13C-Mixed Triglyceride Breath Test

<table>
<thead>
<tr>
<th>13C-Mixed Triglyceride</th>
<th>Molecular weight: 752.0 g/mol</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Enrichment: 99 %</td>
</tr>
<tr>
<td></td>
<td>Marked C-atoms: 1</td>
</tr>
<tr>
<td></td>
<td>Dosage: 150 mg</td>
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</tbody>
</table>

**Metabolism**

1,3-distearyl-2-(carboxyl-13C)octanoylglycerol, the so-called 13C-Mixed Triglyceride passes the stomach and is digested by lipase activity in the duodenum. The two distearyl groups have to be hydrolyzed by pancreatic lipase before absorption and metabolism of the 13C-octanoyl monoglyceride. Thus the oxidation to 13CO2 is dependent on the rate-limiting step of hydrolysis of the fatty acids in position 1 and 3.

**Applications of 13C-Mixed Triglyceride Breath Test**

The 13C-Mixed Triglyceride Breath Test assesses the duodenal pancreatic lipase activity. Therefore it is useful for the investigation of severe exocrine pancreatic insufficiency. If applied under strict conditions even mild to moderate forms can be assessed with high sensitivity and specificity.

The patient should be fasting 10 hours prior to the test. The patient must not drink carbonated water or soft drinks prior to the test since that might interfere with the results. In addition oxygen supplementation should be avoided because increased oxygen content in exhaled breath can influence 13CO2 measurement by NDIRS.

**Test Performance Procedure (see IRIS® Operating Manual for additional information)**

1. Mix 150 mg of 13C-Mixed Triglyceride with 0.25 g of butter per kg body weight and prepare it with 100 g of bread.
2. Collect zero (basal) breath sample as described in manual.
3. Enter patient height and weight into the IRIS®-3 or IRIS®-Doc Software.
4. Administer the prepared bread to the patient.
5. Collect breath samples as shown below (Table 1).
6. Analyze all 13 breath samples with IRIS®-3 or IRIS®-Doc.

<table>
<thead>
<tr>
<th>#1 Bag</th>
<th>#2 Bag</th>
<th>#3 Bag</th>
<th>#4 Bag</th>
<th>#5 Bag</th>
<th>#6 Bag</th>
<th>#7 Bag</th>
<th>#8 Bag</th>
<th>#9 Bag</th>
<th>#10 Bag</th>
<th>#11 Bag</th>
<th>#12 Bag</th>
<th>#13 Bag</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 min</td>
<td>30 min</td>
<td>60 min</td>
<td>90 min</td>
<td>120 min</td>
<td>150 min</td>
<td>180 min</td>
<td>210 min</td>
<td>240 min</td>
<td>270 min</td>
<td>300 min</td>
<td>330 min</td>
<td>360 min</td>
</tr>
</tbody>
</table>

Table 1: 13C-Mixed Triglyceride Test Sample Collection

**Results and interpretation**

The pancreatic function is assessed by the 6 hour cumulative 13CO2 excretion. This can be calculated by the IRIS®-Software, if the correct values for height and weight are entered. Vantrappen et al. found normal values to be at 35.6 % ± 2.8 %. Another study by Swart et al. resulted in a normal value of 33.6 % ± 4.6 %. For detection of disease-dimensional lipase output Vantrappen et al. suggested a cutoff value of 22 % cumulative CO2 after 6 hours (sensitivity 0.89, specificity 0.81). The two pictures below show examples of curves for a 5-hour test set-up, taken from Löser et al.
As the results are dependent on the test set-up and the population, it is strongly recommended that each laboratory establishes its own reference values.

References