Pancreatic Insufficiency
What Is the Gold Standard?

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KEYWORDS

• Pancreatic insufficiency • Endoscopic function testing • Pancreatic function testing • Chronic pancreatitis

KEY POINTS

- Endoscopic pancreatic function testing is a valuable tool to assess for exocrine insufficiency and chronic pancreatitis.
- Pancreatic fluid is assessed for volume, electrolytes, or enzyme components to evaluate for pancreatic insufficiency.
- Different pancreatic function protocols are available in the literature, with limited studies on validation or comparisons of those protocols.
- Indirect pancreatic function tests have limited sensitivity and specificity in early disease stages.
- Newer techniques using MRI to measure pancreas function show promise for evaluating pancreatic diseases.

INTRODUCTION

Exocrine pancreatic insufficiency (EPI) is the inability of the pancreas to generate the secretory capacity of secreting enzymes, bicarbonate, and enough fluid volumes to assist in food digestion, resulting in steatorrhea or diarrhea and weight loss.[1–3] EPI

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can result from multiple congenital or acquired pathologic conditions, and has negative implications for the health and overall wellbeing of the individuals with this condition.[4,5] There is limited knowledge on the incidence and prevalence of EPI and it is generally thought to be underrecognized.[6] Etiologic factors for EPI include congenital and acquired syndromes that manifest as the patient ages from childhood to adulthood. Cystic fibrosis is the most common etiologic factor of congenital EPI in both children and adults.[7] Other conditions that cause EPI in children include but are not limited to Shwachman-Diamond syndrome,[8] Pearson Marrow syndrome, and Jeune syndrome.[9] **Box 1** highlights congenital diseases that are associated with EPI. Acute recurrent pancreatitis and chronic pancreatitis (CP) with a combined incidence of 1 to 5 out of 100,000 population are increasingly important causes of EPI.[10,11] EPI is the gold standard for diagnosing CP.[12] EPI diagnosis by direct function testing is a sensitive method to test for early CP, when mild changes are not easily detectable on imaging.[13]

CP is a morbid condition with poor quality of life; significant pain; and a negative impact on growth, health, and overall wellbeing.[4,5,14,15] Late stages of the disease, manifested by parenchymal fibrosis and loss of exocrine function, are easier to diagnose than mild and early stages (minimal change disease). If CP is recognized early, therapies to treat mild disease and halt the progression to EPI could be applied.[16–19] As such, studies geared toward early detection are needed to identify early-stage disease and allow therapeutic interventions to be applied.

Diagnosing EPI accurately in early-stage disease, remains a challenge in clinical practice. It is of particular importance to recognize the differences in pancreatic function testing (PFT) available in terms of performance, methodology, and interpretation, with the endpoint of facilitating patient management. In general, PFT is thought of in 2 major entities: indirect tests that measure the consequences of EPI and direct PFT that measures the pancreatic function directly.[20] This article summarizes the evolution of PFT over the years and highlights areas for future research.

INDIRECT PANCREATIC FUNCTION TESTING

Indirect PFT is used in clinical practice to screen for a pancreatic disease but seldom confirms the presence of the disease in the pancreas. In general, indirect testing is noninvasive but not as sensitive and specific to pancreatic disease. Indirect testing has a low sensitivity in mild pancreatic disease and has a better sensitivity in more advanced disease.[21,22] Some of the indirect methods that can be used in assessing pancreatic function include fecal fat, fecal elastase, fecal chymotrypsin, and serum markers, including trypsinogen, each of which has its limitations. Studies have shown

Box 1
Congenital syndromes leading to exocrine pancreatic insufficiency

- Cystic fibrosis
- Shwachman-Diamond syndrome
- Johanson-Blizzard syndrome
- Pearson bone marrow syndrome
- Jeune syndrome
- Fetal or congenital infections
- Agenesis of the pancreas