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CORRELATION BETWEEN THE YIELD OF PRODUCED [18F]FDG AND THE ACTIVITY RETAINED DURING SYNTHESIS

Content

The radiosynthesis of 2-[18F]fluoro-2-deoxy-D-glucose [18F]FDG is a routine automated process at the University Institute for Positron Emission Tomography, Skopje, which is performed using an IBA Synthera V2 synthesis module. [18F]FDG is synthesized by nucleophilic fluorination followed by base-catalyzed hydrolysis. The purification of the final product is accomplished by passing the hydrolyzed reaction mixture through purification cartridges (strong cation exchange column, aluminum oxide column and C-18 bonded silica column). The objective of our study is to define whether there is a correlation between the production yield and the activity retained during synthesis.

The analysis includes 63 batches of [18F]FDG, performed on the same module. The IFP cassettes and reagents kits were from the same manufacturer (ABX). In all the synthesis were used Waters Sep-Pak cartridges (QMA, Alumina B, C18) and SPure SCX cartridge. The radiochemical purity was determined by thin layer chromatography using Raytest miniGITA TLC scanner. The radioactivity retained on the cartridges, reaction vessels, v-vials, tube connections and [18O]H2O recovery vials, was measured using Biodex Atomlab 500 Dose Calibrator.

The results of the radiochemical purity show that the [18F]FDG content is more than 99% of the total radioactivity, in all of the batches. To interpret the results of the measured retained activity, we made five subgroups of the batches, depending on the yield, decay corrected: less than 50%, 50-55%, 55-60%, 60-65%, more than 65%. One-way analysis of variance shows that there is no statistically significant correlation between the yield variability and the activity retained on the C18, QMA, SCX cartridges, tubes, reaction vessel, v-vial and recovery vial ($p>0.05$, for all seven correlations). The regression analysis of the activity retained on the alumina cartridge indicates negative linear regression (Fig.1).

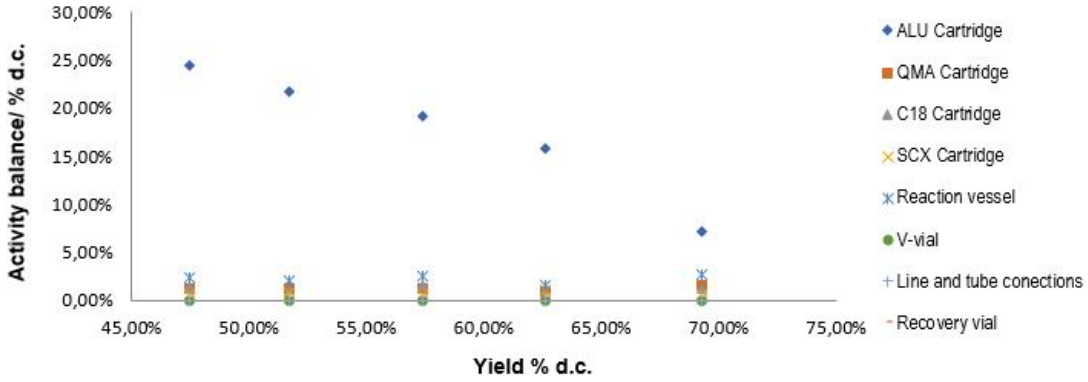

Figure 1: Regression analysis of the retained activity and the yield

A conclusion is made that in our automated [18F]FDG synthesis process, there is statistically significant correlation only between the [18F]FDG yield and the amount of radioactivity retained on the alumina cartridge, which adsorbs the unreacted [18F] fluoride.

Keywords: [18F]FDG, retained activity, cartridge, yield

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