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Somatostatin receptor expression of gastroenteropancreatic neuroendocrine tumors: A comprehensive analysis of expression in the era of somatostatin receptor PET imaging

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BACKGROUND

There is limited data on somatostatin receptor (SSTR) expression of metastatic neuroendocrine tumors using modern imaging techniques and stratifying by primary site and tumor grade. Few studies evaluate the degree of SSTR expression and tumor heterogeneity. Understanding patterns of SSTR expression is essential when determining the relevance of cold and radiolabeled somatostatin analogs for a particular population of patients.

METHODS

A single-institutional retrospective analysis of metastatic well-differentiated G1-3 GEP-NET patients who underwent ^{68}Ga - or ^{64}Cu -DOTATATE PET imaging from September 2016 to June 2024 was performed.

RESULTS

A total of 1192 patients were considered eligible for this study. Among them, 26 (2.2%) had completely negative SSTR expression, and 27 (2.3%) had weak expression (less or equal to the normal liver). Up to 40 (3.4%) had a heterogenous expression: 26 (2.2%) displayed the coexistence of strongly avid lesions with the absence or near absence of SSTR uptake in measurable tumors (heterogenous strong), while 14 (1.2%) had a combination of absent and weakly expressing SSTR tumors (heterogenous low). An additional 9 cases with prior homogenous expression (0.8%) developed new SSTR-negative tumors along with disease progression, potentially indicating dedifferentiation.

The absent or heterogenous SSTR expression rates were greater in NET G3 than G1/G2 and in tumors originating outside the small bowel (midgut). Most NETs with absent or heterogenous SSTR expression were 18FDG avid.

CONCLUSIONS

The large majority of metastatic GEP-NETs demonstrate strong and relatively uniform SSTR expression, but approximately 8% are SSTR negative, weak, or heterogeneous. Higher than average rates of absent/heterogenous/weak SSTR expression occur in G3 NETs and lower rates among small intestine primaries.

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