Postprocessing and Cross Validation

Modeling and Quantification

Measurement of plasma input functions using PET

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Learning Objectives:

- To be able explain the role of plasma input functions in PET
- To be able to list the requirements on the measurements of a plasma input function
- To be able to assess the pros and cons or arterial and image-based input functions

In order to extract physiological parameters like myocardial perfusion and glucose metabolism from PET scans kinetic models can be applied. Although the information obtained in this way is most accurate, it demands the measurement of plasma input functions. The gold standard invasive method to obtain the input function requires continuous and manual arterial sampling. The measured blood radioactivity concentrations need to be corrected for whole blood over plasma ratios as well as for the possible presence of labelled metabolites. In addition, a delay and dispersion correction accounting for the (effect of) the time lag between arterial blood at the location of the tissue of interest and the position of measurement in an external counter is needed. A popular alternative to this invasive method is the use of an image derived input function, which would be possible if the corrections to the obtained blood radioactivity concentrations can be derived from venous instead of arterial blood samples. In this presentation the measurement of plasma input functions will be discussed and representative examples of the various methods will be given.

Relevant Publications:

1. Characteristics of a new fully programmable blood sampling device for monitoring blood radioactivity during PET, Boellaard R, van Lingen A, van Balen SC, Hoving BG, Lammertsma AA. Eur J Nucl Med. 2001 Jan;28(1):81-9.
2. Cerebral blood flow and glucose metabolism in healthy volunteers measured using a high-resolution PET scanner. Huisman MC, van Golen LW, Hoetjes NJ, Greuter HN, Schober P, Ijzerman RG, Diamant M, Lammertsma AA. EJNMMI Res. 2012 Nov 20;2(1):63. doi: 10.1186/2191-219X-2-63.

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