

## Pancreas

The pancreas is located in the abdomen, tucked behind the stomach. It is shaped somewhat like a tadpole - fat at one end and slender at the other - and is around 25cm in length. The pancreas has dual roles; it is an organ of the digestive system and of the endocrine (hormonal) system. Once food has been mulched and partially digested by the stomach, it is pushed into the duodenum (first part of the small intestine). The pancreas adds its own digestive juices and enzymes to the food, via a small duct attached to the duodenum. This process is said to belong to the 'exocrine pancreas'. The pancreas also produces the hormone insulin, which helps to control the amount of sugar in the blood. This is the role of the 'endocrine pancreas'.

### The exocrine pancreas

The pancreas helps to digest food, particularly protein. Pancreatic juices contain enzymes that only become activated once they reach the duodenum. This is to prevent the protein-digesting enzyme trypsin from 'eating' the protein-based pancreas or its duct. Other enzymes produced by the pancreas include amylase (to break down carbohydrate) and lipase (to break down fats). The exocrine pancreas also makes sodium bicarbonate, which helps to neutralise the stomach acids in the food.

### The endocrine pancreas

The pancreas makes the hormone insulin, which helps to control blood sugar levels. Insulin is manufactured by a small clump of pancreatic cells called the 'islets of Langerhans'. High blood sugar levels prompt the release of insulin from the islets of Langerhans, so that the sugars can pass into cells. The endocrine pancreas also makes glucagon, another hormone involved in the regulation of blood sugar.

### Symptoms of disease

The symptoms of a diseased pancreas depend on the underlying cause, but may include:

- Pain in the upper abdomen
- Loss of appetite
- Yellowing of the skin and eyes (jaundice)
- Back pain
- Bloating
- Nausea
- Vomiting
- Digestive upsets
- Passing foul-smelling and fatty faeces.

### A range of disorders

Some of the disorders that affect the pancreas include:

- Acute pancreatitis
- Chronic pancreatitis
- Pancreatic cancer
- Diabetes.

### Acute pancreatitis

Acute pancreatitis is inflammation of the pancreas. This is a medical emergency and requires prompt treatment. It occurs when the pancreas suddenly becomes inflamed - the enzymes can't leave the pancreas and so cause irritation and burning. Enzymes may also leech into the abdominal cavity. The two most common causes for pancreatitis are drinking too much alcohol (alcohol induced pancreatitis) and gallstones within the bile tubes (gallstone pancreatitis). Other factors that may trigger acute pancreatitis include:

- Certain drugs

- Mumps
- Damage or trauma to the pancreas
- Pancreatic cancer.

### Chronic pancreatitis

Chronic pancreatitis means recurring bouts of inflammation, even when known triggers (such as alcohol) are eliminated. Alcoholics are at increased risk of developing this condition. The relentless inflammation eventually damages or destroys parts of the pancreas, reducing its function. Symptoms include digestive upsets and passing fatty, foul-smelling stools.

### Pancreatic cancer

Pancreatic cancer starts in the cells of the duct and spreads into the body of the pancreas. Nearby blood vessels and nerves may be invaded. Without treatment, this type of cancer will spread to every abdominal organ and to other parts of the body, via the lymphatic system. The causes are unknown, but risk factors may include:

- Cigarette smoking
- Chronic pancreatitis
- Advancing age (over 65 years).

### Diabetes

In some cases, the islets of Langerhans can't produce enough insulin, so blood sugar levels remain high. In other cases, insulin is produced but the body is unable to utilise it, for reasons unknown. Complications of high blood sugar levels include:

- Kidney damage
- Eye damage
- Nerve damage
- Increased risk of stroke
- Increased risk of heart attack.

### Diagnostic methods

Diagnostic methods depend on the disorder under investigation, but may include:

- **General tests** - such as blood tests, physical examination and x-rays.
- **Ultrasound** - sound waves form a picture of the pancreas.
- **Computed tomography (CT) scan** - a specialised x-ray takes three-dimensional pictures of the pancreas.
- **Magnetic resonance imaging (MRI)** - similar to a CT scan, but magnetism is used to build three-dimensional pictures.
- **Endoscopy** - a thin telescope is inserted down the throat. This device may be used to inject contrasting dye into the pancreatic duct prior to x-rays.
- **Laparoscopy** - the pancreas is examined through a slender instrument inserted into the abdomen.
- **Biopsy** - a small tag of pancreatic tissue is taken out with a needle and examined in a laboratory.

### Treatment options

Treatment depends on the cause, but may include:

- **Acute pancreatitis** - hospitalisation in intensive care; fasting and intravenous fluids; surgery to remove gallstones or damaged sections of pancreas; lifestyle changes, such as eliminating alcohol.
- **Chronic pancreatitis** - long term treatment may include reducing dietary fats; supplementing digestion with pancreatic enzyme tablets; eliminating alcohol; taking regular insulin injections for reduced endocrine function.
- **Pancreatic cancer** - surgery to remove the cancer and associated tissue; radiotherapy and chemotherapy.
- **Diabetes** - in some cases, diabetes can be managed with a carefully controlled diet. In others, the person may also need to take regular medications or injections of insulin.

### Where to get help

- Your doctor.

### **Things to remember**

- The pancreas has dual roles; it is an organ of the digestive system and of the endocrine system.
- The exocrine pancreas produces enzymes that help to digest food, particularly protein.
- The endocrine pancreas makes the hormone insulin, which helps to control blood sugar levels.
- Disorders of the pancreas include acute or chronic pancreatitis, pancreatic cancer and diabetes.

**This page has been produced in consultation with, and approved by:**

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