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# Simulation of Simultaneous PET Imaging of Antibodies Labeled with Zr-89 and I-124 Based on Triple Coincidences

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Multiplexed PET (mPET) is a new imaging technique able to provide separated images of the biodistribution of two radiotracers based on their standard double coincidences and the triple coincidences generated by one of them. In this work, we evaluated the feasibility of using mPET to improve and facilitate the kinetic analysis of studies with monoclonal antibodies (mAb). By simultaneously administering and imaging mAb labeled with either Zr-89 or I-124, the differences in the activity concentration in the tumor of each isotope can be used to improve tumor detection and the estimation of some of its properties. We have evaluated the proposed method with dynamic realistic simulations of numerical mice phantoms performed with PeneloPET for the preclinical SuperArgus scanner considering all relevant physical effects such as positron emission and annihilation, emission of the prompt gamma rays, and detection in the scanner. The good results demonstrate that this in-silico approach can be used for testing different acquisition protocols before in-vivo acquisitions. It also shows that mPET can be an additional new tool for kinetic modelling of mAb studies.

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