

# Centiloid validation of multi-atlas PET-SUVR analysis in the multi-tracer AMYPAD study

## Introduction

Utilisation of a standardised quantitative imaging analysis scale, Centiloid, for comparing  $\beta$  amyloid imaging tracers in Alzheimer's disease (AD) is within the objectives of the AMYPAD study (<http://amypad.eu/>). A total of 6000 scans will be collected across ~20 European PET centres using the Florbetaben and Flutemetamol amyloid tracers. The utilization of the Centiloid scale will allow to compare the quantitative expression of A $\beta$  burden across all subjects. This work validated the AMYPAD SUVR quantification workflow to produce a standardized Florbetaben and Flutemetamol Centiloid conversion. The analysis workflow is a multi-atlas SUVR PET analysis operating in subject native space using subject specific brain segmentation (LEAP).

## Results

Strong correlation between SPM and LEAP-SUVR was observed (Figure 2). Eight different conversion equations were computed (FBB and FLUT for 4 reference regions). Converting SUVR values into Centiloid, resulted in comparable mean values for an AD population (Figure 3).

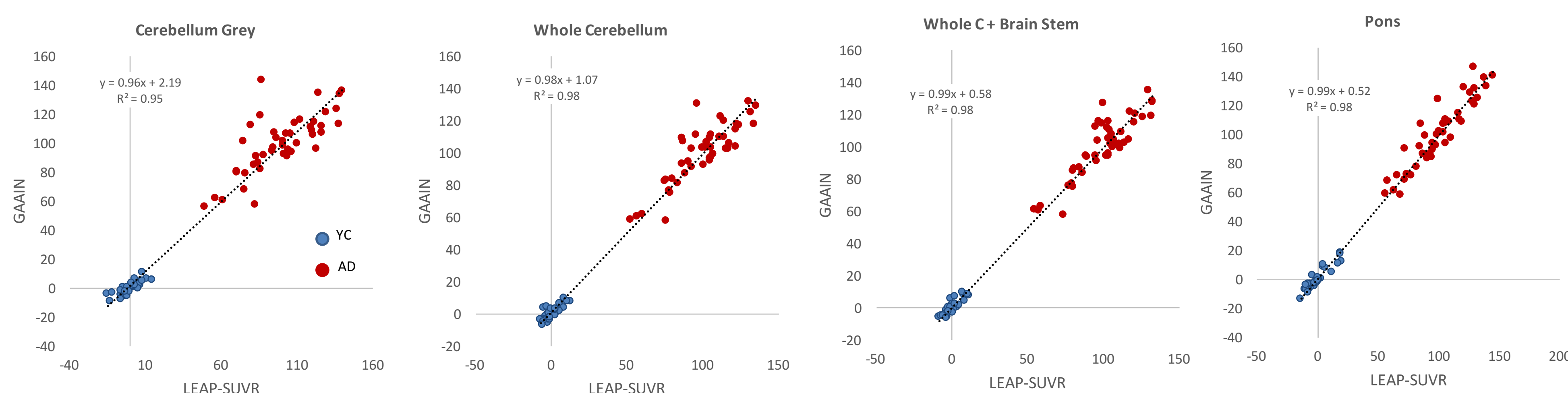


FIGURE 2) CORRELATION BETWEEN GAAIN SPM AND LEAP-SUVR

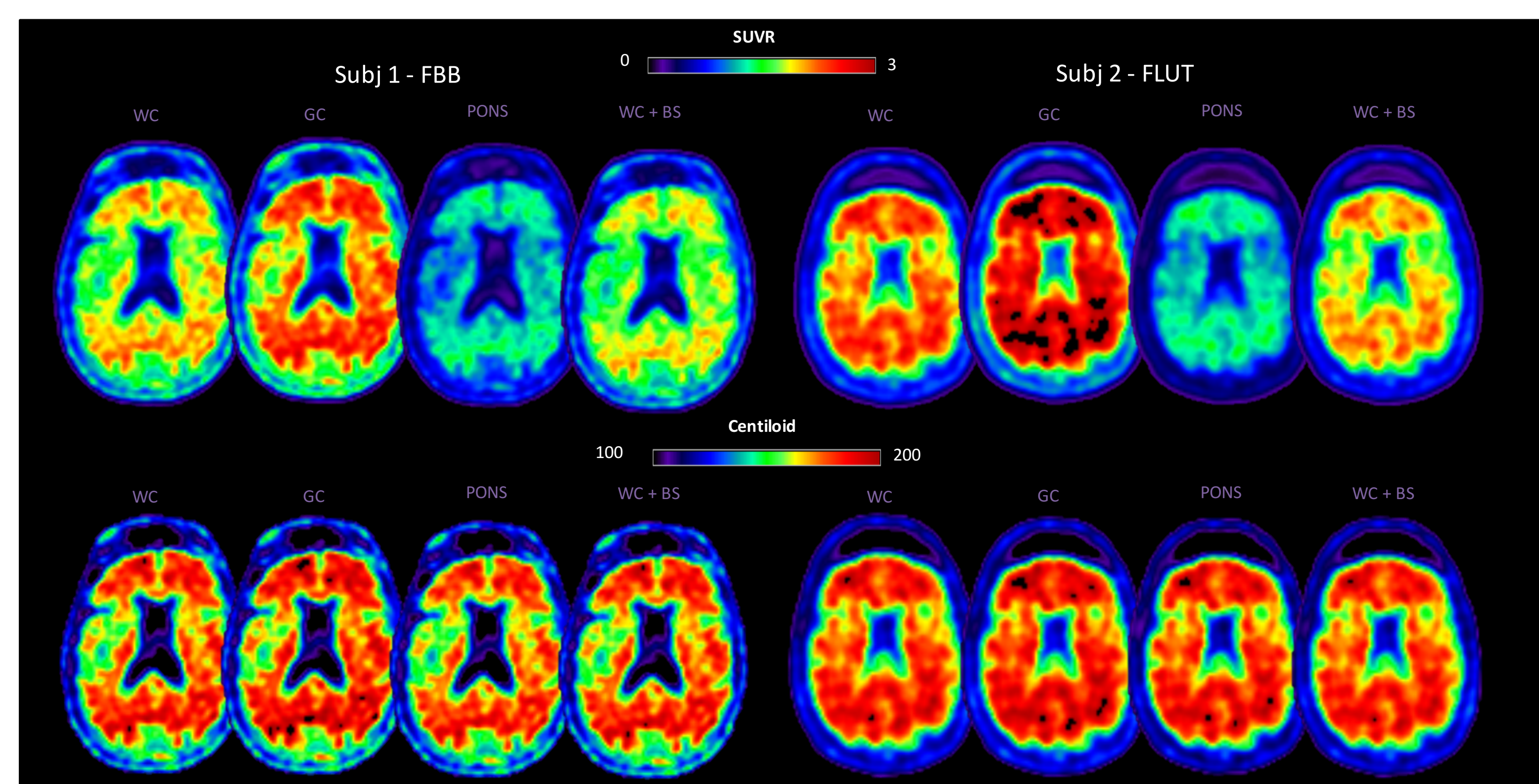


FIGURE 3) REFERENCE REGION QUALITATIVE COMPARISON - TWO AD SUBJECTS WITH AVERAGE CENTILOID ~100

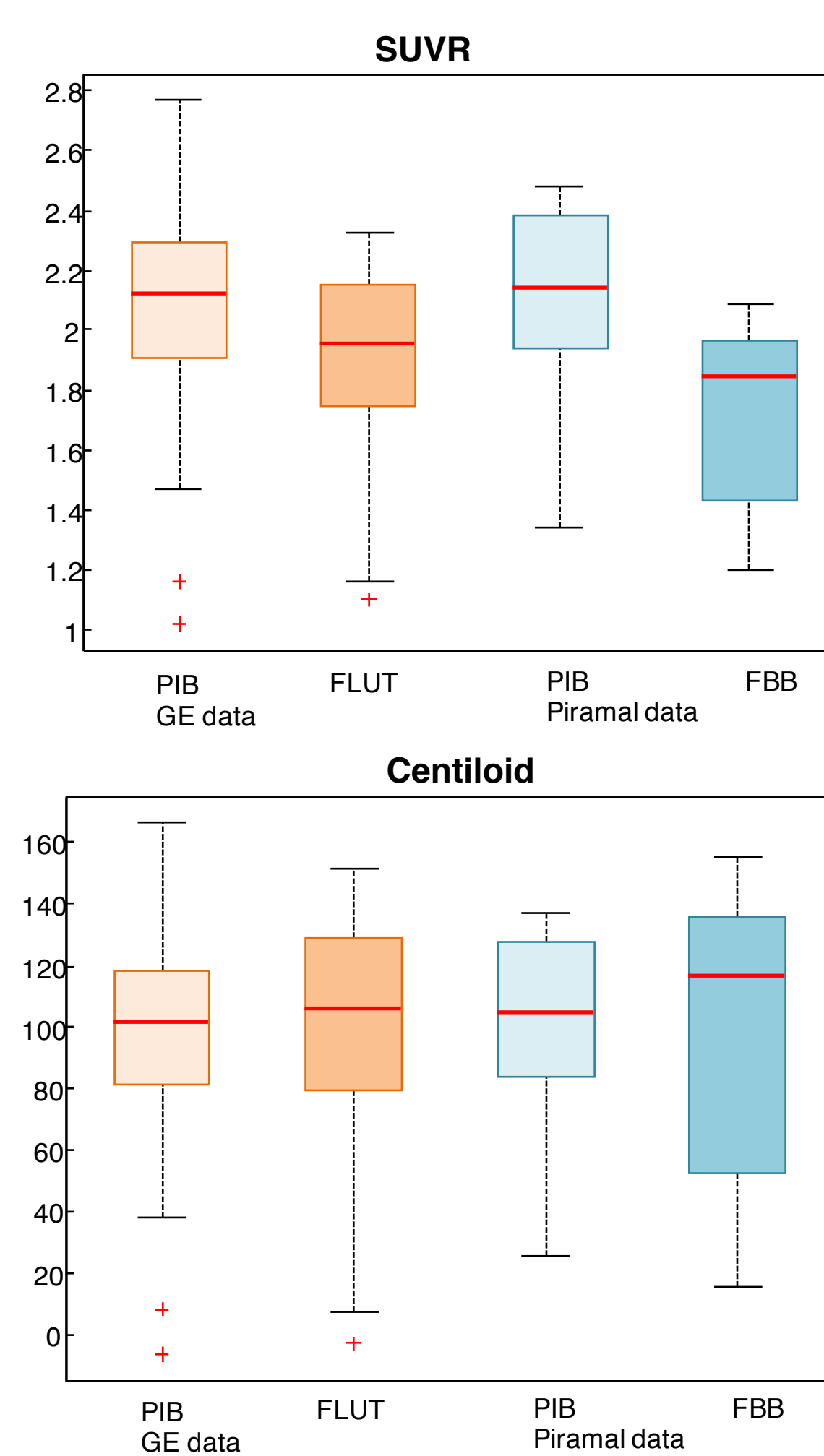


FIGURE 4) MEAN SUVR AND CENTILOID UPTAKE IN AN AD POPULATION

## Methodology

Using Centiloid Volume of Interest (VOI) regions and 4 subject-specific reference regions (grey/whole cerebellum, pons, whole cerebellum + brain stem), three different databases were processed using the LEAP-SUVR analysis: (1) GAAIN PIB images (YC=35,AD=45), (2) PIB and FBB images (YC=10,HE=5,MCI=9,FTD=2,AD=7), (3) PIB and FLUT images (YC=24,HE=10,MCI=20,AD=20). All PIB data were used to calibrate LEAP-SUVR against the GAAIN SPM analysis using all 4 reference regions (analysis A). Using linear regression, FBB-SUVR and FLUT-SUVR were converted into PIB-like SUVRs that were then converted into Centiloid using equations from analysis A (analysis B). The combination of analysis A and B allowed to generate the final transformation of LEAP-SUVR into Centiloids (one transformation for each reference region).

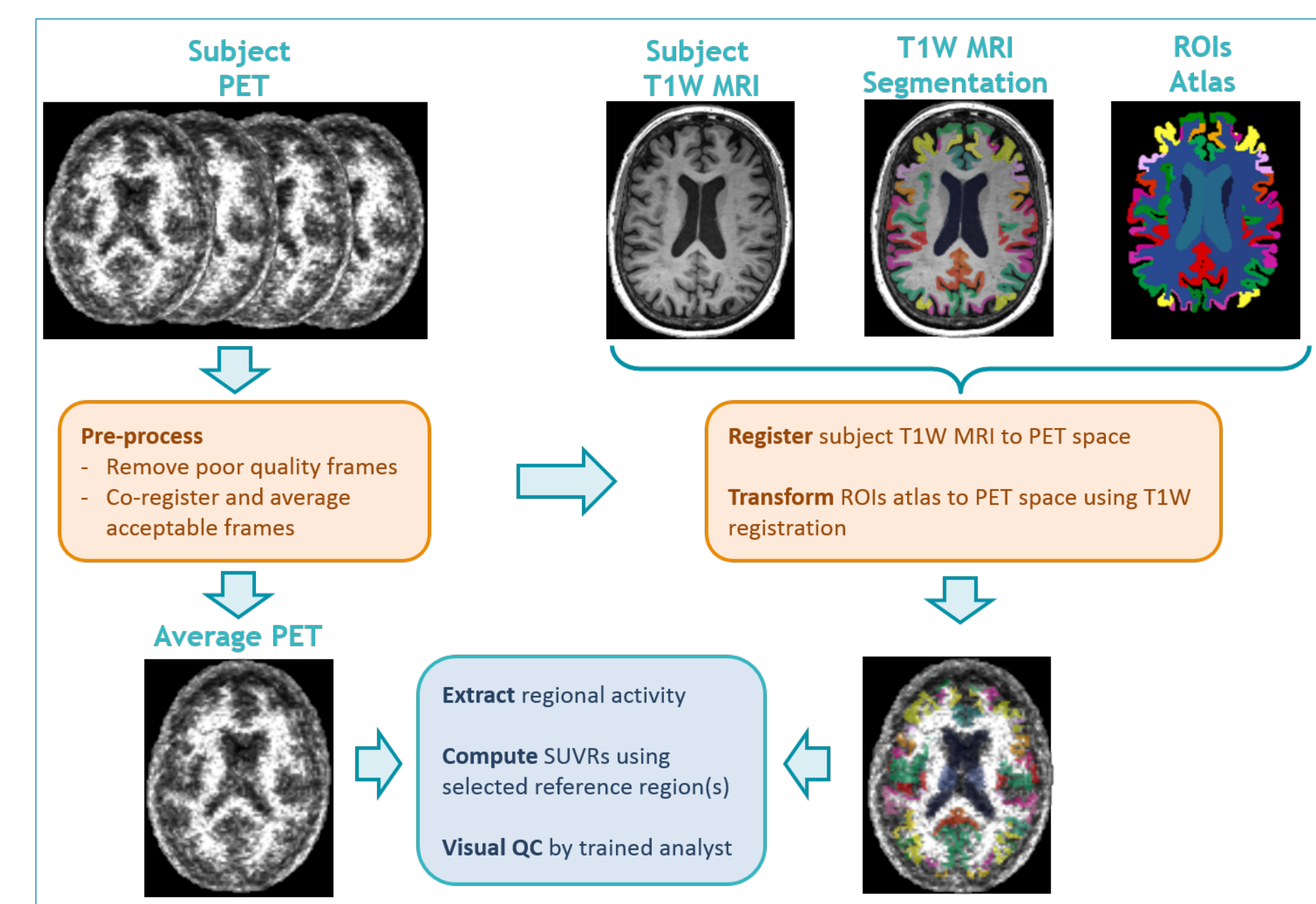
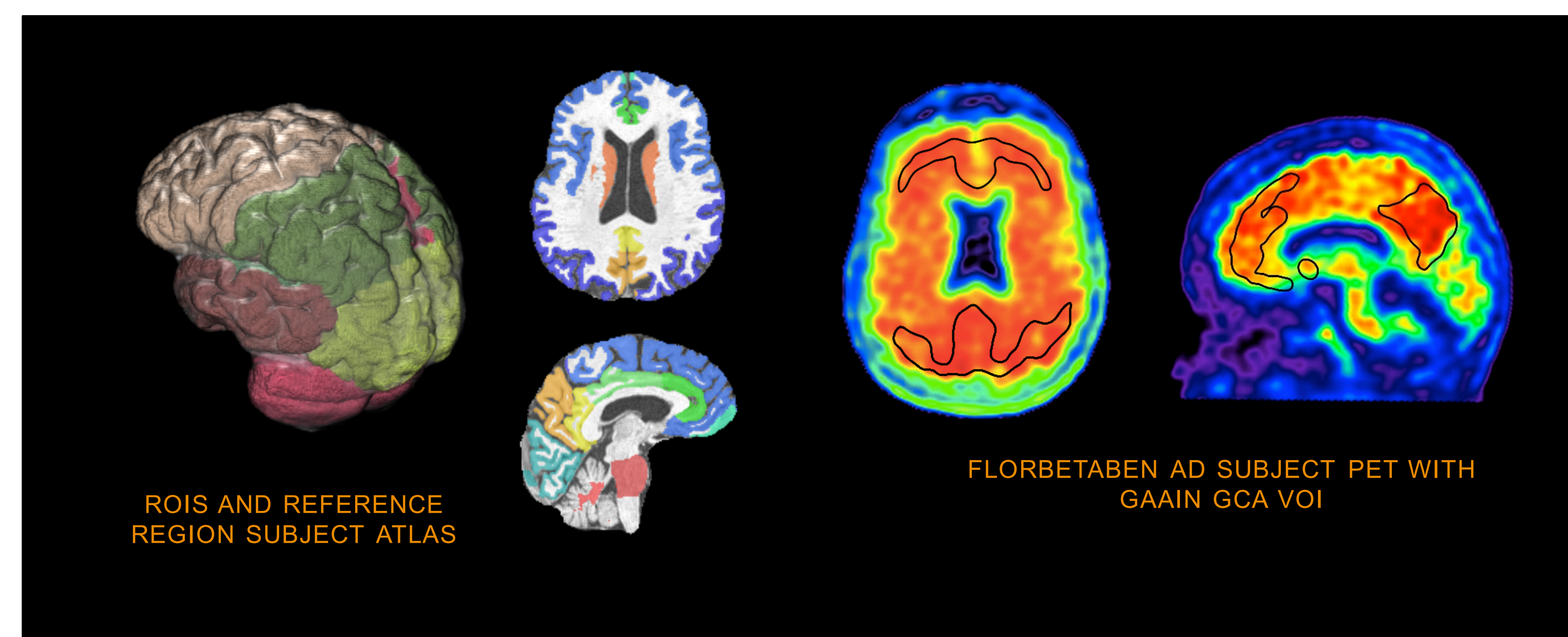


FIGURE 1) SUVR ANALYSIS PIPELINE



## Conclusions

Robust and reliable Centiloid estimates can be obtained for FBB and FLUT using the AMYPAD LEAP-SUVR method. The LEAP-SUVR Centiloid conversion will allow multi-tracer and multi-reference region comparison over a wide range of regions of interest in a 6000 subjects database