

Abdominal SPECT/MRI fusion applied to the study of splenic and hepatic uptake of radiolabeled thrombocytes and colloids

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The importance of applying MRI (CT)/SPECT fusion in the abdominal and thoracic areas has been recognized in recent studies aiming at radionuclide therapy of cancer. According to our earlier results spleen and liver volume determination with different segmentation methods is inaccurate with SPECT alone. We therefore applied a SPECT/MRI registration procedure to the estimation of spleen and liver volumes and spleen/liver activity ratios in three male volunteers administered ¹¹¹In-labeled thrombocytes and ^{99m}Tc-labeled colloids. The objectives of the study were to investigate if the uptake of thrombocytes in the spleen and liver can be measured more accurately when the anatomical borders of these organs are transferred from MRI to SPECT, and to test a SPECT/MRI registration method for improving three-dimensional dosimetry for radiotherapy treatment planning. A good correlation was found between spleen/liver activity ratios calculated from volumetric average activity per pixel values and from total volumetric counts derived from registered data but not from projection data. The average registration residual with this SPECT/MRI fusion method is approximately 1–2 cm in the abdominal area. Combining anatomical images with SPECT is therefore important for improving quantitative SPECT also in the abdomen.

Key words: abdominal fusion imaging, registration, SPECT, MRI