

# A practical method for the preparation of $^{18}\text{F}$ [TFB] labeled with sodium fluoride, using a ITG IQS Fluidic Labelling Module

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## A practical method for the preparation of $^{18}\text{F}$ [TFB] labeled with sodium fluoride, using a ITG IQS Fluidic Labelling Module

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**Background:**  $^{18}\text{F}$ -Tetrafluoroborate ( $^{18}\text{F}$ -TFB) is a radiotracer, promising iodide analog for PET imaging of thyroid cancer and sodium/iodide symporter (NIS) reporter activity in viral therapy applications. The aim of this study was to Standardization y characterization of new radiosynthesis method of  $^{18}\text{F}$ [TFB], in facilities with little infrastructure.

**Methods:**  $^{18}\text{F}$  was produced in a cyclotron via the  $^{18}\text{O}(\text{p},\text{n})^{18}\text{F}$  reaction with 18 MeV protons and then delivered to the hot cell and trapped on a QMA and plus acell CM cartridges, the cartridge was rinsed with 10 mL of water and dried with nitrogen for 3 minutes. After this step the QMA was eluted with 1.2 mL of NaCl 0.9 % ( $^{18}\text{F}$ )-NaF 740-1850 MBq) in the reactor where it contains 100uL of NaBF<sub>4</sub> dissolved in water (10ug) were mixed. The mixture was left to react at 120°C for 20 min venting the reactor every 5 minutes.

The crude  $^{18}\text{F}$ -TFB product was purified by SPE using a Sep-Pak Alumina Light and plus cartridge, and washed with 1 mL of water. Then it was diluted with 5 ml of isotonic sterile saline and filtered through a hydrophilic 0.22 µm Millex. Radiochemical purity was determined by TLC using SG strips as stationary phase methanol as mobile phase. TLC-strips were analyzed by autoradiography. Preclinical evaluation in Wistar rats was performed using a Focus 120 microPET (UNAM).

**Results:** Labeling and formulation took about 30 min, and radiochemical purity of  $^{18}\text{F}$ [TFB] was higher than 98%. The radiochemical yield of  $^{18}\text{F}$ -TFB was  $31.0\% \pm 0.7\%$  (n=10) uncorrected in a synthesis time of 20 min (Fig 1).

The final product  $^{18}\text{F}$ -TFB was analyzed for radiochemical purity by both radio-TLC (MeOH, R<sub>f</sub> = 0.23 for fluoride, 1.04 for  $^{18}\text{F}$ -TFB) and anion chromatography HPLC with a radioactivity detector (retention times, 3.7 min for  $^{18}\text{F}$ fluoride, 7.8 min for  $^{18}\text{F}$ -TFB).

### Conclusion

Based on the results of radiochemical purity and quality control, we can determine that the method is possible to adapt in facilities where there is little equipment infrastructure.

A solid-phase supported synthesis of  $^{18}\text{F}$ -TFB was developed via  $^{18}\text{F}$ -\*NaF. With the optimized condition, the radiochemical yield of  $^{18}\text{F}$ -TFB was  $31.0\% \pm 0.7\%$  (n=10) uncorrected in a synthesis time of 20 min.

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