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["18\text{F}\)]DOPA PET: quality of input functions obtained from arterial versus venous blood
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Introduction: Insufficient response to antipsychotic medication may be caused by differences in striatal dopamine synthesis capacity (DSC). The overall aim of this positron emission tomography (PET) study is to stratify antipsychotic-naïve first-episode psychotic patients based on DSC and evaluate the prognostic value of stratification in terms of treatment response. To do this, we will recruit patients suffering from psychotic symptoms who are not yet medicated at baseline. Working with a particularly vulnerable patient group raised the question of whether a less invasive procedure is applicable and input functions obtained from venous blood samples would be comparable with arterial input functions. In the present preliminary work we compare the quality of input functions from arterial and venous blood respectively.

Background: DSC can be assessed using 3,4-dihydroxy-6-["18\text{F}\)]fluoro-L-phenylalanine (["18\text{F}\)]DOPA) PET. Different approaches have been applied when interpreting ["18\text{F}\)]DOPA PET data. In this study kinetic parameters are determined using the two-compartment model. The input functions require measurement of peripheral radioactivity originating from intact ["18\text{F}\)]DOPA and the primary metabolite 3-O-methyl-FDOPA (OMFD), respectively. Intact ["18\text{F}\)]DOPA and OMFD need to be distinguished in the blood. Arterial blood samples collected through an arterial cannula are the standard in studies using the two-compartment model.

Methods: Eight healthy controls (HC) were scanned using ["18\text{F}\)]DOPA. Blood samples were collected sequentially to measure peripheral radioactivity over time and the fractions of ["18\text{F}\)]DOPA and OMFD. In addition to the arterial blood samples we simultaneously collected venous blood samples. Premedication was given one hour prior to the scan to minimize peripheral metabolism of ["18\text{F}\)]DOPA.

Results: There is a remarkable difference in input functions from arterial and venous blood. Venous samples fail to detect the initial peak visualized in the curves derived from arterial samples. This finding is of potential significance for the interpretation of neurochemical PET data where input functions are based on venous blood measures.

Conclusion: Arterial samples are the most reliable measurement of peripheral radioactivity originating from ["18\text{F}\)]DOPA and OMFD. Based on the data future PET examinations in the study will be performed with arterial samples.

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