SAWA UNIVERSITY

FIRST SEMESTER (CLINICAL ENZYMOLOGY)

AMYLASE AND LIPASES

Sawa University — جامعـــــة ســـــــاوة الاهلية

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fourth Stage — المرحلـــــــــــة الرابعة

محاضرة رقم 7,8 — الجانب العملي

Lecture No. 7,8 — Practical

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INTRUDUCTION

Amylase and lipase are digestive enzymes that break down different types of food; **amylase breaks down carbohydrates,** while **lipase breaks down fats**. Both are primarily produced by the pancreas and released into the small intestine, though **amylase is also found in saliva. Elevated blood levels of either enzyme, particularly lipase, often indicate pancreatic damage like pancreatitis.**

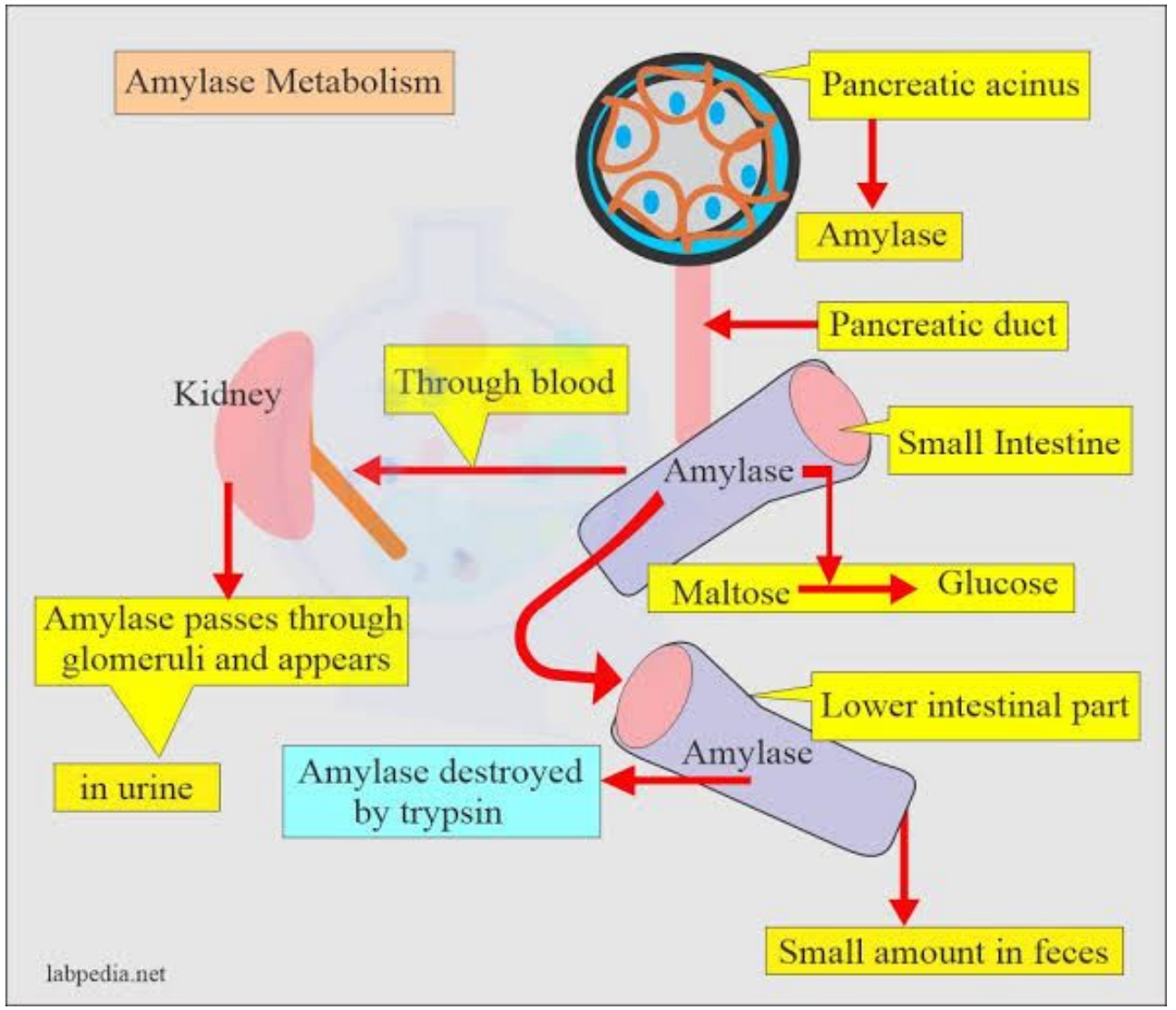
AMYLASE

Function: Breaks down complex carbohydrates (starches) into simple sugars, which can then be absorbed by the small intestine.

Production: Primarily produced by the pancreas and salivary glands.

Normal Blood Levels: Around 23-85 U/L, though some labs may go up to 140 U/L.

When blood levels are high: Can indicate pancreatic dysfunction, pancreatic cancer, or salivary gland infections. .



LIPASE

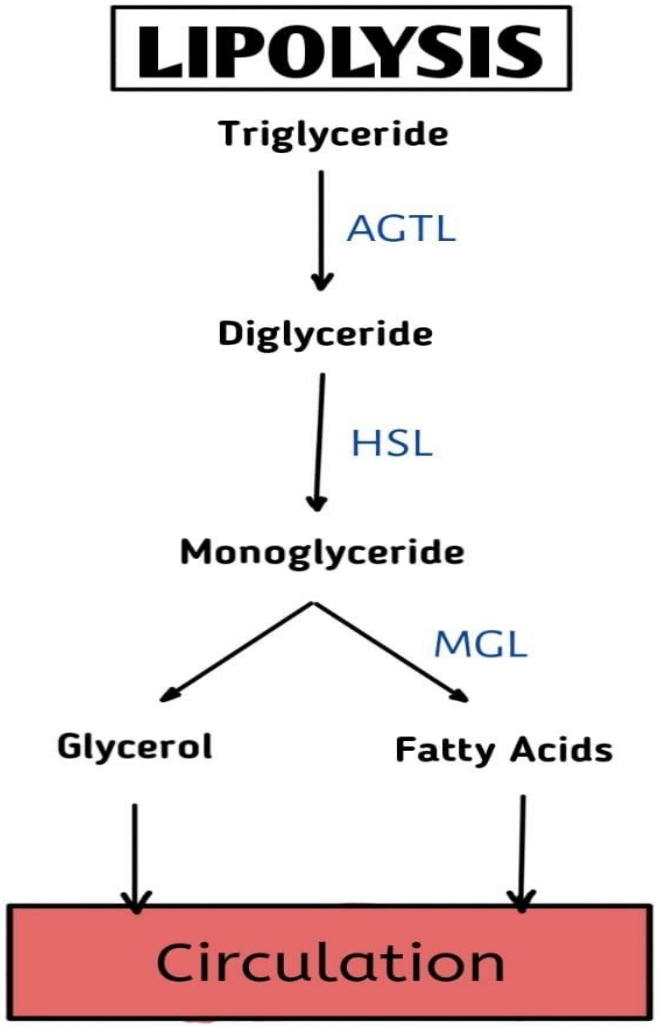
Function: Breaks down fats into fatty acids.

Production: Primarily produced by the pancreas.

Normal Blood Levels: Around 0 -160 U/L, though ranges can vary by lab.

When blood levels are high: Highly suggestive of pancreatitis or other pancreatic diseases because the damaged pancreas releases more lipase into the bloodstream.

Specificity: Lipase is considered more specific for pancreatic issues than amylase.



AMYLASE AND LIPASE

Tests Purpose: Used to help diagnose and monitor conditions affecting the pancreas, such as acute pancreatitis.

Interpretation: If the pancreas is damaged, it can leak these enzymes into the blood, leading to elevated levels.

Diagnosis of Pancreatitis: A diagnosis of acute pancreatitis requires a combination of symptoms (abdominal pain), elevated amylase or lipase levels (typically >3 times the normal limit), and characteristic findings on imaging.

TLE

Amylase levels	Lipase levels	
Normal	23–85 U/L (some lab results go up to 140 U/L)	0–160 U/L
Pancreatitis suspected	> 200 U/L	> 200 U/L

CAUSES OF ELEVATED LEVELS (HYPERAMYLASEMIA AND HYPERLIPASEMIA)

Elevated levels of both amylase and lipase, especially greater than three times the upper limit of normal, strongly suggest pancreatic injury or disease.

Acute Pancreatitis: This is the most common cause for significant elevation of both enzymes.

Chronic Pancreatitis: Can cause elevated levels during an acute flare-up, but in severe, long-term cases, significant damage to the pancreas may result in normal or even low enzyme production because the relevant cells are damaged.

Blocked Pancreatic Duct/Gallstones: Obstruction of the ducts that drain the pancreas and gallbladder can lead to enzyme build-up in the bloodstream.

Kidney Problems: Reduced kidney function can decrease the clearance of these enzymes from the body, leading to higher blood levels.

Other Conditions: Issues like peptic ulcers, intestinal obstruction, celiac disease, some cancers (pancreatic, salivary gland), and severe gastroenteritis can also cause elevated levels.

Medications and Lifestyle: Certain medications (e.g., some diuretics, steroids), excessive alcohol use, and high triglyceride levels can also be contributing factors.

CAUSES OF LOWERED LEVELS

Lower than normal levels of amylase or lipase are less common but can indicate specific issues:

Severe Pancreatic Injury/Disease: In cases of chronic pancreatitis where the pancreas is severely damaged, it may lose its ability to produce these enzymes, resulting in persistently low levels.

High Triglycerides: Extremely high levels of triglycerides in the blood can interfere with the laboratory test for amylase, making the result falsely low.

Macroamylasemia: This is a benign condition where amylase binds to large proteins in the blood, forming complexes too large to be filtered by the kidneys. This results in high blood amylase levels but low or normal urine amylase levels.

Key Distinction

Lipase is generally considered a more specific and reliable marker for acute pancreatitis than amylase, as amylase is also produced by salivary glands and other organs. Lipase levels also stay elevated for a longer period (8-14 days) compared to amylase (5-7 days), which is useful for diagnosis if a patient presents several days after symptoms begin.

Any questions?