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Correlating 68Ga-PSMA PET/CT Imaging Features with PSA Variation for Castration-Resistant Prostate Cancer Patients

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medical treatment, were enrolled. All patients are grouped into two groups based on GS; above 4+3 as malignant and under 3+4 as benign. The tumor in the prostate bed was diagnosed and segmented from PET and CT images by an experienced nuclear medicine physician. Subsequently, 27 radiomic features including shape, first-order, GLCM, GLRLM, GLSZM, and GLDM were extracted from the volume of interest (VOI) of a local tumor on PET and CT images, separately. The features selected by mRMR and Recursive Feature Elimination (RFECV) with Cross-Validation. Nested cross-validation was applied with 3-fold cross-validation for the outer and inner loops. Five models were assessed, including support vector machine (SVM), Logistic regression, Random Forest, Decision Tree, and K-Neighbors. The best model of each outer loop was determined using the area under the curve (AUC) of the receiver operating characteristic (ROC) curve. The performance of the models was evaluated based on the outer loop results. **Results:** The results of this study were split into two parts, CT alone and PET alone. All five models that were applied to predict Gleason grade were compared to each other using AUC Score. Firstly, logistic regression achieved the best results on CT images, in which mean AUC, sensitivity, and specificity were 0.80, 0.87, and 0.61, respectively. Secondly, K-Neighbors reached the best predictive performance on PET images, achieving a mean AUC Decision Tree 0.75, sensitivity of 0.72, and specificity of 0.76. **Conclusion:** The results of the present study demonstrate that radiomic models based on PET/CT images could be a promising non-invasive approach to predict pathological indices, such as GS in primary PCA.

EP-0728

The value of 18F-FDG PET/MR radiomics features in predicting the pathological classification of rhabdomyosarcoma in children

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Aim/Introduction: To explore the value of 18F-FDG PET/MR radiomics features in predicting the pathological classification of rhabdomyosarcoma in children. **Materials and Methods:** The clinical data and PET/MR imaging data of 125 children with pathologically confirmed rhabdomyosarcoma were collected. They were divided into two groups: embryonal rhabdomyosarcoma (ERMS) (n=75) and acinar rhabdomyosarcoma (ARMS) (n=50). Pathological and clinical diagnosis results serve as the gold standard for diagnosis. We used AK software to extract the most relevant imageomics features for tumor classification, and randomly divided the two groups of images into training set (70%) and test set (30%). The maximum correlation and minimum redundancy (mRMR) and minimum absolute shrinkage and selection operator (LASSO) methods were used to select features from 1800 features extracted from MR and PET, and finally eight best features were retained. Multivariate logistic regression analysis was performed using the radiomics characteristics and clinical variables to establish the prediction model. The receiver operating characteristic (ROC) analysis is used to evaluate the prediction model. **Results:** The established PET/MR radiomics features have good prediction efficiency for the recognition of ERMS and ARMS classification, and there are significant differences. The AUC of the training group and the validation group were 0.918 (95% CI: 0.783-0.979) and 0.856 (95% CI: 0.775 - 0.996), respectively. **Conclusion:** The prediction model of PET/MR radiomics features can be used as a promising and practical

auxiliary method to predict the pathological classification of rhabdomyosarcoma in children. It can also provide objective basis for accurate clinical diagnosis and individualized treatment, and has important guiding significance for clinical treatment.

EP-0729

Correlating 68Ga-PSMA PET/CT Imaging Features with PSA Variation for Castration-Resistant Prostate Cancer Patients

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Aim/Introduction: Prostate cancer is a major health concern worldwide, and the treatment of advanced prostate cancer is still challenging. Radiopharmaceutical therapy with ¹⁷⁷Lu-PSMA has emerged as a promising approach to address this issue. PET/CT imaging is commonly used to determine the extent of disease and the correlation between PET/CT imaging features and serum PSA levels has been shown to predict treatment outcomes [1]. In this work, we analyzed some correlations between imaging features and PSA levels to highlight the importance of PET/CT imaging in predicting the response to ¹⁷⁷Lu-PSMA therapy.

Materials and Methods: We conducted a retrospective analysis of 45 male patients who received ¹⁷⁷Lu-PSMA treatment, all patients had a 68Ga-PSMA PET/CT imaging. The images were pre-processed using a deep learning automatic segmentation (TotalSegmentator [2]); the physiological organs uptake, obtained by expanding ⁶⁸Ga-PSMA-avid known OARs (liver, kidneys, spleen, stomach, pancreas ...), was set to zero to obtain one single whole-body tumor region (WBTR) encompassing all potential tumors without physiological uptake. For each patient, the biological PSA (initial and final) was retrieved, and we studied the correlation between the PET radiomics and the PSA values using Spearman's rank correlation, a Multi-Layer Perceptron with three hidden layers, and a Random Forest. We compared the results to a standard approach where the $WBTR_{standard}$ is obtained by a threshold set as the kidney's mean SUV. **Results:** A significant but weak correlation was found between the WBTR volume and the PSA variation. The correlation coefficient was -0.41 (p-value: 0.01), while for the standard approach it was -0.34 (p-value: 0.02). Moreover, we evaluated the predictive performance of MLP and Random Forest models for PSA variation. We obtained a mean absolute error of 163% for MLP and 563% for Random Forest. The standard approach had an error of 149% for MLP and 558% for Random Forest. **Conclusion:** This preliminary study only showed the presence of a weak correlation between the WBTR volume and the PSA variation. The use of simple statistics is not enough to establish a significant improvement. Further research through advanced machine learning techniques is necessary to explore the potential of this method. **References:** [1] Moazemi, May 2021, Annals of Translational Medicine[2] Wasserthal, 2022, arXiv

EP-0730

Prediction of pathological complete response in T-stage III rectal cancer using 18F-FDG PET texture features

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Aim/Introduction: Rectal cancer is known to have low chance to have pCR with combined multimodal therapy. Therefore, it is important to predict pCR to avoid treating insensitive patients. Several studies on the prediction of rectal cancer has been conducted based on the machine learning (ML) model using