# IMAGE-DERIVED ESTIMATION OF ARTERIAL INPUT FUNCTION FROM DYNAMIC FDG-PET STUDIES.

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Positron emission tomography (PET) is an in-vivo radiotracer based imaging technique with widespread application to medical research in oncology, cardiology, and neurophysiology. When data are acquired in dynamic mode, kinetic analysis via an appropriate radiotracer model can be used to obtain valuable measures of the metabolic status of local tissue. These radiotracer models rely on having information which describes the time course of the tracer in the arterial blood. This information is obtained by direct arterial sampling via catheterization, but there are situations where it is inconvenient or impractical to obtain the information in this manner. Since many studies are conducted without blood sampling, image-based extraction of an arterial blood input function is of interest. We have developed a statistical approach based on a flexible parametric representation of blood input functions and a localised 2-component mixture model describing spillover and recovery characteristics in the image. Segmentation is used to identify a tentative blood region and the relevant sources of spillover. A Bayesian formulation is used. The technique is applied to data from a series of human cerebral PET studies with $^{18}$F-Fluorodeoxyglucose (FDG). Comparisons between kinetic parameters for relevant brain structures based on a 2-compartment model, was carried out using both directly sampled arterial blood and the image derived blood input function. The results are quite promising and demonstrate the practical potential for kinetic analysis to be achieved in dynamic PET studies without the need for blood sampling.

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