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Comparison of dynamic FDG-microPET study in a rabbit turpentine-induced inflammatory model and in a rabbit VX2 tumor model

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Purpose: We investigated the optimum time for the differentiation tumor from inflammation using dynamic FDG-microPET scans obtained by a MicroPET P4 scanner in animal models. ***Materials and Methods:*** Forty-six rabbits with 92 inflammatory lesions that were induced 2, 5, 7, 14, 30 and 60 days after 0.2 m*l* (Group 1) or 1.0 m*l* (Group 2) of turpentine oil injection were used as inflammatory models. Five rabbits with 10 VX2 tumors were used as the tumor model. Helical CT scans were performed before the PET studies. In the PET study, after 4 hours fasting, and following transmission scans and dynamic emission data acquisitions were performed until 2 hours after intravenous FDG injection. Images were reconstructed every 10 minutes using a filtered-back projection method. PET images were analyzed visually referring to CT images. For quantitative analysis, the inflammation-to-muscle (I/M) ratio and tumor-to-muscle (T/M) ratio were calculated after regions of interest were set in tumors and muscles referring to CT images and the time-I/M ratio and time-T/M ratio curves (TRCs) were prepared to show the change over time in these ratios. The histological appearance of both inflammatory lesions and tumor lesions were examined and compared with the CT and FDG-microPET images. ***Results:*** In visual and quantitative analysis, All the I/M ratios and the T/M ratios increased over time except that Day 60 of Group 1 showed an almost flat curve. The TRC of the T/M ratio showed a linear increasing curve over time, while that of the I/M ratios showed a parabolic increasing over time at the most. FDG uptake in the inflammatory lesions reflected the histological findings. For differentiating tumors from inflammatory lesions with the early image acquired at 40 min for dual-time imaging, the delayed image must be acquired 30 min after the early image, while imaging at 90 min or later after intravenous FDG injection was necessary in single-time-point imaging. ***Conclusion:*** Our results suggest the possibility of shortening the overall testing time in clinical practice by adopting dual-time-point imaging rather than single-time-point imaging.

Key words: tumor, inflammation, FDG, microPET, dual-time point imaging