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# Monte Carlo simulation and imaging dose estimation for a kilovoltage cone-beam CT unit

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The accuracy of patient and tumor localization for radiotherapy treatments has been improved by the emergence of radiographic image guidance. However, intensive use of Imaged-Guided Radiotherapy (IGRT) could add a significant extra dose to normal tissues and potentially amplify the risk for patients to develop a secondary radiation-induced cancer and side effects. The purpose of this Ph.D study is to understand and estimate the dose from the Cone Beam Computed Tomography (CBCT) unit mounted on the medical Elekta Synergy linear accelerator.

The most accurate tool to evaluate the amount of radiation delivered by CBCT is the Monte Carlo (MC) method. Hence, we developed a dose calculation tool based on the MC method and suitable for clinical environment, and validate it in pre-clinical conditions thanks to measurements performed on the Elekta linac available on the DOSEO platform. This simulation tool allows studying several strategies to integrate the additional dose due to CBCT imaging into the treatment planning optimization.

**Auteur principal:** Mlle CHESNEAU, Héléna (CEA)

**Co-auteurs:** Mme LAZARO, Delphine (CEA); M. BLIDEANU, Valentin (CEA)

**Orateur:** Mlle CHESNEAU, Héléna (CEA)

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