

24.01 Demonstration of the Effects of Portal Vein Ligation on Glucose Metabolism Using In Vivo Multi-modal PET/MRI Measurements in Healthy Rat Liver

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Introduction:

Portal vein ligation (PVL) results in ipsilateral atrophy and hypertrophy of contralateral liver segments. It is unknown how PVL affects metabolic patterns of hepatic tissues. The aim of this study is to evaluate the effect of PVL on glucose metabolism, using multi-modal PET/MRI imaging in healthy rat liver.

Methods:

Male Wistar rats (n=30) underwent PVL. 2-deoxy-2-(18F)fluoro-D-glucose (FDG) PET/MRI imaging and morphological/histological examination were performed before; 1-, 2-, 3-, 7-days after PVL. Dynamic PET data were collected and the standardized uptake values (SUV) for ligated and non-ligated liver lobes were calculated in relation to cardiac left ventricle (SUVVOI/SUVCLV) and mean liver SUV (SUVVOI/SUVLiver).

Result:

PVL induced atrophy of ligated lobes, while non-ligated liver tissue showed compensatory hypertrophy. Dynamic PET scan revealed altered FDG kinetics in both ligated and non-ligated liver lobes. SUVVOI/SUVCLV significantly increased in both groups of lobes, with a maximal value at 2nd postoperative day and returned near to the baseline 7 days after the ligation. After PVL, ligated liver lobes showed significantly higher tracer uptake compared to the non-ligated lobes (significantly higher SUVVOI/SUVLiver values were observed at postoperative day 1, 2 and 3). The homogenous tracer biodistribution observed before PVL reappeared by 7th postoperative day.

Conclusion:

Our study demonstrated an altered glucose metabolism in both ligated and non-ligated liver lobes. The observed alterations in FDG uptake dynamics should be taken into account during the assessment of PET data until the PVL induced atrophic and regenerative processes are completed.