Abdominal MRI made easy with orally administered manganese: a liver-specific contrast agent and a bowel marker


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Abdominal MRI made easy with orally administered manganese: a liver-specific contrast agent and a bowel marker

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Rationale and Objectives: A first clinical trial of orally administered manganese with and without ascorbic acid as a promoting agent in liver MRI was planned. The objectives of the study were to assess efficacy of the contrast agent in doses up to 100 μmol/kg bw, assess whether addition of ascorbic acid (molar ratio 1:2) to the contrast agent improved image quality, and to assess safety.

Methods: Eighteen healthy adult males were enrolled in the trial. The mean age was 25.0 years and mean weight 77.6 kg. Contrast medium: drug: MnCl₂ doses were 25, 50 and 100 μmol/kg bw, respectively and promoting agent: ascorbic acid doses were 50, 100 and 200 μmol/kg bw, respectively. The trial was started 2–3 days after orally administered MnCl₂ intake. Safety parameters assessed in the trial were clinical examinations and vital signs including heart rate and blood pressure. Hematology and clinical chemistry were assessed with standard laboratory procedures.

Results: All pulse sequences showed a clear dose–response in the liver. High enhancements in the liver were seen between 2.5 and 6 h after MnCl₂ intake. At a manganese dose of 50 μmol/kg bw with ascorbic acid and at a dose 100 μmol/kg bw both without and with ascorbic acid, the hepatic enhancements were higher than 100%. GE pulse sequence. Using the volunteers as their own controls, the enhancing effect of ascorbic acid was significant at a manganese dose of 100 μmol/kg bw. The contrast agent distributed well in the small intestine, delineating intra-abdominal organs well. No serious or unexpected adverse events were encountered. The drug was generally tolerated well except for gastrointestinal adverse events such as nausea and vomiting. No significant alteration in hematology or clinical chemistry was seen.

Conclusion: Oral manganese is easy to use and has few side-effects. Besides the liver-specific effect, the agent delineates the intestine.

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Preliminary clinical experience with oral manganese (CMC-001) for liver imaging in daily routine

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Rationale and Objectives: Recently, a new liver specific MR agent has been introduced that is administered orally and only small amounts enter the general circulation. It is the only contrast medium that is delivered to the liver in high doses in the portal vein and very low doses in the hepatic artery. It is taken up by the hepatocytes and excreted together by the bile. We recently received permission from the Danish Health Authorities to use CMC-001 clinically (phase IV). In this paper we evaluate retrospectively our preliminary experience.

Methods: Six patients were studied. All had known liver metastases from colorectal cancers. From midnight the patients were not allowed to drink or eat. Between 8 and 9 a.m. the patients drank CMC-001 dissolved in 400 mL of water and 2 h later the MR examination (1.5 T) took place. The sequences are still being optimized.

Results: In three of the six patients, important new knowledge was obtained. The uptake in the liver was excellent in all patients. There were segmental differences in the uptake in four of the six patients, probably due to fibrosis induced by chemotherapeutics or decreased portal vein flow due to metastatic compression. There was excellent visualization of the biliary system on the T₁-weighted images. No contrast medium adverse events were reported.

Conclusion: CMC-001 seems to be useful in the work-up of patients with liver metastases regarding both the liver parenchyma and the biliary tract. Further research is strongly warranted.