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Cumulative Radiation Burden from High-Resolution Chest CT: Effective Dose and Lifetime Cancer Risk Analysis

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High-Resolution Computed Tomography (HRCT) is widely employed in the diagnosis of lung diseases, demonstrating a sensitivity of 95% and a specificity of 85%. Chest CT is frequently used for the diagnosis and monitoring of disease progression, outcomes, and treatment effectiveness. CT is associated with radiogenic risks, which refer to the potential risk of developing cancer due to exposure to ionizing radiation. It is crucial to assess the benefits and risks to adequately justify the surgery for patients. This study evaluated the radiation dosage and associated cancer risk for patients undergoing high-resolution chest CT scans. A total of 150 patients were assessed, comprising 70%) and 30% female, with a mean age of 50± 12 years, spanning from 22 to 70 years. All patients underwent a high-resolution CT chest scan. The radiation dose parameters were quantified as volume CT dose index (CTDIvol in mGy) and dose length product (DLP (mGy.cm)). The mean CTDIvol(mGy) was 9.5 mGy with a standard deviation of 3.50, within a range of 5.0 to 19.0 mGy. The mean DLP was 350.2 ± 132.66 mGy.cm, with a range of 179.0 to 734.0. The effective dosage for HRCT in the patient was determined to be 6.0 mSv, corresponding to three cancer risks per ten thousand procedures. This study demonstrates that the radiation dosage aligns with HRCT protocol parameters. Explicit justification criteria are essential to ensure that the benefits outweigh the expected risks. Interpatient variability is attributed to variations in patient weight and the imaging techniques utilized.

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