**Fully automated and GMP-compliant synthesis of [18F]SynVesT-1 on a Trasis AllinOne module**

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**Objectives:**

[18F]SynVesT-1 ([18F]MNI1126) enables the positron emission tomography imaging of the synaptic vesicle glycoprotein 2A [1, 2]. This transmembrane protein is ubiquitously expressed in secretory vesicles and its dysfunction is associated with numerous neurological diseases such as Alzheimer's or Parkinson's disease. To ensure a broad application the synthesis of [18F]SynVesT-1 on a standard synthesis module has already been successfully established [3]. The transfer to a kit-based synthesis, in turn, enables an even broader application, as the kit syntheses can be more easily established in other synthesis sites. In the present work, we established a robust and GMP-compliant process for the automated radiosynthesis of [18F]SynVesT-1 on a Trasis AllinOne (AIO) synthesizer.

**Methods:**

[18F]SynVesT-1 is obtained in a one-step reaction via a copper-mediated synthesis starting from the corresponding stannyl precursor and [18F]fluoride [1-3] under optimized conditions. The automated process started with elution of [18F]fluoride from a QMA cartridge with a solution of tetraethylammonium bicarbonate in methanol, followed by an evaporation step at different temperatures. Precursor **1** (5 mg, 12 µmol)solved with *N,N*-dimethylacetamide, together with tetrakis(pyridine)copper(II) triflate (20 mg, 30 µmol) is transferred to the dried [18F]fluoride. The reaction was proceeded for 20 min at 110 °C. After cooling and dilution with saline, the raw solution was directly transferred to an HPLC system for purification of [18F]**2**.

**Results:**

The average radiochemical yield of [18F]SynVesT-1 ([18F]**2**) produced using the AIO systemwas 20 ± 4.3 % (n = 18), with an overall synthesis time of about 35 min (including HPLC purification). In a single production batch starting from 26-50 GBq, between 3-8 GBq of [18F]**2** with a radiochemical purity of > 99 % could be produced. Quality control test were fully compliant with the acceptance criteria defined by the European Pharmacopoeia specifications for the synthesis of 18F-labeled radiotracers.

**Conclusions:**

The use of a cassette system simplifies the GMP-compliant preparation of [18F]SynVesT-1, eliminates the risk of cross-contamination, greatly minimizes the risk of operating errors and increases the reliability of the syntheses.

**References:**

1. M. Naganawa, et al. J Nucl Med 2021;62:561-7.

2. S. Li, et al. ACS Chem Neurosci 2019;10:1544-54.

3. K. Dahl, et al. J Labelled Compd Radiopharm 2022;65:315-22.



Figure1: Synthesis of [18F]SynVesT-1.