PhD in Chemical Sciences
Department of Chemistry "Ugo Schiff"
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PhD Seminar

"Imaging of inflammation and apoptosis: a tale of radiopharmaceuticals' bench-to-bedside translation."

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Abstract

Positron Emission Tomography (PET) is a molecular imaging technique able to visualize biomolecular processes *in vivo*, in real-time, via a radiolabeled drug usually referred to as PET tracer. In the present talk, two PET tracers, ^{18}F-TBD and [^{18}F]fluoronaphthol ([^{18}F]4FN), will be presented. ^{18}F-TBD is a caspase-3 substrate and reports on apoptosis. It was developed employing ^{18}F-click chemistry with ^{18}F-fluoroethyl azide and a stripping resin that allowed for removal of the alkyne-radiolabeling precursor and enhancement of molar activity. [^{18}F]4FN visualizes the production of high-energy reactive oxygen species (ROS), which occurs during acute inflammatory processes when the innate immune system is recruited. It was synthesized by copper-mediated deboronation-fluorination – method that has been recently implemented in GMP. Both tracers have been comprehensively validated for their respective mechanisms of action and have matured enough to be employed in advanced applications. In the present talk, the details and challenges of the chemistry and its translation in GMP, the tracers' validation and their application for early detection of hepatocellular carcinoma will be discussed.