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

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DECLARATION OF CONFLICT OF INTEREST

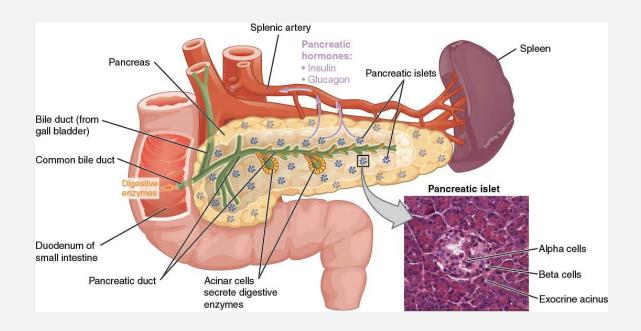
Fresenius Kabi sponsored education

- 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

Learning Outcomes

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.



ANATOMY OF THE PANCREAS

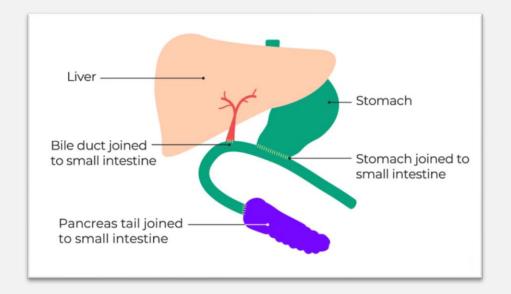
- o 1% is Islets of Langerhans
- o 99% is for exocrine function
 - Amylase to break down Carbohydrate
 - Lipase and Steapsin to break down Fat
 - Trypsin, Chymotrypsin, Carboxypeptidase and Elastase to break down Protein

CAUSES OF PEI

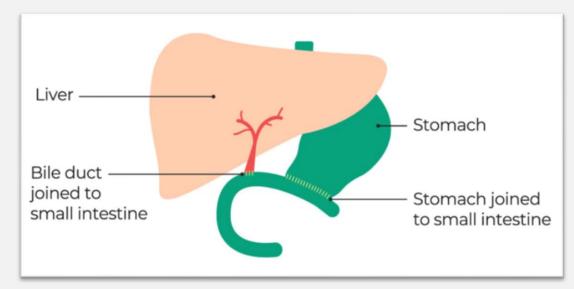
Exocrine Tumor	Pancreatic Ductal Adenocarcinoma (PDAC)	Neuroendocrine Tumor	Neuroendocrine Carcinoma	Cancer in the Biliary Tree
Atrophic Pancreas	Chronic Pancreatitis	Necrotising Pancreatitis	PTC Drain	Whipple Procedure
Distal Pancreatectomy	Pylorus Preserving Pancreaticoduodene ctomy (PDD)	Total Pancreatectomy	Total Gastrectomy	Rou-En-Y end

SURGICAL PROCEDURES

Whipple Procedure



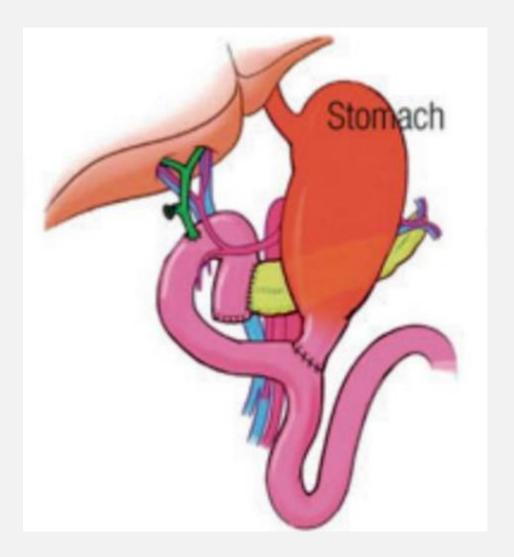
Total Pancreatomy



(Pancreatic Cancer UK, 2025)

ASYNCRONICITY

Pylorus Preserving Whipples



SIGNS AND SYMPTOMS (POLL)

Of the below listed which symptoms could highlight PEI?

□ Weight loss	□ Bloating
□Pale Stools	□Flatulence
□Heartburn	□0ily Stool
□Low Vitamin D	☐Unable to flush
□Cramping stomach pain	☐ Incomplete defecation

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

DIAGNOSIS OF PEI

- Faecal Elastase Test
 - Abnormal levels <200ug/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



When symptoms arise





At Diagnosis of pancreatic cancer



Following a Low Faecal elastase



A low Vitamin D



Upon investigation for Pancreatic Cancer

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.

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		

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

FOODS THAT DO NOT NEED PERT:







Anthropometric	Biochemical	Clinical	Dietary
Ongoing unintentional weight loss	Micronutrient status (Iron, Ferritin, B12, Folate, Fat-soluble vitamins, selenuim, 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

ORAL NUTRITIONAL SUPPLEMENT

Peptide/Semi-Elemental



















ENTERAL FEEDING AND PERT

- •Where possible, semi elemental and medium chin 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 flushes 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

- Explain shortages are ongoing until 2026
- Advise patient NOT to stockpile PERT
- Signpost to Position statement and if applicable to GUTS UK / NET/ Pancreatic Cancer UK websites.
- Make patients aware they may be prescribed a different brand / imported PERT
- Advise patients to use PERT as effectively as possible (e.g. spreading throughout the meal, store correctly, stock rotate to ensure none expire)
- Advise patients to put in their next prescription as soon as previous one dispensed & to ensure they check it has been authorised by their GP surgery
- Contact Customer Helplines: Creon: 0800 8086410, Nutrizym 08000 902408 to check local availability Mon-Fri 9-5
- Only dose escalate PERT in nutritionally compromised patients.
- Advise patient to call their dietitian if they have less than 2-weeks supply left

As per the green box PLUS:

- Ask Drs to consider addition of PPI or H2-receptor antagonist
- Ensure on 500mg calcium and 800IU vitamin D supplement & a multivitamin and mineral (and take these with PERT)
- Ensure regular glucose monitoring in people with diabetes.
- Gradually reduce PERT dose to make supplies last longer (see Position statement for details)
- If on ONS, change to peptide/semi elemental preparation
- If diabetes present monitor BGLs closely
- Consider addition of loperamide (ensure obstructive/ infective/inflammatory causes been ruled out first)
- Consider lowering fat intake (see Position statement)
- Advise against very high fibre diet (aim for <40g per day)
- Consider peptide ONS if weight loss
- Consider sugary snack in those without diabetes to maintain energy intake
- If on other medication advise GP of potential for poor absorption

- Follow ICB guidelines to access emergency supply
- If hospital based ask doctors to issue rescue prescriptions
- Be aware malabsorptive diarrhoea can affect the uptake of other medications – especially anticoagulation/ contraceptive pill / seizure medications – please flag to the managing clinician.
- Close monitoring for hypoglycaemia is needed for people with diabetes
- If no PERT available, issue peptide ONS in place of meals (see position statement)
- Be aware of risk of falls in vulnerable patients
- In vulnerable patients, admission and enteral feeding may be indicated

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.

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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