

Pancreatic Exocrine Insufficiency & Pancreatic Enzyme Replacement Therapy

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What I will be covering

- Pancreatic Enzyme Insufficiency (PEI)
 - Causes
 - Symptoms
 - Diagnosing and differential diagnoses
- Pancreatic Enzyme Replacement Therapy (PERT)
 - Who needs them
 - How to take them
 - Titrating the dose
 - Enteral feeding
 - Trouble Shooting



Causes of PEI

Primary Causes	Secondary Causes
Chronic Pancreatitis and occasionally necrotising acute pancreatitis	Previous Gastrectomy or Oesophagectomy
Pancreatic Cancer NICE guidelines suggest PERT for all Pancreatic Cancers	Changes to intestinal pH following gastric or duodenal resection
Pancreatic Surgery- Whipple's or Pylorus Preserving Pancreatoduodectomy	Bariatric Surgery- duodenal switch
Cystic Fibrosis	Somatostatin Analogues



Symptoms of Malabsorption

- Bowel Symptoms
 - Diarrhoea
 - Pale floating stool
 - Steatorrhea
 - Increased frequency & urgency
 - Increased abdominal wind and bloating
- Weight loss despite good oral intake
- Abdominal pain



Diagnosis

- Faecal elastase-
 - Poor sensitivity for early PEI
 - 89-100% accurate in moderate insufficiency, only 33-65% in mild
 - Can't use a loose stool sample
 - Not effected by treatment
- Differential diagnosis
 - Irritable Bowel Syndrome
 - Coeliac disease- Creon can sometimes show benefit
 - Small Intestinal Bacterial Overgrowth
 - Bile Acid Malabsorption



What does PERT do?

- Aids digestion by replacing the enzymes that the pancreas is not making
- Mixes with food and breaks down to allow absorption
- Contains lipase, protease and amylase
- Pancreas produces the majority of lipase in the body
- Improve quality of life and symptoms



PERT Preparations

- Capsule designed to dissolve in the stomach
- Granules disperse in food when churned in stomach
- Activated at pH 5.5 or below and irreversibly denatured at pH <4
- Creon[®]; Pancrease[®]; Nutrizym[®]; Pancrex[®]
- Porcine origin- no alternatives



PERT Preparations

PERT	Lipase	Protease	Amylase
Creon 25,000	25,000	1,000	18,000
Creon 10,000	10,000	600	8,000
Nutrizym 22	22,000	1,100	19,000
Pancrease HL	25,000	1,250	22,500
Pancrex V Powder (1g)	25,000	1,400	25,000



How to take PERT

- Timing will depend on how long it takes to eat a meal
- Store at room temperature
- With a cold drink
- With all foods excluding jelly, sweets, fruit, vegetables (except avocado, potatoes, beans/pulses), squash, juice, water, tea or coffee with only a splash of milk
- Alcohol- only in milky cocktails/ drinks e.g Baileys
- Supplements
 - Juice based supplements may not need if sipped
 - Bolus/ drank quickly will require PERT



Patients who struggle to Swallow

- Open capsules and mix microspheres with acidic puree e.g apple sauce or yogurt
- Avoid taking in liquid alone
- Wash down with room temperature or colder drink
- Microspheres can cause irritation and ulcers if left in the mouth



Case Study

- Pancreatic ca patient
- Weight stable and not taking PERT
- Diet
 - Breakfast- Bowl of cereal
 - No other meals, has 1x pack of crisps and 1x yogurt for the rest of the day
 - Est <500kcal/day
- Drinks- 10 cups of tea with 8 sugars in each= 1600kcal in sugar



PERT Dosing

- Starting dose:
 - 44,000-50,000 units with meals, 22,000-25,000 units with snacks
 - 75,000 units with meals, 50,000 units with snacks in Pancreatic cancer
 - Give patients permission to dose adjust
- Fibrosing Colonopathy



Increasing PERT

- Increase incrementally- 44-50,000 units per meal, 22-25,000 per snacks
- Increase until symptoms controlled- patient can dose adjust
- $\geq 10\ 000$ units lipase/kg/day, then other causes of the symptoms should be considered before increasing the dose of PERT further



PERT & End of Life

- PERT remains indicated if still eating to improve quality of life
- If intake reduced, consider reducing dose
- If the patient is not eating- can stop PERT due to high pill burden



PERT Effectiveness and Dosing

- Everyone is different!
- Pancreatic function
- Chewing patterns, time taken to eat meals
- Gastroparesis- take dose at end of meal
- Total Gastrectomy- open capsule
- Whipples procedure- no bicarbonate release
- Biliary drains- pH of duodenum not changed
- Dumping syndrome- more frequent enzymes



If symptoms are not improving

- Ensure PERT is being taken correctly
- Is PERT being stored correctly?
- Consider Proton Pump Inhibitor if not prescribed
- Ensure it is being taken with all intake
- Explore other causes of symptoms
- Can change product



Fat Soluble Vitamins

- Complementary mechanisms?
- Vitamin A & E- serum levels don't drop until body stores significantly limited
- Vitamin D- review at similar times of year if possible
- Vitamin K- Prothrombin time a marker, consider effect on warfarin.
- Levels should be monitored for curative patients.
- Routine supplementation due to high risk of deficiency



Poll:

How confident are you with enteral feeding and pancreatic enzymes?

Not at all Confident Somewhat Confident Very Confident



PEI, PERT & Enteral Feeding

- Labour intensive
- Use Pancrex V Powder over PERT that uses microspheres when giving via a tube
- Refeeding risk
- Add to feed or 2 hourly?
- If flushes- do not flush with water pre and post
- Peptide feeds can be used without PERT
- Can be taken orally if fed into the stomach
- Very limited evidence base





Case Study

- Recently diagnosed pancreatic head cancer
 - Bowels opening up to 10x a day, very loose
 - Eating small amounts ~1/2 portions
 - Avoiding fatty foods as makes bowels worse
 - Not yet started any PERT
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- Poll- What do think is important to discuss with this patient?



Summary

- Take in depth diet history
- Ensure PERT is stored and being taken correctly
- Discuss with patients about titrating dose if symptoms persist
- Consider differential diagnoses



Any Questions?

