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# Sub-millimeter I-131 SPECT with clustered pinholes

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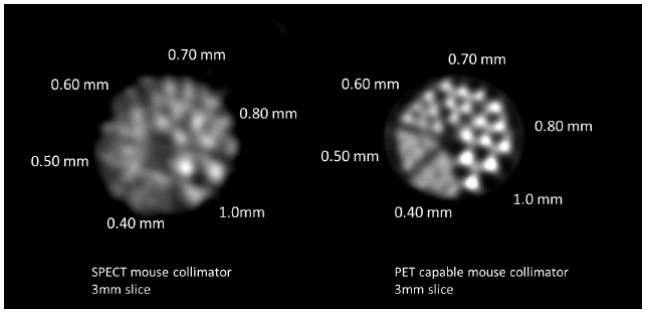
A new pinhole collimator for imaging PET tracers was recently developed for the U-SPECT-II/CT system (MILabs, The Netherlands) to allow for simultaneous imaging of positron emitters and single photon emitters with sub-mm resolution. To this end a novel collimator was optimized for high-energy gamma photons by the use of clustered multi-pinholes (CMP). Small opening angles of each pinhole within a cluster strongly reduce resolution loss due to edge penetration. Here we test CMP for imaging with I-131 that emits high-energy photons (364 keV). A CMP collimator was placed in the triangular stationary detector set-up of the U-SPECT-II system. Images were obtained using pixel-based ordered subset reconstruction that uses a system matrix to correct for blurring due to pinhole size and detector resolution. The image resolution was determined with a Jaszczak hot capillary resolution phantom. The smallest rods that could be resolved in the reconstructed I-131 images have a diameter of 0.6 mm while 0.5 mm for Tc-99m and 0.8 mm for F-18 were obtained with the same collimator and 0.8 mm was obtained for I-131 in a SPECT collimator. Further improvements are expected with more refined modeling of photon transport during iterative reconstruction. The spectrum also shows a reduced scatter-to-primary ratio for imaging I-131 compared to SPECT collimators. We conclude that the collimator that was designed for imaging PET isotopes is also to be preferred for imaging high-energy SPECT isotopes such as I-131 in mice.




Comparison of the reconstructed resolution between the mouse SPECT collimator and the mouse PET-capable collimator.

*Disclosure of author financial interest or relationships:*

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