NON-INVASIVE ESTIMATE OF INPUT FUNCTION FROM PET IMAGES OF SMALL MICE

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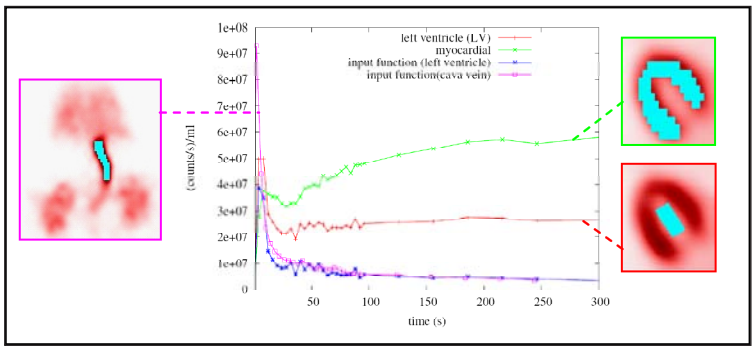
Introduction: PET tracer kinetic models require blood-pool time activity curve or input function, which can be obtained through arterial catheterization, followed by blood sampling. However, arterial blood sampling of small animals (mainly mice) is difficult and challenging to the animal. An alternative method consists in measuring the input function from a region of interest (ROIs) drawn on PET images. The image-derived input function technique is limited by the spatial resolution of the system: if high resolution (<1 mm) images could be obtained, this would enable to distinguish suborgan structures, and therefore a reliable input function could be obtained. This work presents the results obtained using an ARGUS PET-CT scanner in conjunction with a fine-tuned 3D-OSEM reconstruction method.

Methods: C57/BL6 mice (33 g) were injected with 700 uCi of FDG and scanned on an ARGUS PET-CT [1]. Images were reconstructed with a 3D-OSEM algorithm for that machine (FIRST®, [2]). Dynamic PET acquisitions with variable frame duration (4 second frames for the initial input function sampling) were obtained. Time-activity curve for blood was derived from ROIs placed over the myocardium and the left ventricle, and this latter one was corrected for the myocardial spillover [3]. An alternative input function was also estimated from an ROI drawn over the cava vein. Monte Carlo simulations of known activity acquisitions were employed [4] to asses the quantification accuracy on the reconstruction software.



Results: FDG blood input function measured on cava vein (pink curve) is compared to blue curve, obtained from the left ventricle (red curve) corrected by myocardial contribution (green curve). Actual images from a coronal slice of a 4 second frame.

Conclusions: Results from both input functions were comparable both in animal imaging and Monte Carlo simulations. Thus, we conclude that the high resolution and sensitivity of the ARGUS PET-CT scanner together with the 3DOSEM software allows us to non-invasively obtain the blood input function for small mice.

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