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Harmonization of imaging acquisition in radiogemics

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An increasing body of publications has reported the value of radiographic image features (radiomics features) for linking genetic alterations in certain cancer types using multiple imaging modalities. The findings were mostly based on retrospective analysis of imaging data from previous studies that were not designed for quantitative characterization of tumors. Despite the large variety of CT scanner types, imaging acquisition techniques, reconstruction parameters and tumor segmentation and quantification tools, little is known about the effects of such variations on radiomics features. We extracted radiomics image features to describe tumor size, shape, margin, density statistics (histogram-based) and density texture distributions and studied the effects of the various factors during the imaging acquisition and tumor measurement on the radiomics image features using both phantom and in-vivo lesions. Our findings suggest that radiomic features are reproducible over a wide range of CT imaging settings. Radiation dose, CT slice thickness and reconstruction affect radiomics features to different degrees; tumor texture features are more sensitive to the imaging settings compared to the size and shape related features. Our findings will raise awareness of importance of properly utilizing imaging and setting image acquisition parameters in radio genomics research.

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