A flexible automated nucleophilic [^{18}F]fluorination synthesis system for ^{18}F-labeled radiopharmaceuticals

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Abstract

The relative simplicity of FDG production may not reflect the complexity required for many ^{18}F-radiosyntheses. Based on an automated module for FDG preparation, F100 (Sumitomo Heavy Industries, Ltd.), a new automated system has been developed by introducing two purification modules, one for the hydrolysis/deprotection reaction, the purification of the intermediate, and HPLC loop-loading, and one for the formulation of the injectable solution. It's flexibility and utility were demonstrated by the production of [^{18}F]FRP-170 from [^{18}F]fluoride ion. The reaction was performed in DMF for 3.5 minutes at 100°C, and then the reaction mixture was injected into a semi-preparative HPLC system. The desired [^{18}F]FRP-170 fraction was collected after 18 min. The overall decay-corrected radiochemical yield was 10–16.7 %. Radiochemical purity was > 95 % and the specific activity was 180–320 GBq/μmol at the end of synthesis.