Supplemental Information:
Ultra-compact, automated microdroplet radiosynthesizer

Jia Wang[1,2], Philip H. Chao[1,2], R. Michael van Dam[1,2,*]

[1] Crump Institute for Molecular Imaging and Department of Molecular & Medical Pharmacology, David Geffen School of Medicine, University of California at Los Angeles (UCLA), Los Angeles, CA, USA

[2] Department of Bioengineering, UCLA, Los Angeles, CA, USA

* Corresponding author: mvandam@mednet.ucla.edu

Table of Contents

1 Comparison of reactions on different types of droplet reactors

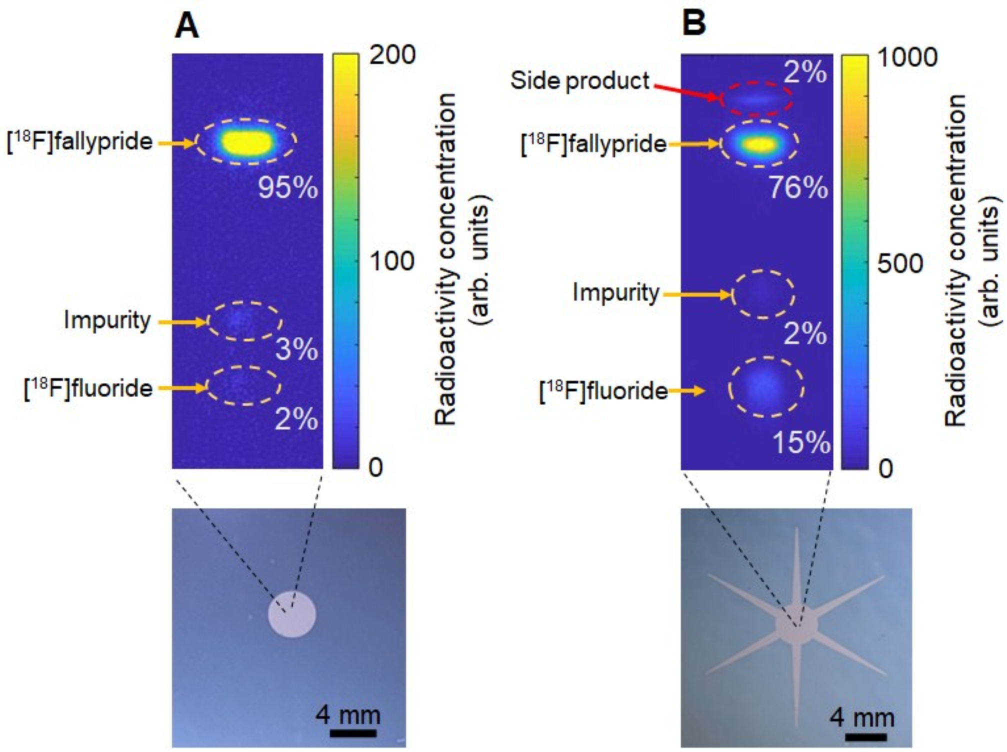

Figure S1. Cerenkov images of developed radio-TLC plates spotted with crude [^{18}F]fallypride product synthesized on (A) the new compact automated droplet radiosynthesizer and (B) the previous system based on "passive transport" chips.

2 Reagent loading protocol optimization

During the preliminary study of using the microdroplet reactor to synthesize another tracer, [^{18}F]FDOPA, we noticed signs of significant splashing of radioactivity outside of the reaction site (**Figure S2A**) after observing the distribution of residual radioactivity (after the collection step) on a series of microfluidic chips via Cerenkov imaging. Suspecting that the addition of collection solution with the piezoelectric dispenser (driven at 69 kPa [10. psi]) may be causing some of the contents of the chip (crude product after fluorination reaction) to splash, we repeated experiments using a lower driving pressure (35 kPa [5.0 psi]) and observed that the signs of splashing disappeared (**Figure S2B**). The initially high residual activity on the chip after collection (17%) was lowered to 5% with this change in the driving pressure.

Since all other reagents are driven at 69 kPa [10. psi] without signs of splashing, this study indicated that delivery of each reagent (or solvent) involved in the synthesis may require a little bit of optimization, to determine the best dispensing pressure, as new tracers are explored.

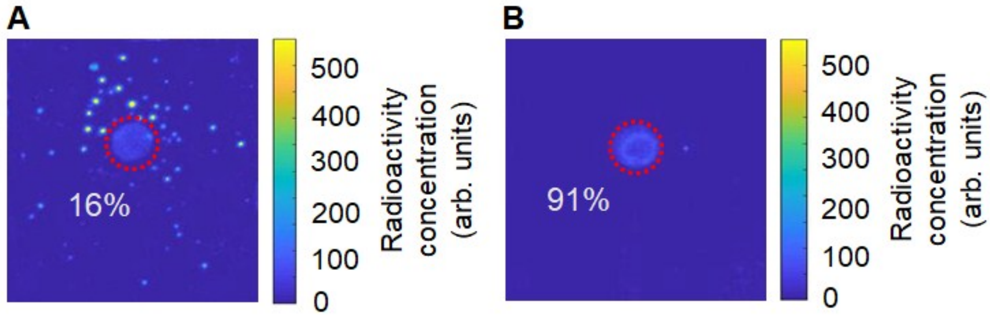

Figure S2. Activity distribution on droplet reaction chips after the collection step, visualized with Cerenkov luminescence imaging. Collection solution (80% MeOH / 20% DI water, v/v) was dispensed on the reaction site at (A) 10 psi or (B) 5 psi. The red dashed circle outlines the reaction site. Ratio of residual activity at the reaction site to total residual activity on the chip is indicated in the images.