

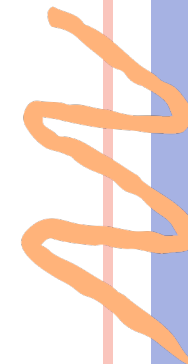
BCH 447 Practical Metabolism

Lipase Assay

(Using Turbidimetric Method)

Mark Distribution

Task	Marks	
Attendance and Performance	5 Marks	
Report	15 Marks	
Homework	3 Marks	
Presentation	5 Marks (<i>due 15 Apr 2025</i>)	
Quiz	12 Marks	
Midterm (20 Marks)	Practical	15 Marks
	Theoretical	5 Marks
Final (40 Marks) ??	Practical	25 Marks
	Theoretical	15 Marks
Total	100 Marks	



Introduction

Lipase

- Is an enzyme that breaks down dietary fats into smaller molecules, fatty acids and glycerol.

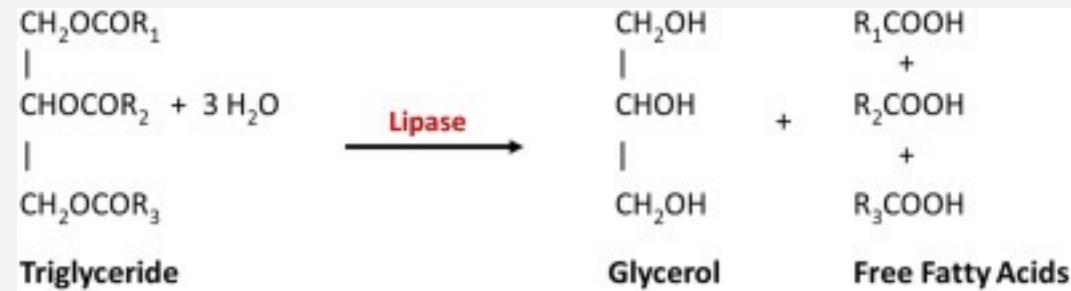


Figure 1. Schematic representation of lipase action. *Source: sciencedirect.com*

- It is produced by the pancreas in large quantity and secrete them into the small intestine.

Serum lipase concentration

- The measurement of lipase activity in serum and other fluids evaluate the conditions associated with **pancreas**.
- Lipase concentrations is increased in **acute pancreatitis**.
- **Acute pancreatitis** is a sudden inflammation of the pancreas. Its most common causes are:
 - Gallstones
 - Pancreatic cancer, and other pancreatic disease
 - Gallbladder inflammation.

Acute pancreatitis

- The common **bile duct** and the **pancreatic duct** join together to transport digestive enzymes and bile to the small intestine.
- A **gallstone** in the common bile duct can cause back pressure in the pancreatic duct leading to pancreatitis (*elevated blood lipase levels*).

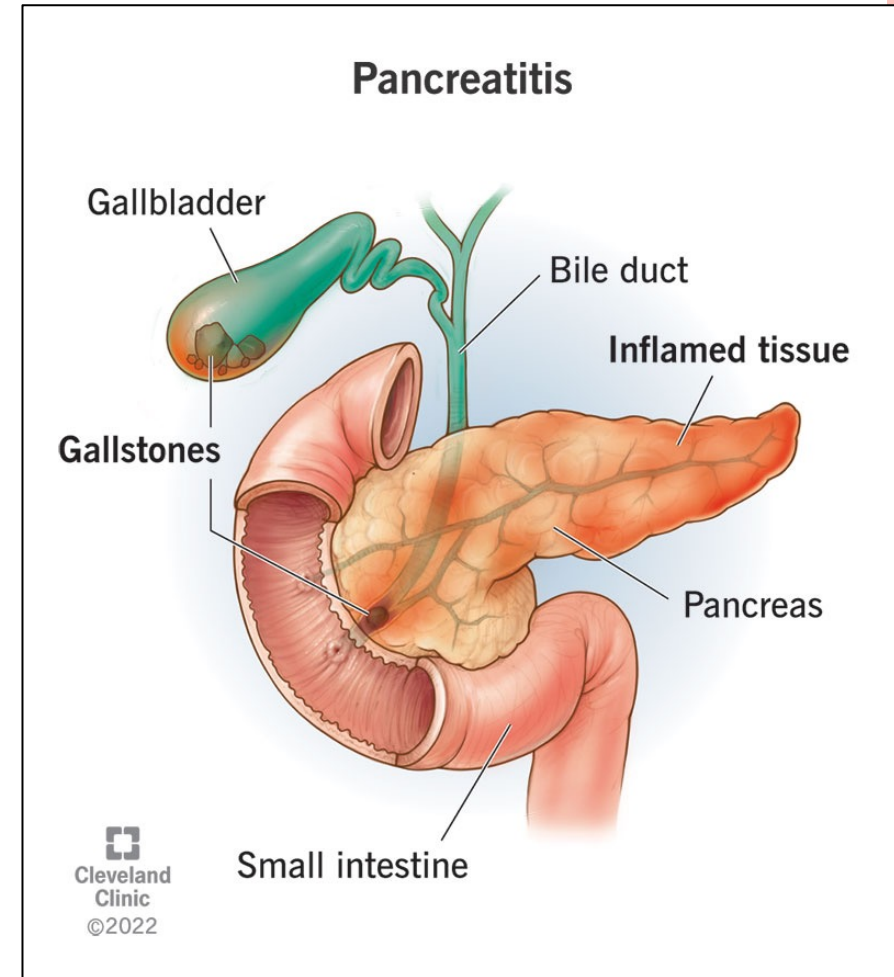


Figure 2. Pathology of acute pancreatitis. Source: my.clevelandclinic.org

Cystic fibrosis

- A low level of lipase in the blood may indicate permanent damage to the lipase-producing cells in the pancreas and this can occur in chronic diseases that affect the pancreas such as **cystic fibrosis**.

Principle of Turbidimetric Method:

- Hydrolysis of triglycerides present in the olive oil by **serum lipase** causes a decrease in the turbidity of the reaction mixture.



- The decrease in turbidity at 400 nm (after incubation) is proportional to lipase activity in the specimen and reflects the activity of lipase in the sample

Objective:

- To determine lipase activity in a serum sample using turbidimetric method.

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Method:

1. Set two test tubes as:

	Test	Blank
Reagent (substrate+ buffer)	3 ml	3 ml
Pre-incubate for 5 minutes at 37° C		
Sample (contains lipase)	0.1 ml	—

1. Read the absorbance (A°) immediately at 400 nm against distilled water.
2. Then transfer to water bath at 37° C and incubate for 5 min then read the absorbance (A_1) at 400 nm against distilled water.

Calculations:

$$\frac{\text{Test (A}_0\text{- A}_1\text{)} - \text{Blank (A}_0\text{- A}_1\text{)}}{\text{Blank (A}_0\text{)}} \times 3000 = \text{Lipase activity in U/L}$$

Note:

- Reagent blank: if (A₀ – A₁) is a negative value, it should be considered as zero.
- However, it should normally be between 0.000 and 0.005.

Normal range:

- In adults: **10-150 U/L**
- In old individuals (more than 60 years): **18-180 U/L**