The TracerLab Maximum (Mx) is also a Flexible (Fx) tool

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In most PET centers, the main focus is [^{18}F]FDG preparation, but the demand for other labeled compounds is increasing. The growing number of either Micropet cameras users or physician requests for PET human protocols involving other ligands, prompted us to prepare and deliver other [^{18}F]radiotracers. Being a cGMP lab, working under Market Authorization for FDG production, we are using the TracerLab Mx (GE, Belgium). For this reason, decision has been taken to dedicate one of our synthesizers to the production of [^{18}F]labeled compounds. An HPLC pump and injection valve, a pin diode for radioactivity detection, and three ways valves are the only added components. They are all connected on the PLC interface and the software is flexible enough to control them.

[^{13}N]NH_3 and [^{13}N]N_2

The radiation-safety authorities require an exact calibration of the stack detectors to quantify the radioactivity released to the environment. Since our cyclotron is not yet equipped with a ^{11}C target, production of [^{13}N]N_2 has been used for calibration of chimney detectors. The irradiated [^{16}O]H_2O is collected in the reactor and mixed with NaOH and DeVarda's[1] catalyst to generate [^{13}N]NH_3, and was trapped in a HCl solution. By addition of NaOH and NaOCl, [^{13}N]N_2 was produced (up to 11GBq). The [^{13}N]N_2 was trapped in a syringe located in an ionization chamber, and high flow gas is used to pop up the plunger to release the nitrogen in the chimney. This method is safe and full automatic.

[^{18}F]NaF

Simple modifications of kit and sequence allow us to get injectable [^{18}F]NaF in less than 10 minutes in quantitative yield. The $^{18}F^-$ is trapped on the QMA cartridge, rinsed with WFI, and finally eluted with saline.

[^{18}F]Fluorocholine

The synthesis of [^{18}F]bromofluoromethane and [^{18}F]fluoromethyltriflate have already been reported[2].We developed three different ways to produce the F-choline, the first one, very simple uses the reaction of [^{18}F]BFM on a C-18 loaded with DMAE. The second, more complicated uses a triflate oven and the same reaction on the C-18. And the last one, uses a loop for the reaction of DMAE with [^{18}F]FMeOTf which requests an HPLC purification. Even if the yield is lower with the first method (average of 20% uncorrected yield, n=48), we use it to produce routinely more than 18 GBq of [^{18}F]F-choline. With that system, the production of [^{18}F]fluoromethyltyrosine is also possible.

[^{18}F]FLT

Starting with the publication of Oh et al.[3], and after different improvements of both sequence and chemistry, we are able to produce FLT with reliable yields higher than 30% uncorrected (>18.5GBq). The sequence is completely automated until the collection of the final product.

[^{18}F]MPPF

The published synthesis of MPPF requested the use of either reformulation system[4] or new interface development[5]. This is now also full automatic, using only our modified TracerLab Mx, from the [^{18}F] recovery to the final formulation after HPLC purification, without additional computer or PLC. Using the same installation [^{18}F]FDDNP and [^{18}F]Fallypride have also been labeled.

Stainless steel manifold

The limitation of the polysulfone manifold is its lack of resistance to solvent like DMSO or DMF. For that reason, the development of a stainless steel manifold prototype has been undertaken. The preliminary tests of flow, pressure and liquid transfer gave very promising results.

References

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