Imaging of hepatic hypervascular tumors & clinical implications
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Hepatoblastoma Evaluated by 18F-Fluoromethyl Choline PET/CT

AN INTERESTING IMAGE
Hepatoblastoma is a rare carcinoma mostly seen in children. Neo-adjuvant chemotherapy followed by resection and adjuvant chemotherapy is the optimal treatment. We present the case of an 18-year-old woman who presented with abdominal pain, nausea, bloating, and fatigue. MRI showed 3 hepatic lesions with high signal intensity on arterial phase T1-weighted images and slight washout on the late phase, suggestive for hepatocellular carcinoma. Laboratory examinations revealed plasma alpha-feto-protein of 114,245 Kg/L. Subsequent baseline and posttreatment 18F-fluoromethyl choline PET/CT were performed to possibly evaluate extent of the disease and assess disease response after neo-adjuvant chemotherapy. PET/CT with 18F-fluoromethyl choline (18F-FCH) is used to detect local prostate cancer and distant metastases [2].

**Figure 1**

An 18-year-old woman presented with abdominal pain, nausea, bloating, and fatigue, all features consistent with an abdominal mass. Physical examination revealed an enlarged liver with tenderness in the epigastric region. Plasma alpha-feto-protein was highly elevated (1100,000 Kg/L). Postcontrast gadolinium MRI showed 3 hyperintense inhomogeneous hepatic lesions on T1-weighted arterial images; the largest lesion measured 9 cm (A, B). Subsequent portal phase showed slight washout with enhancement of the rim of the lesions, consistent with hepatocellular carcinoma (HCC) or hepatoblastoma (C, D). The largest lesion showed hypodense central areas suggestive of bleeding or necrosis. Histopathological biopsy of the lesions was advised to determine the appropriate treatment, resulting in a slight preference for hepatoblastoma, based on histomorphology and the overexpression of alpha-fetoprotein within the lesion. Therefore, treatment with neo-adjuvant cisplatin was started to downsize the tumor [1].

Based on 18F-FCH uptake high-grade gliomas [3], benign lesions and metastases can be detected in the brain [4,5], and concerning the liver, differentiation of focal nodular hyperplasia from hepatocellular adenomas is possible [6]. Furthermore, Talbot et al [7] reported promising results with the use of 18F-FCH PET/CT in evaluation of HCCs [8]. Hepatoblastoma is a malignant hepatocyte proliferation, closely related to HCC, and therefore, we hypothesized 18F-FCH PET/CT to be of potential use in this patient. The patient subsequently underwent an extended left hemihepatectomy,9 and diagnosis of hepatoblastoma was confirmed at the histopathological examination of the surgical specimen. One year after surgery, no recurrent or metastatic disease was found, and the patient has resumed school and work. In all, 18F-FCH PET/CT is a promising additional imaging tool for hepatoblastomas and proved useful for staging and assessment of treatment response in our patient.

**Figure 2**

Before the first cycle of cisplatin, a whole-body PET/CT was performed 5 minutes after injection of 18F-FCH. Coronal (A), sagittal (B), and transverse (C) fused baseline 18F-FCH PET/CT images and maximum-intensity-projection image (D) are shown. Physiological uptake of 18F-FCH was seen in the liver, spleen, pancreas, kidneys, and bladder. Three lesions with inhomogeneous intense uptake were found in segments 4, 4A, and 2 to 4 of the liver, 2 of which are shown. The largest lesion shows a central area of relative photopenia most likely due to necrosis. No additional extraparenchymal localizations of pathological uptake of 18F-FCH were found. After the fourth cycle of cisplatin, a posttreatment 18F-FCH PET/CT was performed to evaluate treatment response. Coronal (E), sagittal (F), and transverse (G) fused posttreatment 18F-FCH PET/CT images and the maximum-intensity-projection image (H) are shown. All 3 lesions showed a strong decrease in pathological uptake when compared to the baseline 18F-FCH PET/CT. Furthermore, the hypodense central areas in 2 of the lesions were larger and more pronounced. These 2 signs indicate significant treatment response with induction of tumor necrosis although the tumors did not shrink.

An 18-year-old woman presented with abdominal pain, nausea, bloating, and fatigue, all features consistent with an abdominal mass. Physical examination revealed an enlarged liver with tenderness in the epigastric region. Plasma alpha-feto-protein was highly elevated (>100,000 Kg/L). Postcontrast gadolinium MRI showed 3 hyperintense inhomogeneous hepatic lesions on T1-weighted arterial images; the largest lesion measured 9 cm (A, B). Subsequent portal phase showed slight washout with enhancement of the rim of the lesions, consistent with hepatocellular carcinoma (HCC) or hepatoblastoma (C, D). The largest lesion showed hypodense central areas suggestive of bleeding or necrosis. Histopathological biopsy of the lesions was advised to determine the appropriate treatment, resulting in a slight preference for hepatoblastoma, based on histomorphology and the overexpression of alpha-fetoprotein within the lesion. Therefore, treatment with neo-adjuvant cisplatin was started to downsize the tumor [1].

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