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Pancreatic Neuroendocrine Tumors: CT Enhancement, but not Histologic Grade, Correlates with Tumor Aggression

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BACKGROUND: Pancreatic neuroendocrine tumors are variable in degree of aggression; some are indolent for many years without therapy and others are metastatic at the time of presentation. Imaging, histologic, or clinical variables that serve as indicators of disease aggression are therefore valuable in the management of this tumor. Our objective is to assess the CT enhancement characteristics of pancreatic neuroendocrine tumors (NET) and determine their correlation with histologic vascularity and fibrosis in order to identify a biomarker for tumor aggression.

METHODS: This retrospective study included 56 patients. CT images were used to calculate differential arterial and venous enhancement of NET compared to pancreas, and between phases ("dynamic washout"). Tumor size, histologic vascularity/fibrosis were assessed. Tumor aggression was grouped by World Health Organization (WHO) and Hochwald grade, and presence of metastases. Variables were assessed for correlation. Groups were compared using t-test/ Wilcoxon rank sums test.

RESULTS: Arterial enhancement and dynamic washout (r= 0.35, P=0.02; r=0.34, P=0.02, respectively), but not venous enhancement, correlate with histologic vascularity. Despite significant inverse correlation between histologic vascularity

and fibrosis (r=-0.62, P<0.001), there is no correlation between enhancement and fibrosis. There is no difference in histologic variables between groups. There is no difference in CT enhancement between WHO/Hochwald grade 1 and 2. Metastatic NET had less arterial [mean(standard deviation) -2(27.1)HU, 35.7(57.5) HU, P=0.01] and venous [12.6(14.4)HU, 29.2(38.3)HU, P=0.04] enhancement, and less washout [8.5(18.5)HU, 26.8(30)HU,P=0.02] compared to nonmetastatic NET. Of the variables examined, arterial hypoenhancement was the only significant predictor of metastases.

CONCLUSION: Aggressive tumors, as determined by metastases, but not histologic grade, enhance less than non-metastatic tumors.