Evaluation of Tc-99m(V) DMSA for imaging inflammatory lesions: An experimental study

Meral T. ERCan,† Nedim C.M. GÜLALD†, † İhsan ÜNSAL, † Mehmet AYDIN, † İran PEKSOY † and Zafer HASÇELIK ‡

Departments of †Nuclear Medicine and ‡Physical Medicine and Rehabilitation, Faculty of Medicine, Hacettepe University, Ankara, Turkey

The present study evaluated ⁹⁹ᵐTc(V) DMSA as an agent for the visualization of inflammatory lesions in comparison to ⁹⁹ᵐTc(III) DMSA and ⁹⁹ᵐTc-HIG. All three radiopharmaceuticals were prepared with commercial kits. ⁹⁹ᵐTc(V) DMSA was prepared at neutral pH by the addition of first bicarbonate and then pertechnetate to the kit contents. The labeling efficiency was 99% as determined by ITLC. Abscesses were induced by i.m. injection of 50 µl turpentine into the right thighs of 36 Swiss albino mice. Six days later 3.7 MBq of each radiopharmaceutical was i.v. administered to 12 mice. The mice were sacrificed at 1, 3, 6 and 24 h later. Scintigrams were obtained with a gamma camera. The abscesses were better visualized on scintigrams with ⁹⁹ᵐTc(V) DMSA compared to ⁹⁹ᵐTc(III) DMSA, starting at 1 h. The animals were dissected and the organs were removed, weighed and the radioactivity determined with a gamma counter. The abscess to other tissue ratios were higher with ⁹⁹ᵐTc(V) DMSA than the other radiopharmaceuticals. The max. abscess/muscle ratios were 9.46 ± 3.20 (24 h), 4.19 ± 1.39 (6 h) and 5.98 ± 1.17 (24 h) and max. abscess/blood ratios were 6.22 ± 1.41, 4.09 ± 0.84 and 0.914 ± 0.351 all at 24 h for ⁹⁹ᵐTc(V) DMSA, ⁹⁹ᵐTc(III) DMSA and ⁹⁹ᵐTc-HIG, respectively.

Experimental arthritis was produced in 6 New Zealand white rabbits by intra-articular injection of ovalbumin. Four days later 37 MBq of ⁹⁹ᵐTc(V) DMSA and ⁹⁹ᵐTc-HIG were each i.v. administered to 3 rabbits. Scintigrams obtained at 1, 3, 6, and 24 h clearly demonstrated arthritic joints. ROI’s over arthritic joints were compared to contralateral normal joints (A/C). The max. A/C ratios were 2.10 ± 0.31 (3 h) and 2.92 ± 0.99 (24 h) for ⁹⁹ᵐTc(V) DMSA and ⁹⁹ᵐTc-HIG, respectively.

Our results indicated the feasibility of imaging inflammatory lesions with ⁹⁹ᵐTc(V) DMSA.

Key words: ⁹⁹ᵐTc(V) DMSA, ⁹⁹ᵐTc(III) DMSA, ⁹⁹ᵐTc-HIG, inflammation, arthritis