



# Pancreas Exocrine Insufficiency

Presented by: Mary-Eve Brown, RD, LDN,CSO

# Objectives

Importance of screening for PEI

Signs and Symptoms of PEI

How to dose and take PERT (Pancreas exocrine replacement therapy)

# Why screen?

At the time patients with PC present themselves:

- Nutritional status is often poor
  - 30% are malnourished
  - 80% report weight loss
  - More than one-third have lost >10% of their usual body weight
- Malnutrition and weight loss in cancer patients can be explained by different mechanisms (eg, changes in tumor cell metabolism, loss of appetite, other nutrition impact symptoms)
  - In PC, pancreatic exocrine insufficiency (PEI) can be another important factor in poor nutrition status

# Importance of PEI Diagnosis



A proper diagnosis is important, since untreated PEI will lead to maldigestion, malabsorption and malnutrition

As a consequence, patients develop fat-soluble vitamin deficiencies resulting in a variety of secondary symptoms

# Incidence of PEI

PEI in unresectable pancreas cancer has a prevalence ranging from 50% to 100%.

A recent meta-analysis showed that PEI was prevalent in 72% of unresectable PC, and that PEI was 3.4 times more prevalent in patients with pancreatic head versus pancreatic tail tumors.

Of note, 78% of PC tumors are located in the head, which contains the largest part of the exocrine tissue. The remaining 22% of PC tumors are equally distributed in the body and in the tail.

PEI also seems to be evolving during the disease. A prospective study in unresectable cancer showed incidences of PEI between 66% and 92% and a decline of the pancreatic exocrine function of **~10% per month**

# Incidence

A systematic review evaluating PEI in patients with PC before and after pancreaticoduodenectomy (PD) found the prevalence of PEI pre-operatively to be 44% and post-operatively 74% (range 36%-100%).

In case of distal pancreatectomy (DP), PEI was present in 20% of patients pre-surgery and in 67% to 80% after DP.

According to another review, PEI after PD ranges from 70% to 100%.

A lower prevalence was found in patients who had undergone DP (30%-66%). This review also reported a substantial prevalence pre-operatively ranging from 46% to 100%.

# Testing

## Direct Testing

measure the release of pancreatic juice in the duodenum have a good specificity and sensitivity but are invasive, time-consuming and not available at many locations

## Indirect Testing

measuring fecal fat in stool; patient eats a high-fat diet with 100 grams/day for 5 days and collect stool for the last 3 days but very unpleasant and tolerance is low

C-mixed triglyceride breath test ( $^{13}\text{C}$ -MTGT) is a non-invasive test for the detection of moderate and severe PEI, but it requires prolonged breath sampling and is not available at many locations

## Stool elastase test

Limitation could be not specific for early detection in mild cases of PEI

Also test for fat soluble vitamin deficiencies (ADEK)



# Screen for Signs and Symptoms

**Patient reports bowel movements as:**

- **Light tan or yellow in color**
- **Increased frequency**
- **Loose or unformed**
- **Float**
- **Large volume**
- **Fluffy**
- **Urgent**

# Screening

- **Excessive gas**
- **Cramping after eating**
- **Pain after eating**
- **Loss of appetite or food avoidance**
- **Gas or BM with foul/rancid odor**
- **Presence of oil in toilet after BM**
- **Cramping with BM**
- **Hyperactive bowel sounds**
- **Weight loss despite adequate intake**
- **Early satiety**
- **Unable to gain weight**

# Dosing

Can be by fat grams per meal/snack

Can be weight based

CFF

# Grams Fat/Meal or Snack

500–4,000 lipase units per gram of fat ingested

Mean is 1,800 lipase units/g of fat

Example

3 oz Turkey and 1 oz American cheese sandwich with 1 tablespoon mayonnaise, 1 cup coleslaw , 1 oz pretzels

31 grams fat = 56,000 lipase units

# Weight-Based Dosing

500-2,500 lipase units/kg/meal

250-1,250 lipase units/kg/snack

# How to Start

Start initial dose in the lower range and titrate up as needed to treat malabsorption

1000-2000 lipase units/gram of fat

Or

**500-1000 lipase units/kg BW**

# Maximum Dosing

>2500 lipase units/kg per meal

>10,000 lipase units/kg per day

Can add PPI if at max dose

# How to Take

First bite first pill

Space remaining in the meal

NOT

Before

Together

after



# Other Things

They can be opened and sprinkled in applesauce or other soft acidic food

Do not need enzymes if eating fruit  
Or small bite of something

Do not take with hot or warm liquids

---

**Thank You!**

# References

Mekal D, et al. *Cancers (Basel)*. 2023;15(15):3816.

Vujasinovic M, et al. *Nutrients*. 2017;9(3):183.

Lindkvist B. *World J Gastroenterol*. 2013;19(42):7258–7266.

Cystic Fibrosis Foundation. Clinical Care Guidelines.

<https://www.cff.org/medical-professionals/clinical-care-guidelines>

Claghorn KVB, et al. Pancreas Enzyme Replacement Therapy (PERT). OncoLink. Reviewed May 30, 2023.

<https://www.oncolink.org/support/nutrition-and-cancer/during-and-after-treatment/pancreatic-enzyme-replacement-therapy-pert>

Whitcomb DC, et al. *Gastroenterology*. 2023;165(5):1292–1301.