Automated synthesis of $^{18}$F-labeled ligands for pre- and postsynaptic PET imaging of the dopaminergic system using IBA Synthera modules

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Abstract

- Positron emission tomography for non invasive in vivo diagnosis of DAT- and D$_2$/D$_3$-like receptor functions is considered to be a valuable tool for differential diagnosis and early detection of Parkinsons disease.\(^\text{[1]}\)
- The aromatic amino acid decarboxylase (AADC), dopamin transporters (DAT) and vesicular monoamine transporters (VMAT2) are valuable targets for preclinical detection of PD.\(^\text{[2]}\)

Materials & Methods

- $^{18}$F-Fluoride was produced by $^{18}$O(p,n)$^{18}$F reaction (Cyclone 18/9 IBA) and transferred to a spare vial.
- $[^{18}F]$-Fallypride and $[^{18}F]$-DMFP were labeled by direct nucleophilic fluorination of corresponding mesyl and tosyl precursors (see Figure 3).

Results

- Depending on the radioligand, different consumables and reaction conditions were used (see Table 2).
- Activity%/Ci/Time%RCY/
- Activity%/mCi/Ti

Table 1: Reaction and purification conditions:

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<tr>
<td>1</td>
<td>30 mL water/1 mL ethanol</td>
<td>30 mL water</td>
<td>30 mL water</td>
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<tr>
<td>2</td>
<td>2 mL water</td>
<td>1 mL ethanol</td>
<td>2 mL water</td>
<td>1 mL ethanol</td>
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Figure 3: Radiosynthesis of $[^{18}F]$PR04.MZ, $[^{18}F]$Fallypride and $[^{18}F]$DMFP

Figure 2: Differential diagnosis of parkinsonism with $[^{18}F]$DMFP

Figure 4: Experimental setup for labeling, purification and post-processing

References