

Quantification of left ventricular amyloid using ¹²⁴I-AT-01 (p5+14) and ¹⁸F-florbetapir positron emission tomography in AL and ATTR amyloidosis

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Background and Objective

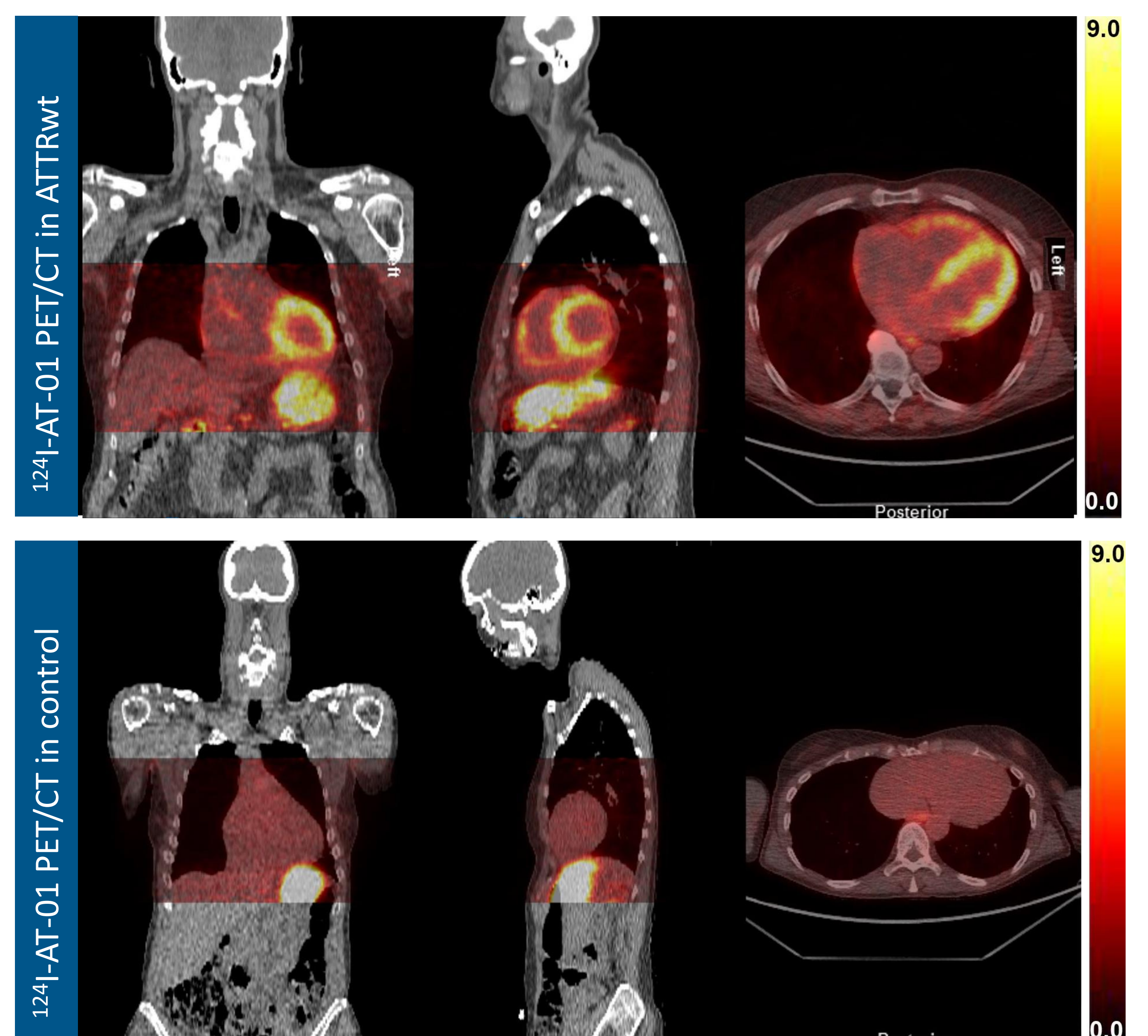
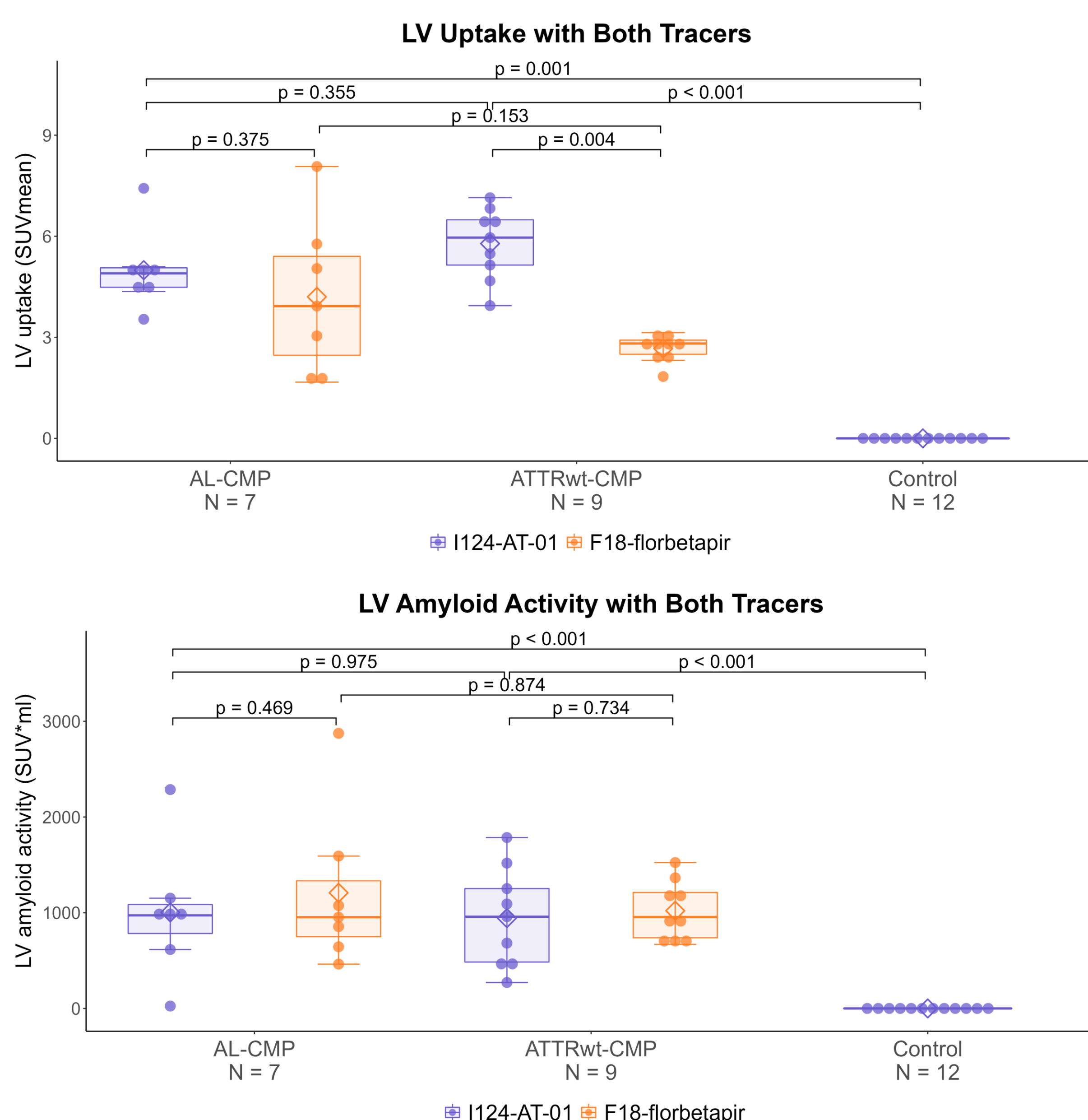
- In light-chain (AL) and transthyretin (ATTR) amyloidosis, methods to identify and accurately quantify cardiac amyloid burden are still limited.
- Among amyloid-targeted positron emission tomography (PET) radiotracers, ¹⁸F-florbetapir can image cardiac amyloid fibrils but has shown higher uptake in AL than ATTR amyloidosis, despite typically higher amyloid content in ATTR amyloidosis, suggesting greater affinity for AL fibrils.
- The novel amyloid-targeted peptide AT-01 (p5+14) is able to image multiple amyloid types in mice (as ^{99m}Tc-AT-01) and in humans (as ¹²⁴I-AT-01, Evuzamitide).
- ▶ This ongoing pilot study aimed to quantify and compare left ventricular (LV) amyloid burden using ¹²⁴I-AT-01 and ¹⁸F-florbetapir PET in subjects with AL and wild-type ATTR amyloid cardiomyopathy (AL-CMP, ATTRwt-CMP), and in non-amyloid controls.

Materials and Methods

- Subjects with AL-CMP or ATTRwt-CMP were included based on standard diagnostic criteria with proof of cardiac involvement by imaging and/or biopsy.
- All AL-CMP and ATTRwt-CMP participants underwent PET/CT with ¹²⁴I-AT-01 and with ¹⁸F-florbetapir, while non-amyloid controls underwent PET with ¹²⁴I-AT-01 only.
- LV uptake (standardized uptake value mean, SUVmean) was calculated in the LV myocardial volume, defined as uptake > 2 times mean left atrial blood pool activity.
- LV amyloid activity was estimated as LV uptake times LV myocardial volume (SUVmean*ml), with uptake > 2 times mean left atrial blood pool activity.
- Data were compared using Dunn test across groups, Wilcoxon signed-rank test (paired) across tracers, with Benjamini-Hochberg adjustment for multiple testing.

Results

- We included 28 participants to date: 7 AL-CMP (25%), 9 ATTRwt-CMP (32%), and 12 controls (43%), with median age 70 years (IQR 64 – 76), and 22 males (79%).
- Median ¹²⁴I-AT-01 dose was 35.7 MBq (IQR 32.8 – 39.7) and median ¹⁸F-florbetapir dose was 273.5 MBq (IQR 255.7 – 315.6).
- LV uptake and LV amyloid activity with both tracers are shown below.



Summary and Conclusions

- In this study, ¹²⁴I-AT-01 showed positive LV uptake and LV amyloid activity in all AL-CMP and ATTRwt-CMP participants, but in none of the controls (100% accuracy).
- When comparing AL-CMP to ATTRwt-CMP, ¹²⁴I-AT-01 LV mean uptake and LV amyloid activity were similar.
- When comparing ¹²⁴I-AT-01 to ¹⁸F-florbetapir, ¹²⁴I-AT-01 showed significantly higher LV mean uptake in ATTRwt-CMP, but similar LV amyloid activity.
- ❖ Thus, the novel radiotracer ¹²⁴I-AT-01 was found to detect the presence of cardiac AL and ATTRwt amyloid deposition very accurately and appears to quantify amyloid burden appropriately in AL and ATTRwt cardiomyopathy.

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