

Effects of regulation difference of phantom RI concentration on PET image evaluation

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Abstract

There are some guidelines for PET performance test in Japan. “Japanese guideline for the oncology FDG-PET/CT data acquisition protocol: synopsis of Version 1.0” with the phantom experiment No. 2(experiment No.2) is one of them. In the experiment No.2, it is suggested that the ratio of activity of hot sphere of NEMA IEC body phantom to background should be 4.00:1 and a model method is introduced to prepare the phantom for the experiment. However, the 4.00:1 ratio is not attainable when using the phantom in our center to prepare with the recommended method, by which the ratio comes to be 4.08:1. So we have examined whether or not we can distinguish the PET images acquired with the ratios 4.00:1 and 4.08:1, and how the difference affects the evaluation of PET images. On visual, a 10mm hot sphere was more clearly viewed in the phantom with the ratio 4.08:1 than that with the ratio 4.00: 1. The sphere was not shown in the image of 4.00:1 phantom by 3-minute data acquisition, but it was recognized in the image by 30-minute data acquisition. We also evaluated the images by comparing PET counts of values of region of interest (ROI). On the basis of ROI value of 37 mm sphere, PET counts of ROI values of 10 mm sphere in the 4.00:1 phantom were 0.36-0.49 and those in the 4.08:1 phantom were 0.40-0.50. While there seemed no significant effects on PET image evaluation, it was suggested that we should be more careful about the difference of activity ratio to background for precise evaluation of PET images.