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Evaluation of Pediatric Radiation Effective dose and cancer risks during Computed Tomography examinations

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Computed tomography (CT) is a vital diagnostic tool in pediatric medicine, but its associated ionizing radiation raises concerns about long-term cancer risks. Children are particularly vulnerable due to their rapidly dividing cells and longer life expectancy for radiation-induced effects to manifest. Epidemiological studies, including extensive cohort analyses, suggest a small but statistically significant increase in cancer incidence, particularly leukemia and brain tumors, following pediatric CT exposure, with risk proportional to cumulative radiation dose. Therefore, protecting them from radiation exposure is essential to minimize cancer risk and prevent deterministic effects. This study estimates the effective dose from pediatric computed tomography (CT) brain, head, neck, and abdomen procedures. Over nine months, 145 CT procedures were conducted during six months at King Khalid Hospital Alkharj. The overall mean and range of patients' age (y) are 5 (1.1-12.5). The mean dose length product (DLP), in mGy.cm, and volume CT index (CTDIvol, in mGy) were 450 and 26 per CT procedure for age groups 0 ≤5.0 and 6.0 ≤12.5 years, respectively. The study revealed that 5.7% and 10.3% were higher than the national Saudi Diagnostic Reference Level (DRL). the effective dose per procedure ranged from 3.6 to 7.2 mSv resulting in cancer risk probability up to 1 per 104 CT procedure. Therefore, it is recommended that the scan length be reduced to ensure that patients receive the lowest possible radiation dose while maintaining the image quality. Optimizing the radiation dose is necessary by using the lowest possible dose to obtain diagnostic-quality images. It is crucial to stress the need for precisely adjusting CT scan parameters to the child's size and specific clinical needs to reduce the projected carcinogenic risks and provide individualized care.

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