CT General – Oral contrast preparation

To mark the stomach and intestinal structures in abdominal CT the Leiden University Medical Center uses the positive ionic contrast agent Telebrix Gastro (350 mgI/ml, Guerbet). Routinely this is given as a dilution of 3 % (30 ml Telebrix + 1000 ml water).

Outpatients and clinical patients with normal peristaltis get 1000 ml of this dilution during one hour before the scan to mark the intestines. It’s important to do this gradually: e.g. every 15 minutes a portion of 250 ml. Moreover it’s of importance to give extra contrast (250 – 350 ml) for adequate distension of the stomach directly before scanning.

In case of specific gastro-intestinal protocols that require an optimal distension of the small bowel and colon, this amount can be increased from 1000 ml to 1500 – 2000 ml administered 1.5 – 2 hours before the CT examination. Also for other specific indications, such as abscesses deep in the small pelvis, a larger amount can be beneficial.

In clinical patients with decreased peristaltis, such as patients confined to their beds, post-operative patients or Intensive Care patients, it is recommended to administer the 1000 ml contrast more slowly. Depending on the physical condition of the patient, the administration should start 2 – 3 hours before the examination. When the patient has a nasogastric or duodenal tube, administration via this tube is preferred.

Common rule is: preparation with 1000 ml and not preparation during 1 hour.

Also other routes of contrast marking can be chosen, in particular rectal contrast for the colon. Depending whether only the distal part or the entire colon has to be examined, there’s a choice between 500 ml and 1000 ml rectal contrast. The same 3% Telebrix dilution is applicable. When a large amount of fluid is suspected in the bowel it can be useful to use a higher concentration, e.g. 5% (50 ml Telebrix + 1000 ml water) or even more.

Marking cavities outside the bowel such as abscesses or bladder (CT cystography in trauma) or for CT fistulograms a higher concentration of 5 – 10% may be needed. Higher concentrations (in the order of 15%) can be used for CT enteroclysis in (intermittent) obstruction cases. The advantage is that conventional fluoroscopy shows the marked structures when they are large enough (e.g. fluoroscopy used for positioning the enteroclysis tube in the jejunum).

Due to the introduction of MDCT with its better spatial resolution, more efficient use of intravenous contrast agent to mark stomach/intestinal structures and an increase in 3D post-processing, negative contrast agents like water or methylcellulose 0.5% are becoming fashionable.

Water provides a good distension of the stomach, duodenum and proximal small bowel, but distally it is resorbed quickly. Starting the preparation shorter before the scan (30 minutes) can solve this problem. Methylcellulose provides a better distension of the stomach and bowel, and is especially advantageous in the colon and (distal) small bowel. A disadvantage is the taste, so mixing it with lemonade or sweeteners is necessary.

Patients who are allergic to iodinated contrast agents such as Telebrix can benefit from Barium preparations or from abovementioned negative agents in all CT examinations. However, allergic reactions caused by oral intake of iodinated contrast agents are very rare.
Protocols with water as oral contrast agent:

- CT of esophagus and stomach
- Biphasic CT of pancreatic tumours
- CT urography
- Biphasic CT of the liver
- CT of the liver preceding isolated liver perfusion or liver transplantation
- On indication: CT angiography in case distension of the stomach or intestines is needed

Protocols with methyl-cellulose as oral contrast agent:

- CT enteroclysis (after intubating the small bowel)

Air or CO\textsubscript{2} are other means to mark the digestive tract. Routinely those media are used in CT colongraphy (virtual colonscopy). Air can also be used for other forms of virtual endoscopy in CT, like in the stomach (virtual gastroscopy) or bladder (virtual cystoscopy).

In acute situations and CT angiography no oral contrast is needed. To diagnose intestinal pathology the presence of fluid and/or the high spatial resolution of MDCT (especially 16-slice) can be used. In the abdomen this is the case for acute abdomen and kidney stones.

**Children**

The amount of contrast in paediatric abdominal CT has to be adjusted to the age of the child. The oral contrast is administered in two parts: a larger amount 45-60 minutes before the scan and a smaller amount 15-20 minutes before the scan. If necessary this can be adjusted for the individual patient.

This is summarized in the table below: (see also pediatric CT protocols)

<table>
<thead>
<tr>
<th>AGE</th>
<th>45-60 min before</th>
<th>15-20 min before</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1 month</td>
<td>60ml</td>
<td>30ml</td>
</tr>
<tr>
<td>1 month – 1 year</td>
<td>125ml</td>
<td>60ml</td>
</tr>
<tr>
<td>1-5 year</td>
<td>250ml</td>
<td>125ml</td>
</tr>
<tr>
<td>6-12 year</td>
<td>400ml</td>
<td>200ml</td>
</tr>
<tr>
<td>13-15 year</td>
<td>700ml</td>
<td>350ml</td>
</tr>
<tr>
<td>&gt;15 year</td>
<td>750ml</td>
<td>350ml</td>
</tr>
</tbody>
</table>

*Based on: Siegel MJ – Paediatric Body CT – Lippincott, Williams & Wilkins, 1999*

At lower kVp dilute the oral contrast medium more: e.g. 1 % (10 ml Telebrix + 1000 ml water) at 80 kVp and 2 % (20 ml Telebrix + 1000 ml water) at 100 kVp

**Remark**

In all cases the amount of oral contrast can be adjusted according to the situation of the specific patient or pathology. Consulting the requesting physician prior to planning the study will often provide - certainly in problem cases - the best achievable examination.