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# Realistic Modeling of the Preclinical Small Animal Using Commercial Software

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**Abstract :** As the increasing incidence of cancer, the technology and modality of radiotherapy have advanced and the importance of preclinical model is increasing in the cancer research. Furthermore, the small animal dosimetry is an essential part of the evaluation of the relationship between the absorbed dose in preclinical small animal and biological effect in preclinical study. In this study, we carried out realistic modeling of the preclinical small animal phantom possible to verify irradiated dose using commercial software. The small animal phantom was modeling from 4D Digital Mouse whole body phantom. To manipulate Moby phantom in commercial software (Mimics, Materialise, Leuven, Belgium), we converted Moby phantom to DICOM image file of CT by Matlab and two- dimensional of CT images were converted to the three-dimensional image and it is possible to segment and crop CT image in Sagittal, Coronal and axial view). The CT images of small animals were modeling following process. Based on the profile line value, the thresholding was carried out to make a mask that was connection of all the regions of the equal threshold range. Using thresholding method, we segmented into three part (bone, body (tissue). lung), to separate neighboring pixels between lung and body (tissue), we used region growing function of Mimics software. We acquired 3D object by 3D calculation in the segmented images. The generated 3D object was smoothing by remeshing operation and smoothing operation factor was 0.4, iteration value was 5. The edge mode was selected to perform triangle reduction. The parameters were that tolerance (0.1mm), edge angle (15 degrees) and the number of iteration (5). The image processing 3D object file was converted to an STL file to output with 3D printer. We modified 3D small animal file using 3- Matic research (Materialise, Leuven, Belgium) to make space for radiation dosimetry chips. We acquired 3D object of realistic small animal phantom. The width of small animal phantom was 2.631 cm, thickness was 2.361 cm, and length was 10.817. Mimics software supported efficiency about 3D object generation and usability of conversion to STL file for user. The development of small preclinical animal phantom would increase reliability of verification of absorbed dose in small animal for preclinical study.

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