 mmol/l
---------------	----------------------

10

10

Core Concept

Procedure of estimation of Serum TGs (contd.)

PIPPETE INTO CUVETTES	RB	Sample or Standard
Sample/STD	-	10μL
RGT	1000μL	1000μL

1. Mix and incubate for 10 min at 20-25 C OR For 5 min at 37 C.
2. Measure the absorbance of sample (Δ A Sample) and the standard (Δ A STD) against the reagent blank within 60 min.

11

Core Concept

Calculation of Serum TGs Value

In the given sample, the quantity is calculated using any of the following formulae:

$$C = 200 \times \frac{\Delta A \text{ Sample } (mg/dl)}{\Delta A \text{ Std}}$$

OR

$$C = 2.28 \times \frac{\Delta A \text{ Sample } (mmol/L)}{\Delta A \text{ Std}}$$

12

12

Core Concept

Result

- Clinical interpretation of Atherosclerotic risk after the estimation of Triglycerides in a given sample is done using the following reference ranges:

NO OR LOW RISK: Sample TAG <150mg/dl or < 1.71 mmol/L

SUSPECTED RISK: Sample TAG 151-200mg/dl or 1.72-2.28 mmol/L

INCREASED/HIGH RISK: Sample TAG >200mg/dl or >2.28 mmol/L

13

13

Horizontal Integration

Anatomy Of Adipose Tissue

14

14

Horizontal Integration

Physiology Of Adipose Tissue

15

15

Vertical Integration

Non-Alcoholic Fatty Liver Disease

HEALTHY AND FATTY LIVER

16

16

Spiral Integration Family Medicine

Management of the Case

Family Medicine plays important role in following manner:

- Diagnosis
- Education
- Dietary Guidance
- Monitoring
- Refer to Specialists

17

17

Spiral Integration Artificial Intelligence

Role Of AI in Management

Artificial Intelligence plays role in following aspects:

- Personalized Nutrition
- Diagnostic Tools
- Food Recommendations
- Drug Development

18

18

Spiral Integration Research Article

New Nomenclature for Nonalcoholic Fatty Liver Disease: Understanding Metabolic Dysfunction-Associated Steatotic Liver Disease, Metabolic Dysfunction- and Alcohol-Associated Liver Disease, and Their Implications in Clinical Practice

Clémence M. Canivet , Jérôme Boursier , Rohit Loomba

<https://www.thieme-connect.com/products/ejournals/abstract/10.1055/s-0044-1785196>
DOI:10.1055/s-0044-1785196

SEMINARS IN LIVER DISEASE Semin Liver Dis 2024; 44(01): 035-042

In June 2023, under the patronage of the American Association for Study of Liver Disease, the European Association for Study of the Liver, and the Asociación Latinoamericana para el Estudio del Hígado with the involvement of 236 participants from around the world, a new nomenclature and definition for nonalcoholic fatty liver disease (NAFLD) has been proposed. Metabolic dysfunction-associated steatotic liver disease (MASLD) was defined as presence of hepatic steatosis and at least one of the cardiometabolic risk factors with alcohol intake less than 140 g/wk for women and 210 g/wk for men and no other causes of steatosis. A new entity called combined metabolic dysfunction- and alcohol-associated liver disease (MetALD) was created outside of pure MASLD for patients with metabolic dysfunction and alcohol intake greater than that allowed for MASLD (i.e., 140–350 g/wk for women and 210–420 g/wk for men). Recent studies have confirmed a 95% overlap between NAFLD and the new MASLD diagnostic criteria. Natural history, biomarkers, and thresholds of alcohol intake in MetALD group remains to be studied and validated.

20

19

Spiral Integration Bioethics

Ethical Consideration

- Informed Consent
- Resource Allocation
- Ethical Consideration
- Access to Healthcare

20

20

How To Use HEC Digital Library

Steps to Access HEC Digital Library

1. Go to the website of HEC National Digital Library
<http://www.digitallibrary.edu.pk>
2. On Home Page, click on the INSTITUTES.
3. A page will appear showing the universities from Public and Private Sector and other Institutes which have access to HEC National Digital Library (HNDL).
4. Select your desired Institute.
5. A page will appear showing the resources of the institution
6. Journals and Researches will appear
7. You can find a Journal by clicking on JOURNALS AND DATABASE and enter a keyword to search for your desired journal.

21

Learning Resources

- Journal of Practical Biochemistry Vol-II
- Google images
- Google Scholar

22

Thank You!

23