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RADIOMIC FEATURES ANALYSIS IN PET IMAGES FOR HEAD AND NECK CANCER

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Positron emission tomography (PET) image has been used routinely in oncology for tumor diagnosis, staging and assessment of treatment response. However, the information extracted from image-based features for diagnosis is still under development during the past decade. In recent years, radiomics texture analysis has been used in medical imaging to obtain quantitative data through automated and reproducible analysis, reflecting the characteristics of the tumor, providing additional clinical diagnostic information. In this study, we analyzed 80 head and neck cancer and extracted image features from four metabolic volumes (MTV2.5, MTV3.0, MTV40% and MTV50%) of PET images. The features include shapes, intensity-based, grey level co-occorence, size zone, length, neighborhood grey-tone difference etc.. ANOVA and Kruskal-Wallis test was used to assess the differences of image texture features in different groups of patients. Receiver-operating characteristic analysis was used to find out the optimal cutoff point of overall survival (OS) and primary, relapse free survival (PRFS) with different image features. The results showed that 16 image texture features had significant differences in early tumor stage (T1, T2) and lately tumor stage (T3, T4). We found 5 and 2 image textural features had ability to predict the tumor response and recurrence, respectively. The histogram entropy is the one predictor of OS and PRFS of head and neck cancer patients. We found that image textural features provide predictive and prognostic information on tumor staging, tumor response, recurrence, and can be a prognosticator for OS and PRFS in head and neck cancer in PET images.

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