Updates in Chronic Pancreatitis

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Disclosures

Jodie Barkin, M.D., faculty for this educational activity, is a consultant for AbbVie, Aimmune Therapeutics, Nestle Health Sciences, CorEvitas, Exact Sciences, Immunovia, Motis GI, Organon, LLC, Cystic Fibrosis Foundation, and Medtronic. He has indicated that the presentation or discussion will not include off-label or unapproved product usage.

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Learning Objectives

- Identify the etiologies of Chronic Pancreatitis
- Recognize the presenting symptoms of Chronic Pancreatitis including Exocrine Pancreatic Insufficiency
- Appreciate the impact of complications of chronic pancreatitis.

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Overall Progression of Pancreatic Disease

3rd Most Common Reason for GI Related Hospitalization in U.S. [1]

Acute Pancreatitis

~ 280,000/year total; ~ 150,000/year incident in U.S.[1,2]

Single Episode

Recurrent OR Complication

Recurrent Acute Pancreatitis

~ 40-50,000 of the 150,000[2]

Chronic Pancreatitis

Pancreatic Cancer

1. Peery AF, et al. Gastroenterology 2019;156(1):254-72.e11
2. Cote GA, et al. Am J Gastroenterol 2018;113:906-912.

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Chronic Pancreatitis: Epidemiology

CP Prevalence:

36.9-41.8 per 100,000 people[1]

Etiology – WOMEN[2]	Prevalence
Idiopathic	32%
Alcohol	30%
Genetic	12.8%
Obstructive	12%

Etiology - MEN[2]	Prevalence
Alcohol	58.5%
Idiopathic	18%
Genetic	7.3%
Obstructive	2.4%

- ~60% of CP from AP/RAP[3]
- CP after AP by AP Etiology[4]:
  - Alcoholic 2x vs. Idiopathic/Genetic
  - Alcoholic 5x vs. Biliary

1. Conwell D, et al. *Pancreas*. 2014;43(8):1143-1162.
2. Romagnuolo J, et al. *Pancreas*. 2016;45(7):934-940.
3. Gardner TB, et al. *Am J Gastroenterol*. 2020;115(3):322-329.
4. Yadav D, et al. *Am J Gastroenterol*. 2012;107:1096–103.

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Mechanistic Definition of Chronic Pancreatitis

- Progressive model of disease with sequential features
- CP Mechanism: "A pathologic fibroinflammatory syndrome of the pancreas in individuals with genetic, environmental, and/or other risk factors who develop persistent pathologic responses to parenchymal injury or stress."

Characteristics of End-Stage CP
Pancreatic atrophy
Fibrosis
Pain syndromes
Duct distortion/strictures
Calcifications
Pancreatic endocrine dysfunction
Pancreatic exocrine dysfunction
Dysplasia (Pancreatic cancer)

Gardner TB, et al. *Am J Gastroenterol*. 2020;115(3):322-329.
Whitcomb DC, et al. *Pancreatology*. 2016;16:218-24.
Whitcomb DC. *Pancreas*. 2016;45(10):1361-4.

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Chronic Pancreatitis Etiologies: TIGAR-O
(Version 2 in 2019)

- **T**oxic-metabolic: Alcohol, Smoking, HyperCa, Hypertriglyceridemia, Medications, Toxins (CKD, Chemo/XRT, Vascular), Metabolic (DM, obesity)
- **I**diopathic
- **G**enetic: CFTR, PRSS1, SPINK, CTRC, among others
- **A**utoimmune Pancreatitis
- **R**ecurrent Acute Pancreatitis
- **O**bstructive: Divisum, Ampullary stenosis, MPD stones/strictures/calcifications, Neoplasm

***Remember*: Perform a Careful and Detailed Clinical, Family, & Social History**

Whitcomb DC, et al. Clin Transl Gastroenterol. 2019;10(6):e00027

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Diagnosis of Chronic Pancreatitis

- Clinical Factors: Symptoms (pain, malnutrition, diarrhea), History of acute/acute recurrent pancreatitis, Sarcopenia
- Labs: Diabetes mellitus, Fat soluble vitamin deficiencies, Fecal fat

Imaging/Histology:

- CT or MRI 1st line (CT/MRI/EUS similar sensitivity)
- EUS only if question of diagnosis (invasive, lack of specificity)
- Secretin-MRCP if dx inconclusive after imaging +/- EUS with high clinical suspicion
- Histology (gold-standard) only if high clinical likelihood of CP, but dx remains inconclusive
- Pancreatic function testing is complementary as used for EPI but not CP diagnosis

Gardner TB, et al. *Am J Gastroenterol.* 2020;115(3):322-329.

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Natural History of Chronic Pancreatitis[1]

- **Early Phase:** approximately the first 5 years of the illness are characterized by acute pancreatitis, pain, hospitalizations and surgical interventions
  - "Early CP": Preserved pancreatic function & potentially reversible features; however, no specific international consensus definition or diagnostic criteria for this entity[2]
- **Middle Phase:** lasting 5-10 years in which acute manifestations are reduced, but stricture of the main biliary duct, chronic pseudocysts and pancreatic calcifications become apparent
- **Late Phase:** 10 years onwards, acute manifestations become rare and focus on diabetes mellitus, exocrine pancreatic insufficiency and pancreatic cancer

1. Levy P, et al. UEG Journal 2014;2(5):345-365.
2. Whitcomb DC, et al. Pancreatology 2018;18:516-527.

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Management of Chronic Pancreatitis

- Prevent further damage:
  - Recognize and correct inciting event
  - Discontinue alcohol → ↓ pain, but unchanged risk of EPI/Diabetes
  - Discontinue smoking → ↓ pancreatic calcifications
  - Address strictures and stones
- Nutritional support
  - Regular diet
  - Pancreatic enzyme replacement therapy (PERT)
  - Vitamins – A, D, E, K
  - Minerals – B-12, Folate, Zinc, Selenium
- Pain control – non-narcotic pain medication
- Complication recognition
  - Malignancy, Diabetes, Bone Disease, Exocrine Pancreatic Insufficiency

Othman MO, Harb D, Barkin JA. Int J Clin Pract 2018;72(2). doi: 10.1111/ijcp.13066.
Barkin JA, Barkin JS. J Clin Densitom. 2020 Apr-Jun;23(2):237-243.
Gutama BW, et al. Pancreas 2019;48(9):1160-1166.
Gardner TB, et al. *Am J Gastroenterol*. 2020;115(3):322-329.

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Pain Management in Chronic Pancreatitis: Part 1

- Opiates: only once other modalities exhausted
  - Consider gabapentin or amitriptyline
- PERT: ***Not*** used for pain
- Celiac block:
  - Bupivacaine and triamcinolone; EUS vs. Percutaneous
  - Duration 3-6 months
  - ↓ Opioid requirements
- Antioxidant therapy: limited potential benefit
  - Mechanism: ↓ oxidative stress, ↓ free radicals, anti-inflammatory effects
  - Widely variable combinations studied
  - General combination: selenium, ascorbic acid, b-carotene, methionine
  - Blueberries → ↑ insulin sensitivity and ↑ pancreatic β-cell survival in murine models[2]

1. Gardner TB, et al. *Am J Gastroenterol*. 2020;115(3):322-329.
2. Liu W, et al. *Nutr Metab (Lond)*. 2019;16:34.

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Pain Management in Chronic Pancreatitis: Part 2: Endoscopic vs. Surgical

- Endoscopic options: EUS, ERCP, +/- ESWL
- Surgical options: drainage vs. resection

- ACG 2020 Recommendation[1]: Surgical > endoscopic therapies for long-term pain relief in obstructive CP if exhausted or unsuccessful endoscopic approaches (type of surgery doesn't matter)
  - RCT of 39 CP patients to endoscopy (16/19 ESWL) vs. surgery (20) for pain relief followed for 24 months:[2]
    - Pain relief: 32% endo vs. 75% surgery
    - 47% of endo treated eventually underwent surgery
    - More interventions needed in endo group
  - Long-term (79 month) follow up:[3]
    - No significant difference in mean validated pain scores (Endo 39 vs Surg 22; p 0.12)
    - Surgery better for pain relief (80% vs 38%; p 0.042)
    - No differences in QOL and pancreatic function

- TPIAT:
  - Only after exhausting medical treatment options for pain in CP (different than in recurrent AP to prevent debility and CP development)
  - Expert centers only, Multidisciplinary approach required, No RCTs available

1. Gardner TB, et al. *Am J Gastroenterol*. 2020;115(3):322-329.
2. Cahen DL, et al. *N Engl J Med*. 2007;356(7):676–84.
3. Cahen DL, et al. *Gastroenterology*. 2011;141(5):1690–5.

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Exocrine Pancreatic Insufficiency: Definition

- Exocrine Pancreatic Insufficiency a.k.a. ***EPI***

New Proposed Definition of EPI (AGA-PancreasFest 2021)*:

- *Essence*: Failure of pancreas to deliver minimum level of pancreatic digestive enzymes to the intestine to meet the nutritional/metabolic needs of that patient
  - Impacted by macro/micro-nutrient needs, nutrient intake, exocrine pancreas function, and intestinal anatomy/function/absorptive capacity
- *Character*:
  - Variable deficiencies in micro- and macro-nutrients (essential fats & fat-soluble vitamins)
  - GI symptoms of maldigestion
  - Improvement with Pancreatic enzyme replacement therapy (PERT), diet/lifestyle changes, and disease treatment
- Normal pancreatic function will produce approximately 700,000 lipase units per meal (varies by meal)
- Fat maldigestion when < 10% of residual lipase function

Whitcomb DC, et al. AGA-PancreasFest Joint Symposium 2021.
Lindkvist B. *World J Gastroenterol*. 2013;19:7258-7266.
Sikkens E, et al. *Best Pract Res Clin Gastroenterol*. 2010;24(3):337-347.
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Domínguez-Muñoz JE. *Adv Med Sci*. 2011;56(1):1-5.
DiMagno EP. *NEJM*. 1973;288:813-815.
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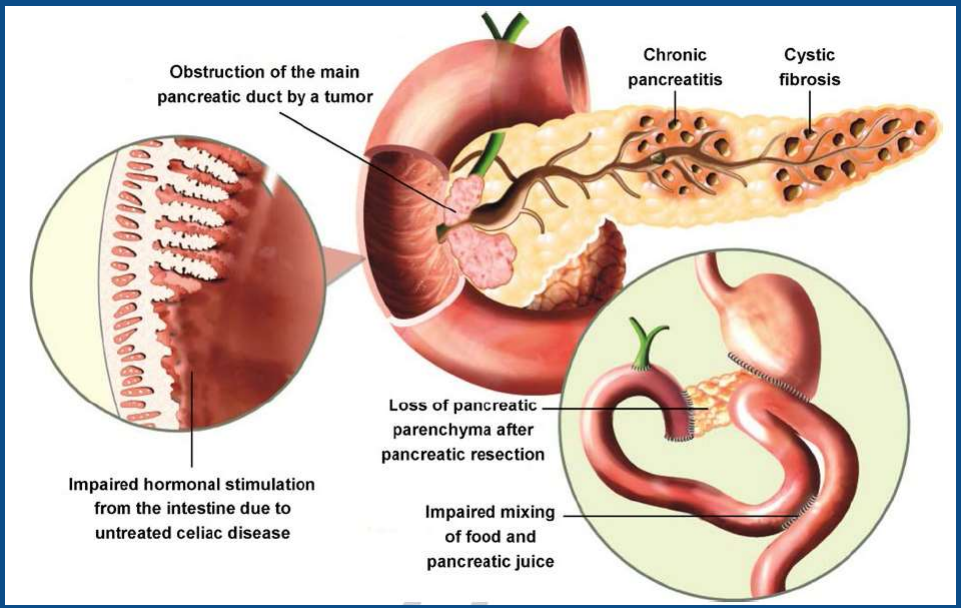
Causes of Exocrine Pancreatic Insufficiency



Lindkvist B. *World J Gastroenterol* 2013;19(42):7258-66

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Exocrine Pancreatic Insufficiency (EPI) in Chronic Pancreatitis

- Etiology:
  - Destruction of pancreatic parenchyma and loss of acinar cells
  - Obstruction of the pancreatic duct secondary to strictures and stones
- Prevalence and severity of EPI increases with duration of CP
  - 6-22% at time of CP diagnosis
  - 28% by 5 years post-CP diagnosis
  - 50% by 12 years post-CP diagnosis
- More common in alcoholic than non-alcoholic CP (41% vs. 19%)

Duggan S, et al. *Nutr Clin Prac*. 2010;25:362-370.
Muniraj T, et al. *Dis Month*. 2014;60:530-550.
Lindkvist B. *World J Gastroenterol*. 2013;19:7258-7266.
Layer P, et al. *Gastroenterology*. 1994;107(5):1481-1487.
Machicado JD, et al. *Pancreatology*. 2018;18(1):39-45.
Sandhu BS, et al. *Clin Gastroenterol Hepatol*. 2007;5(9):1085-1091.

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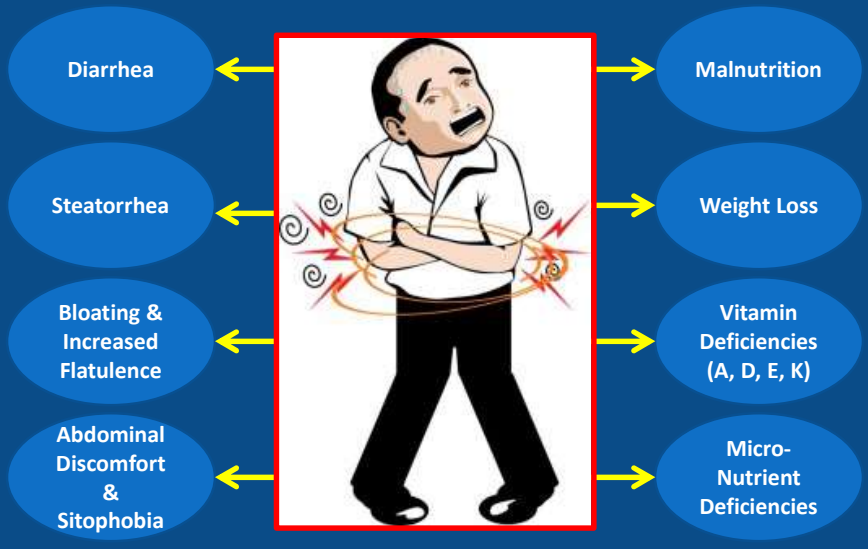
Clinical Symptoms of Exocrine Pancreatic Insufficiency



Pezzilli R, et al. *World J Gastroenterol.* 2013;19:7930-7946.
Keller J, Layer P. *Gut*. 2005;54(Suppl VI):vi1-vi28.

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Diagnosis of Exocrine Pancreatic Insufficiency

- Quantitative 72-hour fecal fat (using a standardized fat intake diet)
- Endoscopic pancreatic function testing via Dreiling tube/endoscopy (+/- use of secretin) – measuring bicarbonate secretion
- Secretin enhanced MRCP pancreatic function testing
- **Fecal elastase-1 (FE-1) (Traditionally EPI < 200 mcg/g)**
  FE-1 performance characteristics by meta-analysis[1]:
  - FE-1 vs. Secretin Stimulation: FE-1 sensitivity 77%, specificity 88%
  - FE-1 vs. Quant Fecal Fat: FE-1 sensitivity 96%, specificity 88%
  - If low EPI probability (5%), FE-1 false neg = 1.1%, false pos = 11%
  - If high EPI probability (40%), FE-1 false neg = ~ 10%
- Fecal chymotrypsin (less sensitive than FE-1)
- Breath testing via 13-C mixed triglyceride marked substrates (unavailable in US)
- Imaging severity of CP does not correlate with presence or severity of EPI

Don't Forget… Perform FE-1 testing on solid stool to reduce false positive results

1. Vanga RR, et al. *Clin Gastroenterol Hepatol*. 2018;16:1220-8.
2. Lohr JM, et al. *UEG Journal*. 2017;5(2)153-99.

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Pancreatic Enzyme Replacement Therapy Corrects Nutritional Deficiencies in Chronic Pancreatitis

The Solution to EPI is…
Pancreatic Enzyme Replacement Therapy (PERT)

- **PERT to be taken WITH meals**
- Approximately **36,000-80,000 units of lipase per meal** (half for snacks)
- In a meta-analysis of 17 studies of 511 CP patients, PERT significantly improved coefficient of fat absorption compared to baseline ($p<0.00001$) and placebo ($p=0.0001$), and reduced fecal fat excretion
- No significant adverse events with PERT
- PERT improves nutritional parameters, GI symptoms, and quality of life
- High-dose or enteric-coated enzymes more effective than low-dose or non-coated

De La Iglesia-Garcia D, et al. Gut 2017;66(8):1354-1355

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1. We suggest PERT in patients with CP and exocrine pancreatic insufficiency to improve the complications of malnutrition.
2. Patients with CP should have periodic evaluation for malnutrition including tests for osteoporosis and fat-soluble vitamin deficiency.
3. We do not suggest the use of pancreatic enzyme supplements to improve pain in CP.
4. PERT should include an adequate dosage (at least 40,000–50,000 USP units of lipase with each meal) administered during the meal.

Gardner TB, et al. *Am J Gastroenterol*. 2020;115:322-339.

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PERT Initial Dosing & Adjustment

Society Sponsoring Guideline	Year	PERT Starting Dose
American College of Gastroenterology [1]	2020	40,000-50,000 units TID with meals (half dose with snacks)
United European Gastroenterology [2]	2017	40,000-50,000 units TID with meals (half dose with snacks)
Australasian Pancreatic Club [3]	2015	25,000-40,000 units TID with meals (10,000 units with snacks)
Japanese Society of Gastroenterology [4]	2015	Initial dosing not mentioned

- PERT should be administered with meal (not before or after)
- PERT "non-responders" management:
  - Ensure PERT compliance/correct administration
  - Consider increasing dose
  - Consider adding PPI
  - Consider switching PERT type/formulation
  - Ensure no other comorbid conditions, i.e. SIBO

1. Gardner TB, et al. *Am J Gastroenterol*. 2020;115:322-339.
2. Lohr JM, et al. *UEG Journal*. 2017;5(2)153-99.
3. Working Party of the Australasian Pancreatic Club, et al. *Pancreatology*. 2016;16(2):164-80.
4. Ito M, et al. *J Gastroenterol*. 2016;51:85-92.

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PERT Treats EPI-Associated Symptoms and Malabsorption in Chronic Pancreatitis

- Aim: Evaluate improvement in EPI in patients with CP taking PERT for coefficient of fat absorption (CFA) and clinical symptoms (stool frequency, consistency, abdominal pain & flatulence)
- Methods: Post-hoc analysis of 2 double-blind, randomized, placebo-controlled trials of PERT (pancrelipase) x1 week + 51-week OLE in subjects with CP followed by ANOVA analysis for symptoms response calculations.
- Study Population:
- 116 CP patients (59 treated with PERT & 57 with placebo)
- 86 (74%) men, median age 47 years

Barkin JA, et al. *Pancreas*. 2021;50(2):176-82.

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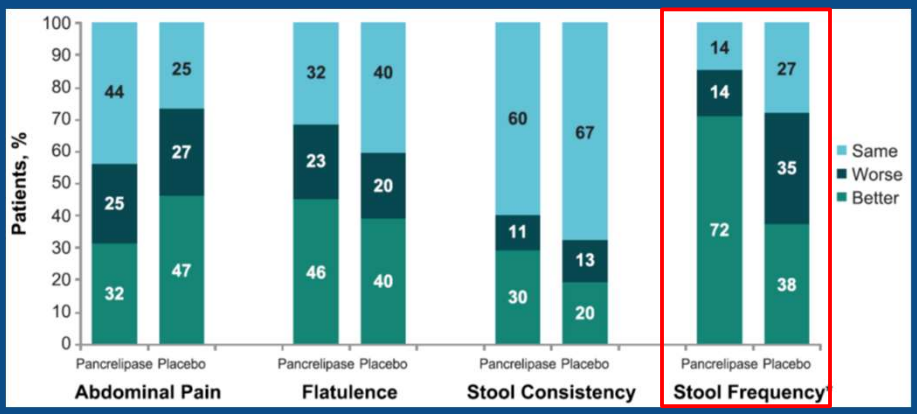
PERT Treats EPI-Associated Symptoms and Malabsorption in Chronic Pancreatitis



- Treatment with PERT vs. Placebo significantly improved stool frequency at week 1 (71.9% vs. 38.2%; p=0.001)

Barkin JA, et al. *Pancreas*. 2021;50(2):176-82.

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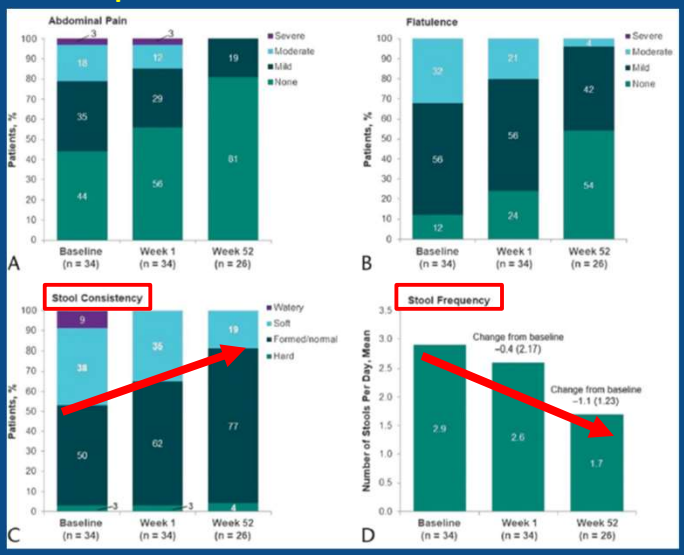
PERT Treats EPI-Associated Symptoms and Malabsorption in Chronic Pancreatitis

Stool consistency and frequency significantly improved with PERT, with durable 52-week response



Barkin JA, et al. *Pancreas*. 2021;50(2):176-82.

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PERT Treats EPI-Associated Symptoms and Malabsorption in Chronic Pancreatitis

TABLE 2. *P* Values From ANOVA for Between-Group Comparison of Change From Baseline in CFA or MSF and Symptom Response

	Change in CFA		Change in MSF	
	Symptom Improved vs Not Improved*	Pancrelipase vs Placebo†	Symptom Improved vs Not Improved*	Pancrelipase vs Placebo†
Symptom	*P*	*P*	*P*	*P*
Abdominal pain	0.842	<0.001	0.850	<0.001
Flatulence	0.282	<0.001	0.058	<0.001
Stool consistency	0.030	<0.001	0.033	<0.001
Stool frequency	<0.001	<0.001	<0.001	<0.001

- **Stool Coefficient of Fat Absorption and Mean Stool Fat improved with PERT**
- On ANOVA, improvement in stool frequency and consistency positively correlated with improvement in CFA and mean stool fat.
- PERT use did not affect significant changes in abdominal pain & flatulence.
- **Improved stool frequency and consistency may serve as surrogate clinical markers of response to PERT**.

Barkin JA, et al. *Pancreas*. 2021;50(2):176-82.

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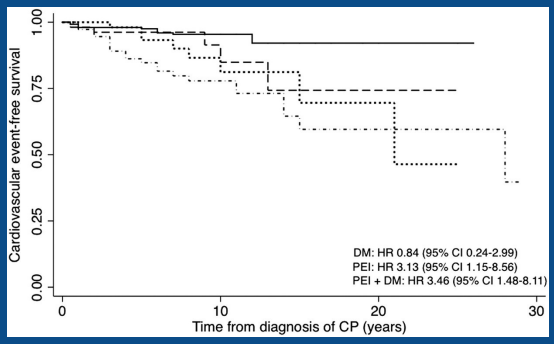
EPI in Chronic Pancreatitis Is Associated with Increased Risk of Cardiovascular Events

- Aim: To evaluate the risk of cardiovascular (CV) events in a CP cohort and evaluate the association with EPI.
- Methods: Prospective, longitudinal cohort study of 433 CP patients in Spain (Mean age 47.8 ± 14.4 years of age; 79.1% male; Mean follow-up was 8.6 ± 4.6 years).



Conclusions:

- Higher incidence of CV events if EPI present
  - Incidence Rate Ratio 3.67, 95% CI 1.92-7.24, p<0.001

Increased CV risk on Multivariate Analysis if:

- EPI without DM (OR 4.96; 95% CI 1.68-14.65)
- Coexistence of EPI and DM (OR 6.54; 95% CI 2.71-15.77)
- Hypertension (OR 3.40; 95% CI 1.50-7.72)
- Smoking (OR 2.91, 95% CI 1.07-7.97)

De La Iglesia D, et al. J Gastroenterol Hepatol. 2019;34(1):277-83.

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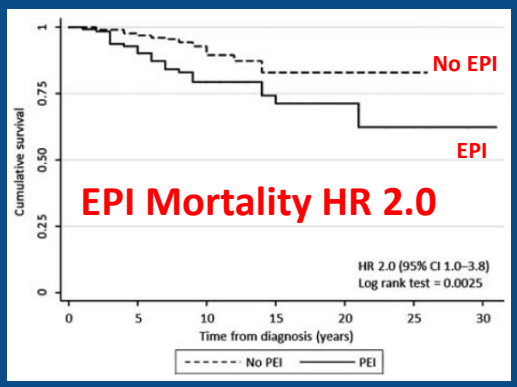
EPI in Chronic Pancreatitis Is Associated with Increased Risk of Mortality

- Aim: Assess mortality risk of EPI in CP patients
- Methods: prospective longitudinal cohort study of 430 CP patients (79.1% M; mean age 47.8 yrs; mean follow up 8.6±4.6 yrs)

Conclusions: EPI is associated with increased:

- Mortality (HR 2.59; p<0.003)
- Cirrhosis (HR 3.87; p<0.001)
- Age at diagnosis (HR 1.05; p<0.001)
- Toxic etiology of CP (HR 3.11; p<0.05)
- Respiratory comorbidities (HR 2.19; p<0.03)
- Lower nutritional markers in EPI vs. non-EPI (p<0.001) and in pts who died vs. survived (p<0.001)



De La Iglesia D, et al. J Clin Gastroenterol. 2018;52(8):e63-e72.

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Anthropomorphic Effects of EPI in CP

Weight:

- EPI is associated with being underweight[1]
- On multivariate analysis, presence of EPI was significantly and independently associated with lower BMI

Muscle Mass:

- EPI significantly increases risk for sarcopenia[2,3]
- Presence of sarcopenia also increases risk for EPI (76% of CP pts with sarcopenia had EPI; OR 3.8, 95%CI 1.2-12.5, p=0.003)

1. Olesen SS, et al. *Nutrition*. 2017;43-44:1-7.
2. Olesen SS, et al. *Pancreatology*. 2019;19(2):245-251.
3. Shintakuya R, et al. *Pancreatology*. 2017;17:70-75.

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Metabolic Bone Disease in CP Patients with EPI

- Decreased bone mineral density is common in CP and increased in those with EPI[1,2]
- Pooled Prevalence of Bone Disease in CP (Systematic Review & Meta-Analysis of 513 pts): Osteopenia 40%; Osteoporosis 23%[3]
- Osteoporosis is increased in CP compared to matched controls (34% vs. 10%)[4]
- Low-trauma fractures are common in CP (4.8% Prevalence) and significantly increased (HR 2.0, p<0.0001) compared to matched controls[5,6]
- Treatment with PERT in CP decreased fracture risk (HR 0.8)[6]
- Treatment with PERT is associated with significantly improved bone density via DEXA score (p<0.05)[7]

1. Barkin JA, et al. J Clin Densitom. 2020;23(2):237-43.
2. Sikkens ECM, et al. *Pancreatology*. 2013;13(3):238-242.
3. Duggan SN, et al. Clin Gastroenterol Hepatol 2014;12:219-228.
4. Duggan SN, et al. Pancreas 2012;41(7):1119-1124
5. Tignor AS, et al. Am J Gastroenterol 2010;105:2680-2686.
6. Bang UC, et al. Clin Gastroenterol Hepatol 2014;12:320-326.
7. Haas S, et al. JOP 2015;16(1):58-62

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Epidemiology and Pathogenesis of Diabetes in Chronic Pancreatitis

- Diabetes from Pancreatic disease = Pancreatogenic Diabetes = Type 3c diabetes mellitus
- Diabetes in CP: Prevalence 30-40%[1,2], Overall Incidence 30%[3]
- Progressive Incidence: 15% (3 yrs) → 33% (5+ yrs) → 46-83% (20+ yrs) → >90% (50+ yrs)[3-6]
- Risk Factors: overweight/obese, adult onset of CP, EPI, pancreatic surgery, calcifications in pancreas, duration of CP[1,2,7,8]
  - Effect of Alcohol? Mixed data, no increased risk on meta-analysis[3]

1. Bellin MD, et al. Am J Gastroenterol 2017;112:1457-65.
2. Schwarzenberg SJ, et al. Gastroenterol Nutr 2019;68:566-73.
3. Zhu X, et al. Pancreas 2019;48:868-75.
4. Pan J, et al. Medicine (Baltimore) 2016;95:e3251.
5. Malka D, et al. Gastroenterology 2000;119:1324-32.
6. Wang W, et al. Pancreas 2011;40:206-12.
7. Aslam M, et al. Pancreatology 2021;21:15-20.
8. Olesen SS, et al. UEGJ 2020;8:453-61.

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Treatment Challenges and Screening for Diabetes in Chronic Pancreatitis

- *Remember*: New onset diabetes with weight loss → evaluate for pancreatic cancer
- Challenging to treat given alpha cell (glucagon) and beta cell (insulin) dysfunction with more rapid insulin dependence than type 2 DM[1]
  - Reduced insulin secretion early on in CP before development of advanced CP morphology[2]
  - Brittle diabetes, more prone to hypoglycemic episodes
  - Not an ideal medication regimen
- Screening for diabetes in CP: not mentioned in 2020 ACG CP guidelines[3]
- Consider Hemoglobin A1c testing on an annual basis

1. Woodmansey C, et al. Diabetes Care 2017;40:1486-93.
2. Lundberg R, et al. Pancreas 2016;45:565-71.
3. Gardner TB, et al. Am J Gastroenterol 2020;115:322-39.

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Effects of Diabetes in Chronic Pancreatitis

- COSMOS Study compared Type 2 DM with Diabetes in CP[1,2]:
  - Similar risks of hospitalization or mortality from MI, peripheral vascular disease, cerebrovascular disease
  - Diabetes in CP → ↑ risk of hospitalization from COPD (HR 1.7), infectious disease (HR 1.4), mod-sev renal disease (HR 1.4), all-cause mortality (HR 1.3)
- ↑ Risk of Pancreatic Cancer in CP with diabetes vs CP without diabetes[3-5]
  - Baseline ↑ risk of Pancreatic Cancer in CP vs general population
  - ↑ Cancer-related mortality in women with diabetes in CP vs type 2 DM or type 1 diabetes[1]
  - COSMOS Study: Compared to Type 2 DM alone, ↑ Pancreatic cancer risk in CP without and with diabetes (Without aHR 4.9; With aHR 12) → *CP and Diabetes are compounding risks for Pancreatic Cancer*[5]
- PROCEED Study: ongoing prospective study to evaluate CP and complications including diabetes[6]

1. Cho J, et al. Acta Diabetol 2021;58:797-807.
2. Cho J, et al. Am J Gastroenterol 2019;114:804-12.
3. Munigala S, et al. Dig Dis Sci 2022;67:708-15.
4. Liao KF, et al. Taiwan J Gastroenterol Hepatol 2012;27:709-13.
5. Cho J, et al. Diabetes Care 2020;43:2106-12.
6. Yadav D, et al. Pancreas 2018;47:1229-38.

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Pancreatic Cancer Screening in CP?

- Relatively higher risk of pancreatic adenocarcinoma in CP vs general population[1]
- Lifetime risk of 5-10% in individuals with genetic polymorphisms[2]
- Lack of evidence showing benefit of pancreatic cancer screening program in CP[1]
- Lack of high-quality studies supporting screening: no RCTs, no systematic reviews, no meta-analyses[1]
- ACG 2020 Recommendation[3]: no definitive benefit to screen CP pts for pancreatic adenocarcinoma
  - Invasive and costly nature of testing
  - Difficult to screen due to the structural changes of CP
  - Inability to alter disease course even if early-detection of malignancy

1. Lowenfels AB, et al. *N Engl J Med*. 1993;328(20):1433–7.
2. Shelton CA, et al. *Am J Gastroenterol*. 2018;113(9):1376–84.
3. Gardner TB, et al. *Am J Gastroenterol*. 2020;115(3):322-329.

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Take Home Points

- Chronic pancreatitis results from a combination of genetic and environmental factors
- Chronic pancreatitis has several associated complications including EPI, diabetes, sarcopenia, and metabolic bone disease
- EPI may present with increased stool frequency and decreased stool consistency amongst other maldigestive symptoms
- Untreated EPI has substantial impact on symptoms, quality of life, morbidity, and mortality

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Acknowledgements

- Thank You for Joining Me Today!!

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