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Student: Janisch Michael

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Non-contrast enhanced CT texture analysis of primary and metastatic pancreatic ductal adenocarcinomas: Value in assessment of histopathological grade and differences between primary and metastatic lesions.

Michael Janisch; Gabriel Adelsmayr; Heimo Müller; Andreas Holzinger; Elmar Janek; Emina Talakic; Michael Fuchsjäger; Helmut Schöllnast

Background: Despite progress in therapeutic options, prognosis of pancreatic ductal adenocarcinoma (PDAC) remains poor. It is, among local and distant extension, influenced by histopathological grading, that is usually assessed post surgery. As neoadjuvant therapy may improve outcomes for patients with poorly differentiated PDAC, a non-invasive method to assess histopathological grade would be valuable. A non-invasive tool to assign liver lesions in patients with PDAC to draw conclusion to the primary tumor would also be clinically helpful. The aim was to evaluate the significance of CT-texture analysis (CTTA) in assessment of histopathological grade of PDAC and to compare CTTA texture features between primary and metastatic PDAC.

Method/Results: In this retrospective study with 120 patients and histopathologically confirmed PDAC, Sixty-five patients underwent CT-guided biopsy of primary PDAC, while 55 patients underwent CT-guided biopsy of hepatic PDAC metastasis. All lesions were segmented in non-contrast enhanced CT scans for CTTA based on histogram analysis, co-occurrence matrix and run-length matrix. Statistical analysis was conducted for 372 texture features using Mann-Whitney-U-test and ROC analysis. A p-value <0.05 was considered statistically significant. Three features were identified that differed significantly between histopathological G2 and G3 primary tumors. Of these, "low gray-level zone emphasis" yielded the largest AUC, reaching a sensitivity and specificity of 0.76 and 0.83, respectively (cut-off value of 0.482). Fifty-four features differed significantly between primary and hepatic metastatic PDAC (AUCs: 0.72-0.93).

Conlusion: CTTA of PDAC identified differences in texture features between primary G2 and G3 tumors that could be used for non-invasive tumor assessment. Differences between the features of primary and metastatic PDAC suggest that CTTA of metastatic lesions may not allow conclusions regarding the histology of the primary tumor.