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## Study on Availability of Monte-Carlo Simulation for Attenuation Correction of Brain-Dedicated PET

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Brain-dedicated positron emission tomography (B-PET) aimed at diagnosing Alzheimer disease is being developed. Unlike the existing PET used in combination with MRI or CT, B-PET will be operated independently without additional equipment. Therefore, a study is needed for PET-based correction method, which replaces a CT-based method for quantitative assessment as well as improved quality of an image. This study was conducted with focusing on attenuation mapping in a series of processes for that purpose. The B-PET system is a ring shape with 36 two-line blocks, each containing 8x8 array silicon photomultipliers (SiPM) and the ring has a diameter about 300 mm. Lutetium-yttrium oxyorthosilicate, known as LYSO, is used for a crystal of detector. In the simulated B-PET system like the aforementioned environment, the PET-based attenuation correction method was performed on MCNPX 2.7 using water-based cylinder phantom and ICRP phantom. An experiment with tissue equivalent brain phantom was conducted with B-PET as a control group of simulations to verify the availability of Monte-Carlo simulations. As a result of this study, we will show the application of the attenuation correction method and discuss the availability of simulation by comparing images reconstructed by simulation data and experimental value. The electronics of front-end module and readout system are manufactured by PETSYS electronics, and the SiPM (Mo. PA3325-WB-0808) which manufactured by KETEK GmbH was used for PET detector.

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