

# PANCREATIC EXOCRINE INSUFFICIENCY (PEI) AND PANCREATIC ENZYME REPLACEMENT THERAPY (PERT)

NAOMI SMITH – SURGICAL DIETITIAN – NHS TAYSIDE – [NAOMI.SMITH4@NHS.SCOT](mailto:NAOMI.SMITH4@NHS.SCOT)

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# DECLARATION OF CONFLICT OF INTEREST

Fresenius Kabi sponsored education

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# Learning Outcomes

- Understand what PEI is
- Understand the causes and consequences of PEI
- Be able to identify symptoms of PEI
- Understand what PERT is and when to advise
- How to trouble shoot some of the issues that arise with PERT
- PERT with Oral Nutritional Support
- PERT with Enteral Nutrition

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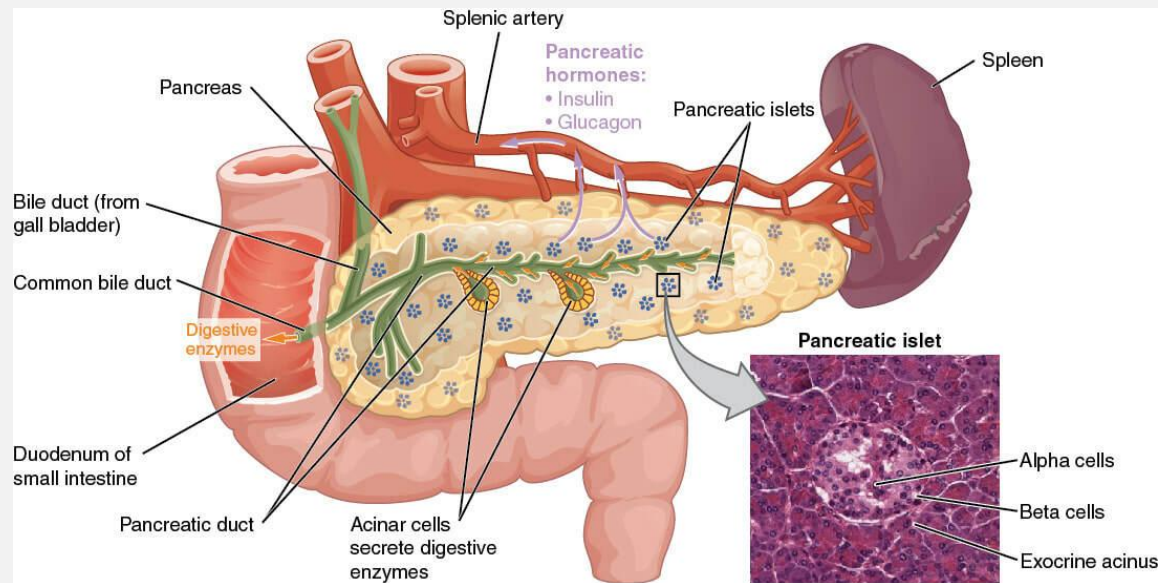
# WHAT IS PEI?

- PEI is characterised by the reduced secretions of pancreatic enzymes into the duodenum.
- Clinical manifestations are maldigestion and malnutrition, associated with low circulating levels of micronutrients, fat-soluble vitamins and lipoproteins. Patients present with gastro-intestinal symptoms such as diarrhoea, steatorrhea and abdominal cramps.

(NICE, 2025)

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# ANATOMY OF THE PANCREAS



- 1% is Islets of Langerhans
- 99% is for exocrine function
  - Amylase to break down Carbohydrate
  - Lipase and Steapsin to break down Fat
  - Trypsin, Chymotrypsin, Carboxypeptidase and Elastase to break down Protein

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# CAUSES OF PEI

Exocrine Tumor

Pancreatic Ductal  
Adenocarcinoma  
(PDAC)

Neuroendocrine  
Tumor

Neuroendocrine  
Carcinoma

Cancer in the Biliary  
Tree

Atrophic Pancreas

Chronic Pancreatitis

Necrotising  
Pancreatitis

PTC Drain

Whipple Procedure

Distal  
Pancreatectomy

Pylorus Preserving  
Pancreaticoduodene  
ctomy (PDD)

Total  
Pancreatectomy

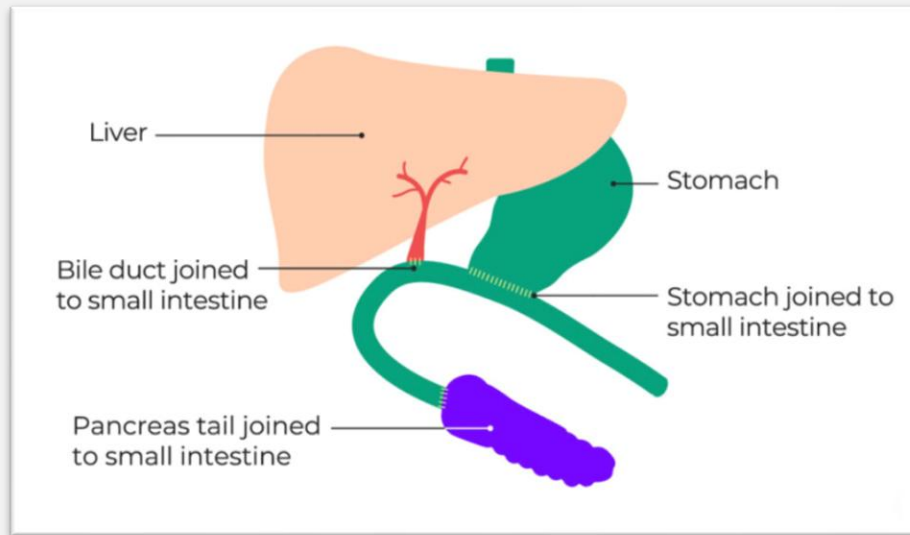
Total Gastrectomy

Rou-En-Y end

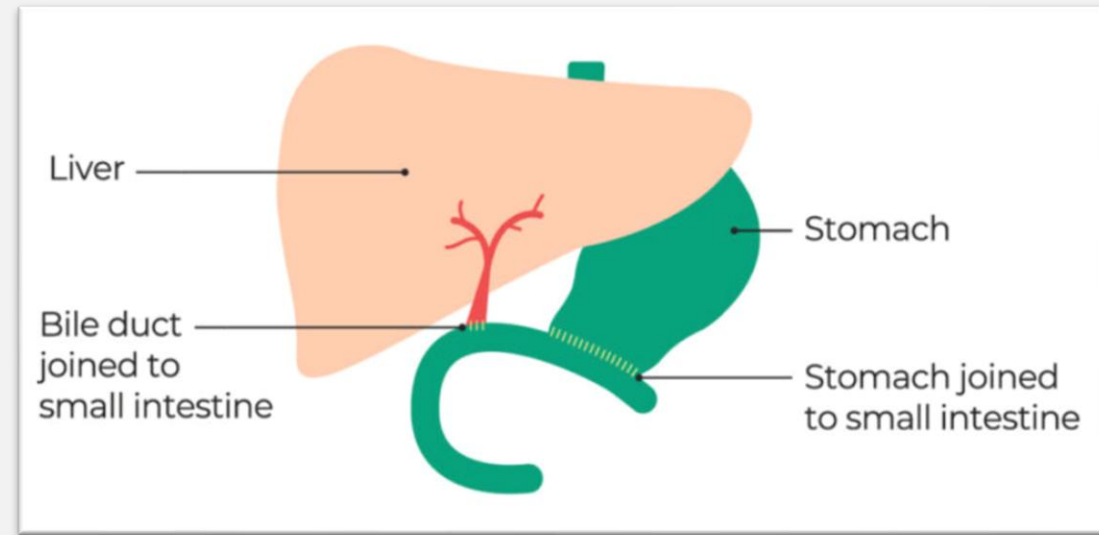
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# SURGICAL PROCEDURES

## Whipple Procedure



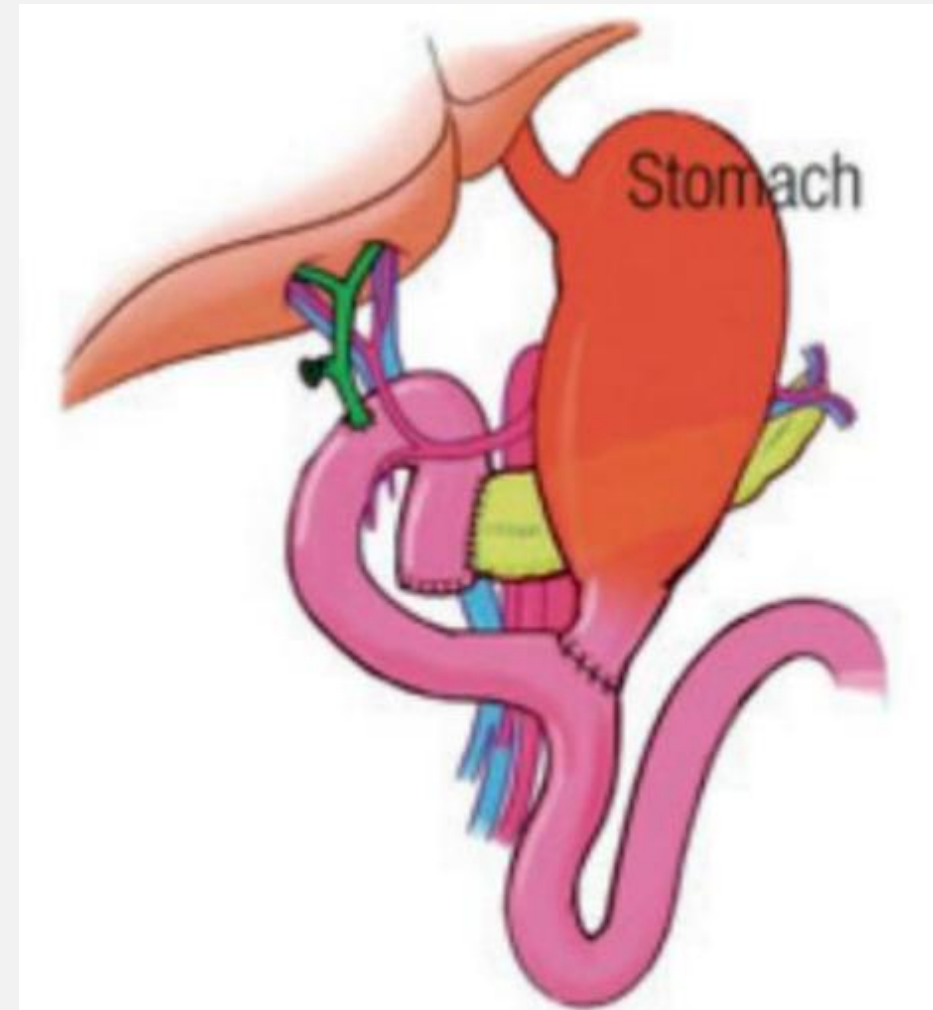
## Total Pancreatotomy



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# ASYNCRONICITY

Pylorus Preserving Whipples





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# SIGNS AND SYMPTOMS (POLL)

**Of the below listed which symptoms could highlight PEI?**

☐ Weight loss

☐ Pale Stools

☐ Heartburn

☐ Low Vitamin D

☐ Cramping stomach pain

☐ Bloating

☐ Flatulence

☐ Oily Stool

☐ Unable to flush

☐ Incomplete defecation

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# CONSEQUENCES OF PEI

## Malabsorption of nutrients leading to malnutrition

- Vitamin and Minerals
- Weight loss
- Lean Muscle Mass loss

## Risks associated with malnutrition

- Increased risk of infection
- Increased GP visits
- Prolonged recovery from infections, longer hospital admissions, impact on treatment options
- Poor quality of life, from symptom management

70-80% of pancreatic cancer patients are malnourished or experiences cachexia

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# DIAGNOSIS OF PEI

- - Faecal Elastase Test
  - Abnormal levels  $<200\mu\text{g/g}$  stool
  - Patient can continue to take PERT while getting a faecal Elastase test
- - Clinical History and symptom assessment
  - PEI can be present despite lack of symptoms
- - Diagnostic scans/ imaging for the cause of PEI

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## WHEN TO START SOMEONE ON PERT? (POLL)



When symptoms arise



At Diagnosis of pancreatic cancer



Following a Low Faecal elastase



A low Vitamin D



Upon investigation for Pancreatic Cancer

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# WHAT DOES PERT DO?

- When someone has PEI, it shows that they are unable to produce natural pancreatic enzymes or unable to produce the adequate quantity required to breakdown their food.
- Once swallowed, the capsule is dissolved by the stomach acid, allowing the microspheres to be released to mix with the stomach contents. The microspheres are activated in the duodenum secondary to the altering to a neutral pH
- Therefore, it can help alleviate the symptoms already discussed.
- Ensure you are aware of your patient's religious beliefs. PERT is made from pork products and there is no alternative. Advise patients to speak with their religious leader and communities do accept this as a medical treatment.

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# ENZYME SECRETION

Natural Enzyme Production from the Pancreas		
	Mean Intra digestive production	Post Prandial Peak
Lipase	Up to 1000u/min	3000 – 6000 u/min
Amylase	50 – 250u/min	500 – 1000u/min
Protease	50 – 100u/min	200 – 1000 u/min

Enzyme secretion continues for 2hrs post prandial

25,000 U Creon Capsule	
Lipase	25,000u
Amylase	18,000u
Protease	1000u

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# HOW TO TAKE IT EFFECTIVELY

- Recommended starting dose 50,000 U with meals and 25,000 U with snacks
- Must be taken with food and fluids containing energy
- Split your dose – half at the beginning of the meal and other half, half-way through
- If you are having multiple courses – dose for each plate
- Swallow whole with a **cold** drink.
- Ambient Temperature is key
- More energy, more PERT! Such as takeaways, roasted or fried food, puddings or food with a lot of full fat dairy (cream, cheese, chocolate)
- Remember to take with oral nutritional supplements
- PPI can be beneficial to aid activation of enzymes

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# FOODS THAT DO NOT NEED PERT:





Anthropometric	Biochemical	Clinical	Dietary
Ongoing unintentional weight loss	Micronutrient status (Iron, Ferritin, B12, Folate, Fat-soluble vitamins, selenium, zinc, magnesium, copper, clotting)	Stool frequency, texture, colour, appearance, oily	24hr dietary recall with relevant PERT dose
Functional changes (hand grip/sit-to-stand)	Glycaemic control (HbA1c and random glucose)	Flatulence, bloating, abdo pain	Food avoidance due to abdo pain
	Careful of CRP impact on blood results	Medications that may mask symptoms (Opioids, ondansetron, iron supplements)	Avoidance of fat containing products
			Nutritional Adequacy of diet

(Phillips *et al.*, 2021)

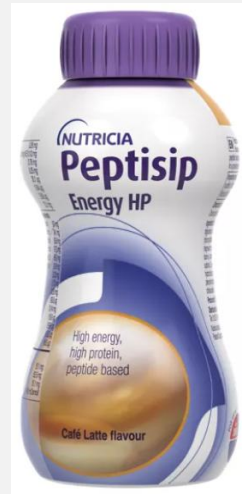
## WHEN TO DOSE ESCALATE

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# ORAL NUTRITIONAL SUPPLEMENT

## Peptide/Semi-Elemental



## Reduced Fat



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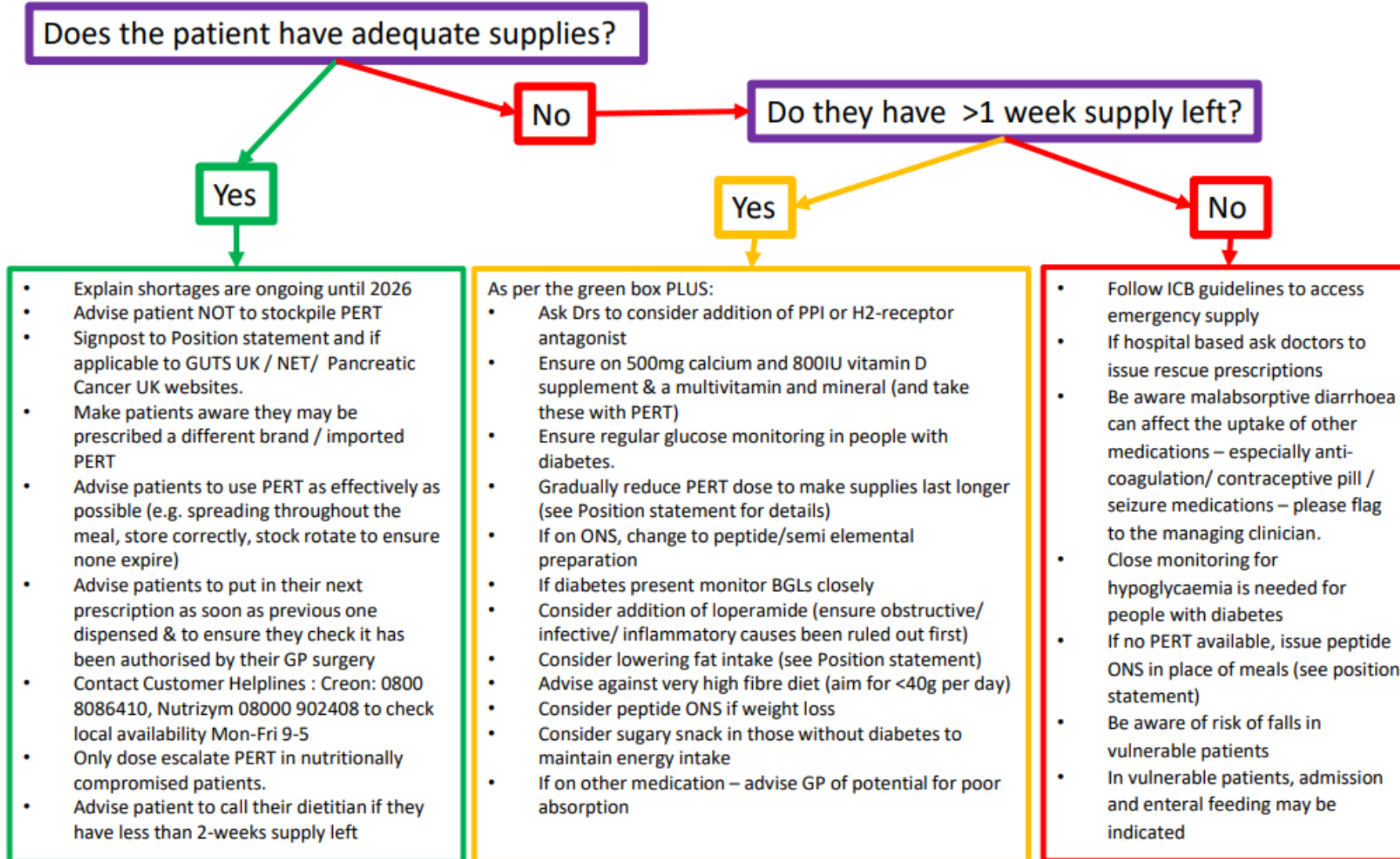
# ENTERAL FEEDING AND PERT

- Where possible, semi elemental and medium chain triglyceride-based feeds should be used.
- Majority of patients may tolerate semi-elemental feeding without PERT, however where malabsorption symptoms are persistent, enzymes can be flushed every 2hrs or added to the feed itself
- Dosing: 1g scoop of Pancrex V in 50ml sterile water Or add 1-2g Pancrex V powder directly to the feed and hang for 4hrs only.



(Phillips *et al.*, 2021)

## PERT shortage in patients who do not have Cystic Fibrosis – advice for Dietitians



Link to Position statements: [Position Statement: Pert Shortage | Pancreatic Society of Great Britain and Ireland \(psgbi.org\)](#).

Thank you to Emily Button, Cambridge University Hospitals for developing this flowchart.

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# KEY TAKEAWAY MESSAGES

1. Think about the location of the cancer within the pancreas
  2. Think about all symptoms
  3. Break the information down into short session
  4. Use the escalation table if symptoms are not improving
  5. Prep them for shortages in the community
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*'The pancreas'* by OpenStax College. License: CC BY 3.0

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