Postprocessing and Cross Validation

Modeling and Quantification

Applications of Modeling and Quantification in the Brain
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Learning Objectives:

- Understand the importance of parameter estimation in clinical and research applications of neurological PET
- Understand how to determine the most suitable quantitative method for a given neurological PET application
- Appreciate the challenges and limitations of quantitative parameter estimation techniques in neurological PET, as well as the importance of the information they provide

This presentation explores the role of quantitative kinetic parameter estimation in molecular imaging of the brain, with a particular focus on positron emission tomography (PET). Examples will be drawn from clinical and research applications of PET where quantitative methods are not only useful but, in certain cases, essential to answer the question at hand. These include applications requiring the estimation of regional cerebral blood flow, cerebral rate of oxygen and glucose metabolism, receptor density and receptor occupancy. Case studies will also be chosen to illustrate the broad range of methodological approaches described in the literature, including the linearization methods highlighted in the preceding lecture, and the challenges encountered in using these methods in practice.