

P3359

### Myocardial flow reserve using <sup>13</sup>N ammonia PET for detection of cardiac allograft vasculopathy in heart transplant patients

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**Purpose:** Risk stratification and early detection of cardiac allograft vasculopathy (CAV) are essential in heart transplantation patients. CAV is associated with poor outcome in the chronic phase after heart transplantation. CAV presents a diffuse vascular involvement and has been difficult to non-invasively diagnose by the lack of a sensitive method to detect developing vascular pathology in the allograft. The present study investigates the ability of <sup>13</sup>N-ammonia PET for detection of CAV in heart transplant patients.

**Methods:** Data of adenosine-stress <sup>13</sup>N-ammonia PET imaging for thirty-one patients (mean age, 39 years-old) after 11 + 7 years from transplant was analyzed. Five patients had undergone percutaneous coronary intervention (PCI), and the remaining 26 patients had no history of definite myocardial ischemia. Myocardial flow was generated from the time activity curve of left ventricle input and myocardial uptake using 3-compartment model and the first 2 minutes' dataset of list-mode acquisition. Global - myocardial flow reserve (MFR) was calculated by stress to rest flow ratio. Patient with global-MFR <2.0 was defined as significant decrease. Summed

difference score (SDS) was used as an estimate for the extent of ischemia, and the patient showing SDS >2 was identified as those having significant ischemia.

**Results:** The mean Global-MFR of our subjects were 2.3 (1.2 to 3.9). MFR using <sup>13</sup>N-ammonia PET significantly decreases in one third of heart transplant patients in chronic stage. Eleven patients with Global-MFR <2.0 (35%) were observed, and eight of them had no history of clinical myocardial ischemia. The proportion of patients with a history of PCI is 18% in patients with Global-MFR <2.0 (vs 5%, p=0.210). Moreover, there were eight patients with SDS >2 (26%) including three patients having a history of PCI. The proportion of patients with a history of PCI tends to be high with SDS >2 (38% vs 9%, p=0.056).

**Conclusion:** This modality using <sup>13</sup>N ammonia PET is useful for easily detection of CAV before manifestation of symptomatic myocardial ischemia in heart transplant patients.