Dual-Tracer Multiparametric Imaging with a Long-Axial Field-of-View PET to Better Characterize Cancer

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Numerous new PET radiotracers introduced in the past decade have improved our ability to non-invasively detect disease and characterize tumor biology. The integration of these tracers into clinical practice has transformed the treatment of many diseases, ushering in a new era of precision medicine guided by molecular imaging. Modern PET protocols, though, limit our ability to fully exploit this new tracer technology. As a PET scanner cannot distinguish between tracers, different tracers must be imaged on separate days to allow for decay of the first prior to imaging the second. This current delay hampers the radiologist's ability to render a timely unified diagnosis of the two image datasets and is inconvenient to patient.

Leveraging a long-axial field-of-view (LAFOV) PET, dual-tracer PET imaging becomes feasible whereby two PET tracers with different molecular targets may be imaged back-to-back in single imaging session. The increased sensitivity of a LAFOV PET enables imaging the first tracer at such a low injected activity that upon injection of the second tracer at a typical activity, minimal confounding signal remains from the first tracer. A successful proof-of-concept study with Fluoroglutamine and FDG provided support to advance this imaging paradigm. Future work will optimize protocols to best extract the molecular data provided by these scans. Ultimately, such protocols will advance the capabilities of PET—optimizing the utilization of new radiotracers—to characterize and guide treatment in oncology.