

SECTION: Clinical

Procedure No. 02132/v1/01/2018

PROCEDURE TITLE: Liver Function Breath Test ¹³C with Methacetin

Review Officer: Senior Scientist,
Gastroenterology & 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: Liver function, breath test.

PURPOSE

In the therapy and management of patients with chronic liver disease, quantifying liver function can greatly improve therapy control, and assessment of liver function is crucial in ensuring that the correct therapeutic decisions are made. This test enables the quantitative evaluation of the cytochrome P450 dependent liver function.

OUTCOME

When ¹³C-methacetin is orally administered, it undergoes extensive liver first-pass clearance. Hepatic cytochrome P450 IA2, (a demethylase), rapidly converts methacetin via O-dealkylation to acetaminophen and ¹³CO₂. The degree of appearance of ¹³CO₂ in breath reflects the degree of demethylation. Enrichment of ¹³C compared to ¹²C in the breath is evaluated using infra-red technology.

AUTHORISED TO UNDERTAKE THE PROCEDURE

All Gastroenterology Laboratory Staff

INDICATIONS

In Hepatology: for monitoring disease progression, predicting the prognosis and choosing therapeutic strategies in patients with liver disease.

In Surgery: with liver cirrhosis or hepatoma due to undergo surgical procedures. It is necessary to be able to determine the functional liver capacity of a patient before the partial liver resection, so as to ensure that patients who no longer have sufficient functional reserves of liver tissue are not subjected to what is for them a high-risk operation or are not assigned to other treatment methods.

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

A risk of mild burns is possible when preparing the solution as hot water is used. Exercise appropriate caution.

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.

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

- ¹³C Methacetin powder (INC 590P Methacetin (N-4-Methoxy-¹³C-phenyl)acetamide); Eurisotop GmbH)
- 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 indicating sample time intervals
- Pencil
- Disposable drinking cup
- IRIS (¹³C Infra-Red Isotope analysis System- Wagner Analysen)

PROCEDURE

Solution Preparation:

1. Onto a piece of foil, weigh 75 mg ¹³C Methacetin
2. (INC 590P Methacetin; Eurisotop GmbH)
3. Add 120 mL boiling hot water to a 500 mL Schott bottle, being careful not to burn oneself.
4. Add the weighed methacetin powder, screw on the lid and shake *gently* to dissolve (sometimes the solution does not entirely dissolve. This doesn't seem to affect the test.
5. Add some ice cubes or fridge-cold tap water to make up 150 mL.

Breath Test sample (CO₂) 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 drink the test solution and start the stopwatch.
5. Samples are for 10 mins for the first hour, then after bag no 7, the timer is changed to 20 mins a total of 10 bags.
6. Once the collection is complete, analyze on IRIS.

POTENTIAL COMPLICATIONS

- Equipment failure
- Patient not following instructions

ANALYSIS OF RESULTS

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

EVALUATION METHOD

The Senior Scientist will keep the procedure updated with any relevant changes.

SUPPORTING DOCUMENTS

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

REFERENCES

1. Afolabi P¹, Wright M, Wootton SA, Jackson AA. Clinical utility of ¹³C-liver-function breath tests for assessment of hepatic function. Dig Dis Sci. 2013 Jan;58(1):33-41. doi: 10.1007/s10620-012-2340-z. Epub 2012 Aug.
2. Braden B¹, Faust D, Sarrazin U, Zeuzem S, Dietrich CF, Caspary WF, Sarrazin C ¹³C-methacetin breath test as liver function test in patients with chronic hepatitis C virus infection. Aliment Pharmacol Ther. 2005 Jan 15;21(2):179-85
3. Stravitz RT¹, Ilan Y². Potential use of metabolic breath tests to assess liver disease and prognosis: has the time arrived for routine use in the clinic? Liver Int. 2017 Mar;37(3):328-336. doi: 10.1111/liv.13268. Epub 2016 Nov 19