

**SECTION:** Clinical

**Procedure No.** 02131/v1/01/2018

**PROCEDURE TITLE:** Pancreatic Function Breath Test <sup>13</sup>C with Mixed Triglyceride

**Review Officer:** Senior Scientist,  
Gastroenterology and Hepatology

**Review Summary:** v1

**Applicable To:** All Gastroenterology  
Laboratory Staff

**Date Introduced:** 01/2018

**Next Review Date:** 01/2021

**Authority:** Director, Gastroenterology &  
Hepatology

**Replaces:** New procedure

**Key Words:** pancreas, function test,  
mixed triglyceride, breath test

## PURPOSE

Pancreatic exocrine insufficiency may occur with maldigestion and also in advanced stages of pancreatic disease. The non-invasive mixed triglyceride breath test is used to detect functional impairment of the exocrine pancreas.

## OUTCOME

The test is based on the principal that the detection of <sup>13</sup>C carbon dioxide in the breath requires prior digestion by pancreatic lipase to produce free fatty acids and monoacylglycerol. These lipids are then absorbed and further metabolised, finally undergoing hepatic lipolysis and beta oxidation resulting in <sup>13</sup>CO<sub>2</sub>. The increase in <sup>13</sup>CO<sub>2</sub> in breath reflects the degree of pancreatic lipase secretion. Enrichment of <sup>13</sup>C compared to <sup>12</sup>C in the breath is evaluated using infra-red technology.

## DEFINITIONS

MTG – mixed triglyceride

## AUTHORISED TO UNDERTAKE THE PROCEDURE

All Gastroenterology Laboratory Staff

## INDICATIONS

- In several pancreatic diseases such as in chronic pancreatitis, but also cystic fibrosis, pancreatic tumors, diabetes mellitus, as well as in extra-pancreatic conditions such as Coeliac disease, Crohn's disease and Zollinger-Ellison syndrome.
- The test is useful to follow the evolution of pancreatic disease and to monitor the effect of pancreatic enzyme replacement therapy. Essentially it assesses duodenal lipase activity

## CONTRAINDICATIONS

- Nil to patient: Test is non-invasive and utilises a stable isotope of carbon that is non-radioactive and totally safe.
- Non-fasting compromises accuracy of results.

## RISKS AND PRECAUTIONS

General laboratory safety must be observed.

## STEPS OF THE PROCEDURE

### PRE-PROCEDURE PREPARATION

Patient must present in the fasted state (10 hrs).

Smoking should be avoided the day before and the day of the test.

Food products with high concentrations of <sup>13</sup>C such as corn or pineapple should be avoided for 48 hrs prior to the test.

### PATIENT TEACHING

Explain the purpose and length of time of the test, techniques used.

Provide patient with written and/or verbal instructions for conduction of the test

### SOLUTIONS AND EQUIPMENT

- <sup>13</sup>C Mixed Triglyceride powder (<sup>13</sup>CMTG) (INC 650P Mixed triglyceride (2-Octanoyl 1-<sup>13</sup>C)-1,3 distearol glycerol); Eurisotop GmbH) 200 mg per test
- 2 slices white bread (may be thawed from freezer)

- 2 x 9 g (or 0.25 g per kilo body weight) Anchor butter (room temp – obtain from ward)
- 1 large serving plate
- 1 small bread/butter plate
- Breath Test Foil Bags (Wagner Analysen Technik) – 5 double bags, each section labeled with permanent ink with the numbers 1-10
- Breath Test mouthpieces (Wagner Analysen Technik)
- Stoppers (plugs)
- Stopwatch Timer
- Clipboard with run sheet indicating sample time intervals
- Pencil
- Disposable drinking cup
- IRIS (<sup>13</sup>C Infra-Red Isotope analysis System - Wagner Analysen)

## PROCEDURE

### Test meal Preparation:

- Onto a piece of foil, weigh 200 mg <sup>13</sup>C MTG
- (INC 650P MTG (2-Octanoyl 1-13C)-1,3 distearol glycerol; Eurisotop GmbH)
- Soften the butter. Add the MTG and mix into a paste. Thickly butter the 2 slices of bread with the MTG/butter.
- Pour 150 mL tap water into a disposable cup

### BREATH TEST SAMPLE (CO<sub>2</sub>) COLLECTION:

1. Sample timings are indicated on the test timing sheet.
2. Obtain the patients height and weight.
3. Take a baseline breath sample by encouraging the patient to breathe in through the nose and gently blow into the mouthpiece.
4. Ask the patient to eat the test meal of 2 slices of bread, drink the water. The stopwatch is then started.
5. Samples are for 30mins 6hrs a total of 13 bags (basal sample + 12 test samples).
6. Once the collection is complete, analyze on IRIS.
7. 6hr cumulative <sup>13</sup>C-excretion of 23% is considered to indicate normal pancreatic function. Less than this indicates impaired pancreatic lipolytic activity.

### POTENTIAL COMPLICATIONS

- Equipment failure
- Patient not following instructions

### ANALYSIS OF RESULTS

- Results are analyzed on the IRIS instrument – see manual located in the laboratory.

### EVALUATION METHOD

The Senior Scientist will keep the procedure updated with the most relevant information.

### SUPPORTING DOCUMENTS

[01629 Booking Process for Gastrointestinal and Liver Function Tests and Oesophageal pH Studies](#)

[APPENDIX - Equipment visual](#)

### REFERENCES

1. Vantrappen GR, Rutgeerts PJ, Ghoo YF, Hiele MI. Mixed triglyceride breath test: a noninvasive test of pancreatic lipase activity in the duodenum. *Gastroenterology*. 1989 Apr;96(4):1126-34.
2. Keller J, Layer P, Brückel S, Jahr C, Rosien U. <sup>13</sup>C-mixed triglyceride breath test for evaluation of pancreatic exocrine function in diabetes mellitus. *Pancreas*. 2014 Aug;43(6):842-8.
3. González-Sánchez V, Amrani R, González V, Trigo C, Picó A, de-Madaria E. Diagnosis of exocrine pancreatic insufficiency in chronic pancreatitis: <sup>13</sup>C-Mixed Triglyceride Breath Test versus Fecal Elastase. *Pancreatology*. 2017 Mar 6. pii: S1424-3903(17)30044-3. doi: 10.1016/j.pan.2017.03.002. [Epub ahead of print]

**APPENDIX - Equipment visual**

