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A New Software for Image Registration in Multimodality, PET-MR, Imaging in Cell Tracking Studies

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Positron emission tomography (PET) is an essential tool for in vivo
molecular imaging, due to its high sensitivity. Combined with the unparalleled soft tissue contrast of magnetic resonance imaging (MRI), PET–MRI allows for accurate quantification required for cell tracking studies. The purpose of this study is to develop a landmark based image registration program capable of fiducial registration, for application in a stem cell tracking study . PET and MR Images acquired with fiducial markers located in the field of view around the specimen were registered using our landmark based program, written in Matlab. The fiducial markers were also used to test the accuracy of our Matlab program, along with other automated image registration software including: automatic image registration (AIR), FMRIB's linear image registration tool (FLIRT), and medical image processing, analysis, and visualization (MIPAV), all available online free for download. All of the programs were able to successfully register the images; however, our Matlab program provided the best registration accuracy, with a fiducial registration error (FRE) of 1.36 mm.

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