

## **Evaluation of external radiation dose of humans involved in veterinary nuclear medicine by using EGS4**

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### **Abstract**

This simulation study was undertaken to show the radiation safety data as the reference source of guidelines for the veterinary nuclear medicine in Japan. EGS4 was applied in this simulation in order to avoid unnecessary animal experiments. In this study, <sup>99m</sup>Tc and <sup>18</sup>F were considered since these two nuclides are the most expected radionuclides worth not only for human medicine but also for veterinary medicine. Mathematical phantom of the canine trunk structures containing the major organs including the heart, the liver, the kidney, and urinary bladder was prepared and evaluated based on the basis of the mass balance distribution of the radionuclide. Radiation exposure of the personnel involved in veterinary nuclear medicine (a veterinarian), animal owner, and general public from the animal and their realistic but maximal condition (time and distance from the animal) for the exposure were also considered. The estimation indicated that the exposure of the veterinarian was at most 0.12mSv per study from the large breed dog phantom (30kg) and was about 1/160 of the average dose limit per year (20mSv). As to the public exposure, less than 1/100 of the counseled level ICRP was achieved by 20 hours after injection of either <sup>99m</sup>Tc or <sup>18</sup>F to the animal phantom. At the same time, accumulated dose from either <sup>99m</sup>Tc or <sup>18</sup>F was much less than the dose constraint (5 mSv) announced by IAEA. In this study, nevertheless the condition for the exposure evaluation is still tough enough for overestimation. Therefore in more realistic or precise condition for the practice of veterinary nuclear medicine, there would be no or insignificant effect for the radiation exposure to the public.