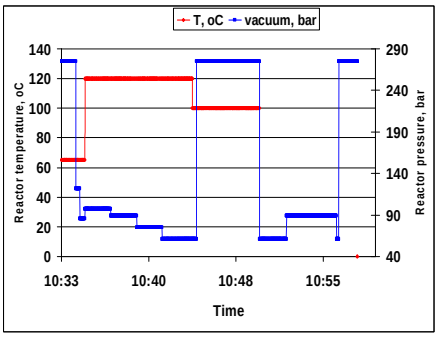
Automated radiosynthesis of [^{18}F]FAZA with Synthera radiochemistry box

A.G. Horti, M. Y. Kiselev, H.T. Ravert, R. L. Wahl, R.F. Dannals

Dept. Radiology, Johns Hopkins Medicine; IBA

[^{18}F]FAZA, 1-(5-[18F]fluoro-5-deoxy-a-D-arabinofuranosyl)-2-nitroimidazole, is an azomycin-based nucleoside for studying hypoxic tumors in patients and animals. There is a substantial interest in a simplified and automated radiosynthesis of this PET tracer.1-4 Here we present a radiosynthesis of [^{18}F]FAZA using a new automated system called Synthera® (commercially available from Ion Beam Applications, Belgium).
All reagents and solvents used were purchased from Aldrich. The tosyl-FAZA precursor was obtained from ABX. Production of [^{18}F]FAZA has been done via simplified method1 using disposable integrated fluid processor (IFP™) followed by HPLC purification. The radiochemical purity and radiochemical yield of the final product were >98% and 20±4%, respectively. The time of radiosynthesis is 26 min. If required, an automatic ejection of IFP™ will allow multiple production runs per day.
Conclusion: A simple, efficient and automated radiosynthesis of [18F]FAZA has been achieved with the Synthera® (IBA) radiochemistry box.

1.Reischl, G.; Ehrlichmann, W.; Bieg, C.; Solbach, C.; Kumar, P.; Wiebe, L. I.; Machulla, H. J., *Appl Radiat Isot* 2005, 62, (6), 897-901.
2.Sorger, D.; Patt, M.; Kumar, P.; Wiebe, L. I.; Barthel, H.; Seese, A.; Dannenberg, C.; Tannapfel, A.; Kluge, R.; Sabri, O. *Nucl Med Biol* 2003, 30, (3), 317-26.
3.Kumar, P.; Patt, M.; Machulla, H. J.; McEwan, A. J. B.; Wiebe, L. I., [^{18}F]-FAZA: a putative PET radiotracer for hypoxia. *Synthesis and Applications of Isotopically Labelled Compounds, Proceedings of the International Symposium, 7th, Dresden, Germany, June 18-22, 2000,* 367-370.
4.Kumar, P.; Wiebe, L. I.; Asikoglu, M.; Tandon, M.; McEwan, A. J. *Appl Radiat Isot* 2002, 57, (5), 697-703.



Protocol

Prep HPLC: Luna C18, 50/950 ethanol/water + 0.01M NaH_2PO4, 4 ml/min

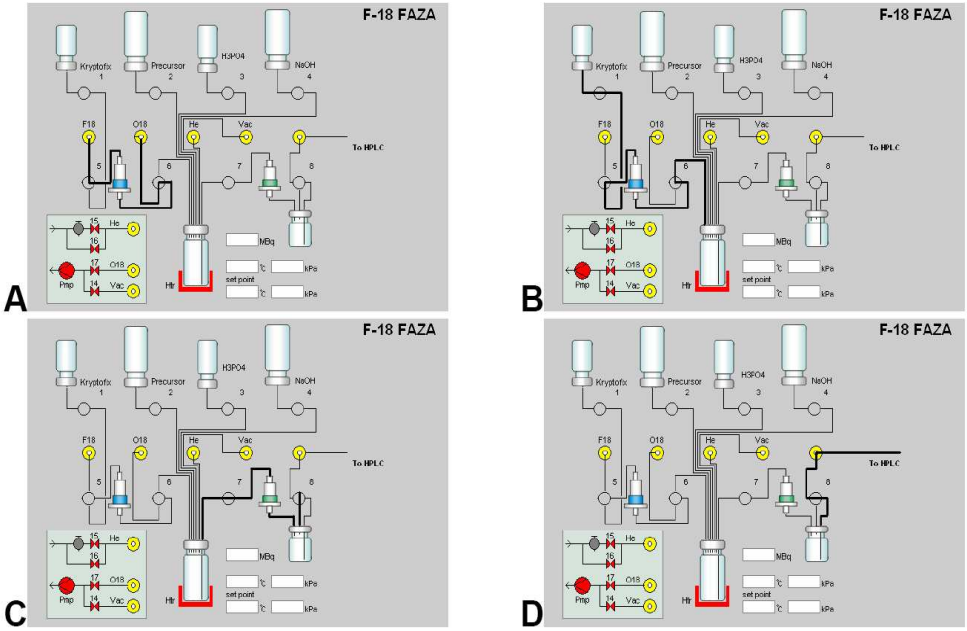
Analytical HPLC: Supelco 50/950 ethanol/water + 0.01M NaH2PO4, 2 ml/min

V1=0.6 ml K222/K2CO3, V2=3-5 mg precursor in 0.6 ml DMSO,
V3=0.7 mL 0.2M H3PO4, V4=1.0 ml 0.1N NaOH,

Collect F18 from the target and start synthesis

Elute fluoride with 25 mg of K222+3 mg K2CO3 in 0.3mLCH3CN+0.3mLH2O into the reaction vessel. Dry fluoride under an argon stream and continue heating after bakeout at 120˚C. Chill down to 100˚C.

Add *3-5 mg* of precursor in 600 µL of DMSO. Heat for 5 min at 100oC. Cool down to 25oC and add 1 mL 0.1N NaOH, Wait for 4 min at 25˚C. Add 0.7mL 0.2M H3PO4. Transfer to the collection vial via Al2O3 Sep-Pak Light (washed with 10 cc H2O). Inject the content of vial onto prep HPLC.



A. Trapping of [^{18}F]fluoride with QMA Sep-Pak
B. Stripping of [^{18}F]fluoride with K_2CO_3/Kryptofix solution
C. Transfer of the reaction mixture via the Al_2O_3 Sep-Pak into the collection vial
D. HPLC injection