

**Performance evaluation of Siemens Somatom go.Open Pro CT scanner using GATE: dosimetry and image quality for treatment planning in radiotherapy**

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**Background:** the reduction of the dose delivered by CT scanners is a major health issue. Our study aims to optimize the dose in relation to the image quality necessary for treatment planning in radiotherapy or diagnosis on the latest generation of Siemens Healthineers CT scanners.

**Material and Methods:** this study allows an accurate Monte Carlo simulation of the SOMATOM go.Open Pro CT scanner (X-ray spectrum, bowtie filter, filtration, collimation and detectors) using the open-source GATE platform (see [www.opengatecollaboration.org](http://www.opengatecollaboration.org)). First, scanner simulations were compared to Monte Carlo Reference Data Sets for Imaging Research: AAPM Task Group 195 Report [1]. Energy deposited in a cylindrical phantom as well as in 19 anatomical regions of the XCAT phantom were studied (cases 5 and 6). Second, dosimetric (body CTDI) and anthropomorphic (e.g. XCAT) phantoms were used to measure  $CTDI_{100}$ ,  $CTDI_w$  and  $CTDI_{Vol}$  corresponding to the dose per patient and per slice in mGy as well as absorbed and effective doses. Simulation outputs were compared to measurements performed on multiple CT scanners.

**Preliminary results:** the impact of the different CT scan parameters (e.g. voltage, mAs, tube rotation) were evaluated and differences with measurements were determined. This work will be completed with the study of image quality using dedicated phantoms and patient CT scans.

As perspectives, the CASTOR software will be used for patient image reconstruction.

[1] “Monte Carlo reference data sets for imaging research: Executive summary of the report of AAPM Research Committee Task Group 195” Medical Physics, 42, 5679-5691 (2015)