Diagnostic accuracy of [11C]PIB positron emission tomography for detection of cardiac amyloidosis.

Authors:
S Rosengren1, T Skibsted Clemmensen2, L Tolbod3, SO Granstam4, H Eiskjaer2, GWikstrom5, O Vedin5, TKero6, MLubberink6, HJ Harms3, FA Flachskampf4, G Antoni7, NFrost Andersen8, SHvitfeldt Poulsen2, JSorensen6, 1Uppsala University, Department of Medical Sciences, Haematology - Uppsala - Sweden, 2Aarhus University Hospital, Department of Cardiology - Aarhus - Denmark, 3Aarhus University Hospital, Department of Nuclear Medicine and PET - Aarhus - Denmark, 4Uppsala University, Department of Medical Sciences, Clinical Physiology - Uppsala - Sweden, 5Uppsala University, Department of Medical Sciences, Cardiology - Uppsala - Sweden, 6Uppsala University, Department of Surgical Sciences, Radiology - Uppsala - Sweden, 7Uppsala University, Department of Medical Chemistry - Uppsala - Sweden, 8Aarhus University Hospital, Department of Haematology - Aarhus - Denmark,

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Background: [11C]PIB positron emission tomography (PIB-PET) has shown promise as a specific and non-invasive method for the diagnosis of cardiac amyloidosis (CA).

Objectives: This study evaluated the diagnostic accuracy of the method.

Methods: The study was performed at two sites. Sixty-three subjects were included and underwent PIB-PET and echocardiography. Sensitivity and specificity of PIB-PET were established for two simple semi-quantitative approaches, SUVR (standardized uptake value ratio) and RI (retention index). There were 36 patients with known CA and LV hypertrophy (15 immunoglobulin light chain (AL) and 21 transthyretin (ATTR) amyloidosis) and 16 controls (8 were non-amyloid hypertrophic and 8 healthy volunteers). Optimal semi-quantitative values were then applied prospectively to 11 non-hypertrophic amyloidosis patients.

Results: The diagnostic accuracy of visual inspection of [11C]PIB uptake was 100%. Semi-quantitative [11C]PIB uptake discriminated CA from controls with a 94% sensitivity and specificity of 88% - 94%. [11C]PIB uptake was significantly higher in AL-CA than in ATTR-CA patients (p<0.001) and discriminated AL-CA from controls with 100% accuracy. Compared to controls, semi-quantitative [11C]PIB uptake was elevated in the non-hypertrophic amyloidosis subjects (p=0.01).
[11C]PIB retention was associated with New York Heart Association Class, NT-pro-BNP levels, diuretic and beta-blocker use, septal wall thickness (IVST) and biventricular dysfunction in ATTR, and with IVST and right ventricular dysfunction in AL (all p<0.05).

Conclusions: In a dual-centre setting, [11C]PIB PET was highly accurate in detecting cardiac involvement in the main amyloid subtypes, with 100% accuracy in AL amyloidosis. [11C]PIB uptake was associated with symptoms and signs of cardiac dysfunction, but varied between amyloid types.