



AL-Mustaqbal University College

**Medical laboratory Techniques
Department**

Clinical Biochemistry

**Lecture (7)
(Pancreas functions)**



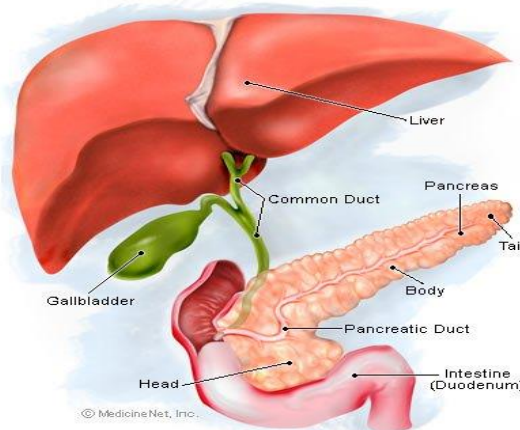
Lecturer : M. Sc. Salam Mohammed Naser

History of the discovery of the pancreas:-

The pancreas was discovered by the Greek surgeon (Herophilus), who lived between 335-280 B.C., And the Greek doctor (Ruphos) called this organ the name of the pancreas "Pancreas", a word derived from the Greek words "Pan" meaning all and the word "Kreas" means meat. (Claude Bernard) discovered that the pancreas had a role in digesting fats, and in 1889 a disease of pancreatitis was discovered by (Reginald Fitz).

What is the pancreas and where is it located?

The pancreas is a pear-shaped organ that ranges between 6-10 inches in length and extends horizontally behind the stomach in the upper left part of the human abdomen, and is surrounded by the small intestine, spleen and liver. The pancreas acts as a ductal gland that secretes digestive juices, and as an endocrine gland that regulates the level of sugar in the blood.



The pancreas with surrounding vessels and organs

Pancreas functions ?

The pancreas performs many vital functions in the human body, including:

1. **Secretion of digestive juices:** the exocrine glands in the pancreas secrete digestive juices that contain enzymes that break down food into small molecules that can be easily absorbed, and **these enzymes include:**

- Amylase, which helps digest carbohydrates

- The enzyme trypsin and chymotrypsin help digest proteins and convert them into amino acids.
 - The enzyme lipase, which helps digest fats and convert them into fatty acids and cholesterol.
2. **Secretion of stomach acid:** Islets of Langerhans secrete in the pancreas the hormone gastrin, which stimulates the stomach to produce hydrochloric acid, which helps in the digestion of food.
3. **Regulating the level of sugar in the blood:** The pancreas secretes hormones that maintain the level of sugar in the blood within normal limits, and among these hormones:
- Insulin hormone: A hormone produced by beta cells in the pancreas when the level of sugar in the blood is high, and it transfers glucose to the muscles and various body tissues for use as a source of energy, and glucose is stored in the liver in the form of glycogen until it is needed.
 - Glucagon hormone: a hormone produced by the alpha cells in the pancreas when the level of sugar in the blood is low.

Indication of weakness pancreatic function: -

- 1- Dry tongue and unexplained thirst, with increased urination.
- 2- High blood pressure, or a gallstone that affects its performance.
- 3 - Coldness of the skin with its moisture, and pain in the lower abdomen and lower back.
- 4 - Unexplained high fever, with dizziness and vomiting.
- 5- Yellowing of the whites of the eyes, with a change in the color of urine to darker.

- 6 - Itchy skin, as a result of poor performance of the pancreas, which is reflected in the lack of the enzyme needed to burn fat.
- 7 - Stool color change to pale, fluctuation between constipation and diarrhea.
- 8- Unexplained loss of appetite, weight loss.
- 9 - Slow healing of wounds, blurred vision, and tingling of hands and feet.
- 10 - Increased inflammation, whether affecting the skin or lung.

Diseases of the Pancreas

Disorders affecting the pancreas include pancreatitis, precancerous conditions such as Pancreatic Intraepithelial Neoplasia (PanIN) and Intraductal Papillary Mucinous Neoplasms (IPMN), and pancreatic cancer. Each disorder may exhibit different symptoms and requires different treatments.

Acute Pancreatitis

Acute pancreatitis is a sudden attack causing inflammation of the pancreas and is usually associated with severe upper abdominal pain. The pain may be severe and last several days. Other symptoms of acute pancreatitis include nausea, vomiting, diarrhea, bloating, and fever. In the United States, the most common cause of acute pancreatitis is gallstones. Other causes include chronic alcohol consumption, hereditary conditions, trauma, medications, infections, electrolyte , high lipid levels, hormonal abnormalities, or other unknown causes. The treatment is usually supportive with medications showing no benefit. Most patients with acute pancreatitis recover completely.

Chronic Pancreatitis

Chronic pancreatitis is the progressive disorder associated with the destruction of the pancreas. The disease is more common in men and usually develops in persons between 30 and 40 years of age. Initially, chronic pancreatitis may be confused with acute pancreatitis because the symptoms are similar. The most common symptoms are upper abdominal pain and diarrhea. As the disease becomes more

chronic, patients can develop malnutrition and weight loss. If the pancreas becomes destroyed in the latter stages of the disease, patients may develop diabetes mellitus.

The most common cause of chronic pancreatitis in the United States is chronic alcohol consumption. Additional causes include cystic fibrosis and other hereditary disorders of the pancreas. For a significant percentage of patients there is no known cause.

Pancreatitis

Pancreatitis is inflammation of the pancreas that occurs when pancreatic enzyme secretions build up and begin to digest the organ itself. It can occur as acute painful attacks lasting a matter of days, or it may be a chronic condition that progresses over a period of years.

Pancreas Function Tests:-

A. Blood tests :-

can check for signs of related conditions, including infection, [anemia](#) (low blood count), and [dehydration](#). A tumor marker called CA 19-9 may be checked if [pancreatic cancer](#) is suspected.

B. Secretin Stimulation Test :-

Secretin is a hormone made by the small intestine. Secretin stimulates the pancreas to release a fluid that neutralizes stomach acid and aids in digestion. The secretin stimulation test measures the ability of the pancreas to respond to secretin.

This test may be performed to determine the activity of the pancreas in people with diseases that affect the pancreas (for example, cystic fibrosis or pancreatic cancer).

C. Fecal Elastase Test:-

The fecal elastase test is another test of pancreas function. The test measures the levels of elastase, an enzyme found in fluids produced by the pancreas. Elastase digests (breaks down) proteins.

In this test, a patient's stool sample is analyzed for the presence of elastase.

D. Computed Tomography (CT) Scan With Contrast Dye:-

This imaging test can help assess the health of the pancreas. A CT scan can identify complications of pancreatic disease such as fluid around the pancreas, an enclosed infection (abscess), or a collection of tissue, fluid, and pancreatic enzymes (pancreatic pseudocyst).

E. Abdominal Ultrasound

An abdominal ultrasound can detect gallstones that might block the outflow of fluid from the pancreas.

References

1. *Laffan T, Horton KM, Klein AP, et al. (Sep 2008). "Prevalence of unsuspected pancreatic cysts on MDCT". *AJR Am J Roentgenol.* 191 (3): 802–807.*
2. Ammann RW. The natural history of alcoholic chronic pancreatitis. *Intern Med* 40(5): 368-375, 2001. PMID: 11393404