WHAT IS IT?
- Zollinger-Ellison syndrome results when small tumours (gastrinoma) develop in the pancreas and duodenum, producing high levels of gastrin in the blood.
- The higher than normal levels of gastrin result in overproduction of stomach acid, which produces the gastrointestinal symptoms.
- Up to a quarter of patients will have multiple tumours as part of a condition called multiple endocrine neoplasia type I (MEN I). In addition to pancreatic and duodenal tumours, these patients will have tumours elsewhere, including the pituitary and parathyroid glands.
- Zollinger-Ellison syndrome most frequently occurs in those aged 20–50.
- Patients may have single or small, multiple tumours.
- Over half of single tumours are malignant and can spread to the liver and nearby lymph nodes.

CAUSES
- The precise reasons why some people develop Zollinger-Ellison syndrome are unknown.
- The ulceration in the upper gastrointestinal tract is caused by excess gastrin secreted by the tumours.

SYMPTOMS
- Symptoms include:
  - Burning pain in the abdomen, usually in the area between the breastbone and navel. It often develops after eating and can feel like it is travelling from the stomach to the throat (gastroesophageal reflux);
  - Sensation of pressure, bloating, or fullness;
  - Vomiting, often with blood;
  - Diarrhoea – stools may be foul-smelling and contain blood;
  - Fatigue;
  - Nausea;
  - Weight loss;
  - Weakness.

DIAGNOSIS
- A variety of tests and signs can assist in the diagnosis of Zollinger-Ellison syndrome, including:
  - An increased gastrin level;
  - A secretin stimulation test (secretin stimulates the pancreas to release a fluid with a high bicarbonate content, which acts as an antacid);
  - A CT or octreotide scan may reveal the presence of tumours;
  - A positive calcium infusion test;
  - Exploratory surgery can locate a tumour.

TREATMENT
- The main treatment for Zollinger-Ellison syndrome is proton pump inhibitors, which reduce the amount of acid produced in the stomach and so promote the healing of ulcers. They are also able to reduce diarrhoea.
- Rarely, a single gastrinoma can be surgically removed if there is no evidence that it is spreading to other organs such as the lymph nodes.
- However, the gastrinomas involved in Zollinger-Ellison syndrome can grow slowly and patients may live for many years after a tumour is diagnosed.

COMPLICATIONS
- A number of complications are associated with Zollinger-Ellison syndrome, including:
  - The tumour may metastasise to other organs, such as the liver;
  - Surgery may fail to locate the tumour;
  - The ulcers may perforate, resulting in internal bleeding;
  - Severe diarrhoea and weight loss may occur.

REFERENCES