LIPASE ASSAY

(USING TURBIDIMETRIC METHOD)
**LIPASE ACTIVITY**

- **Objective:**
  - To determine Lipase activity.
**INTRODUCTION:**

- Lipase is defined as a group of enzymes which hydrolyze the glycerol; esters of long chain fatty acids so it can be easily absorbed.

- Lipase is produced by the pancreas, liver, intestine, tongue, stomach, and many other cells.

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

- Lipase testing is indicated in **acute pancreatitis and pancreatic cyst**.

- The measurement of lipase activity in serum and other fluids evaluate the conditions associated with **pancreas**.
- Serum lipase concentration:

- Lipase concentrations is increased with pancreatic duct obstruction, pancreatic cancer, and other pancreatic disease as well as with gallbladder inflammation.

- Lipase concentrations are increased in pancreatitis up to 3 times normal.

- 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.

- Therefore, acute pancreatitis elevates blood lipase levels.
Normal

Pancreatitis
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.

Symptoms of pancreatitis may include:

• Severe abdominal pain
• Back pain
• Fever
• Nausea
• Vomiting
• Loss of appetite
- **Principle:**

- **Serum lipase** hydrolyzes the olive oil emulsion.

- The decrease in turbidity at 400 nm (after incubation) is proportional to lipase activity in the specimen.
SPECIMEN COLLECTION STORAGE

- Use **fresh serum** specimens.

- Hemolyzed specimens should not be used.

- Lipase activity in serum is stable at room temperature for one week and may be stored for three weeks in the refrigerator (4-8°C) and for several months if frozen.

- Caution!

- Bacterial contamination of the specimens may result in an increase in lipase activity.
- Normal range:
- In adults: **10-150 U/L**
- In old individuals (more than 60 years): **18-180 U/L**
- **METHOD:**

- **Two test tubes:**

<table>
<thead>
<tr>
<th></th>
<th>Test</th>
<th>Blank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lipzyme reagent buffer</td>
<td>3 ml</td>
<td>3 ml</td>
</tr>
<tr>
<td>Pre-incubate for 5 min. at 37°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serum</td>
<td>0.1 ml</td>
<td>---</td>
</tr>
</tbody>
</table>

- Read the absorbance \(A_0\) immediately at 400 nm.

- Then transfer to water bath pre-incubate for 5 min. at 37°C.

- Then read the absorbance \(A_1\) at 400 nm against distilled water.
- **CALCULATIONS:**

\[
\frac{\text{Test (}A_\circ - A_1\text{)} - \text{Blank (}A_\circ - A_1\text{)}}{\text{Blank (}A_\circ\text{)}} \times 3000 = \text{Lipase activity in U/L}
\]

- **Example:**

\[
A_1 \text{ TEST } = 0.454 \quad \quad A_\circ \text{ TEST } = 0.464
\]

\[
A_1 \text{ Blank } = 0.334 \quad \quad A_\circ \text{ Blank } = 0.332
\]

\[
\text{LIPASE ACTIVITY} = \frac{(0.464 - 0.454) - (0.332 - 0.334)}{0.332} \times 3000 = 71.85 \text{ U/L}
\]

**Normal**

- **Note:**

- Reagent blank: if \((A_\circ - A_1)\) is a negative value, it should be **considered as zero**. However, it should normally be **between 0.000 and 0.005**.