

## Abstract

### Detection and characterization of hepatocellular liver lesions by using MRI with hepatospecific contrast agent Gd-EOB-DTPA

**Aim:** To prospectively compare contrast properties of extracellular (gadobutrol) and hepatospecific (gadoxetic acid) contrast agents in upper abdominal MRI studies. To prospectively evaluate the possibilities of detection and characterization of hepatocellular liver lesions by means of MRI using hepatospecific contrast agent Gd-EOB-DTPA.

**Materials and methods:** Standardized (0,1 ml/kg) dose of gadobutrol (56 subjects) and gadoxetic acid (51 subjects) was administered intravenously by MRI-compatible injector at 2 ml/s, followed by 20 ml saline flush. MR signal intensity changes (SIC) between precontrast scans and arterial phase, portal venous phase, equilibrium, and delayed scans at 10 and 20 minutes were measured in abdominal aorta, portal vein, common bile duct, liver, and spleen. Mean SIC values for gadobutrol and gadoxetic acid were compared by a two-sample t-test with  $p$ -value  $< 0,05$  considered significant. A total of 78 subjects with known arterial hypervascularized liver lesion (other than haemangioma) were examined on MRI with administration of liver specific contrast agent Gd-EOB-DTPA. All studies were performed before and after contrast agent injection in arterial, portal venous, equilibrium phases, and at twenty minutes past injection. Size, signal, enhancement pattern, homogeneity, and presence of central scar were evaluated. Lesions with contrast agent accumulation in liver specific phase were considered to be of hepatocellular origin. Iso-/hyperintense lesion in liver specific phase was in non-cirrhotic liver considered to be focal nodular hyperplasia provided the features on precontrast and dynamic contrast studies were in keeping with this diagnosis. Lesion showing signal increase in liver specific phase, however to a lesser degree than normal non-cirrhotic liver parenchyma was considered to be adenoma. Lesion showing no enhancement in liver specific phase was diagnosed as metastasis.

**Results:** Gadobutrol showed superior enhancement of upper abdominal structures in the dynamic phases. On the contrary, gadobutrol reached significantly lower mean SIC in the liver on delayed scans. 101 focal nodular hyperplasias (in 67 subjects) were diagnosed. 14 adenomas were found. A single lesion in non-cirrhotic liver was thought to be a hepatoma (adenoma confirmed on biopsy). A single patient presented with tens of lesions due to liver adenomatosis (histologically verified). Two lesions in two patients with liver cirrhosis were diagnosed as hepatomas. Three oncological patients were diagnosed with liver metastases. Signal intensity changes after administration Gd-EOB-DTPA were higher in FNH lesions compared to the liver parenchyma ( $p < 0,001$ ).

**Conclusion:** Gadobutrol showed superior enhancement of upper abdominal structures in the dynamic phases whereas gadoxetic acid showed better enhancement of the hepatobiliary structures on delayed scans. Administration of liver specific contrast agent Gd-EOB-DTPA improves specification of hepatocellular liver lesions, particularly in cases of focal nodular hyperplasia where non-invasive diagnosis can be made with high accuracy. Also, differentiation between hypervascularized metastases and lesions of hepatocellular origin is very beneficial.