

# Identification of Primary Tumors in Patients Presenting with Metastatic Gastroenteropancreatic Neuroendocrine Tumors

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**Background:** Patients with gastroenteropancreatic neuroendocrine tumors (GEPNETs) often present with metastases. Identification of the primary tumor is important for surgical management, and therefore we sought to determine our success at identifying primary tumors with diagnostic testing and surgical exploration.

**Methods:** A clinical NET database was reviewed to identify patients presenting with metastases and primary tumors in situ. Results of radiologic, endoscopic, and operative procedures were evaluated to determine which correctly identified the primary tumor. Imaging was deemed positive if a discrete mass or thickening was identified; mesenteric lymphadenopathy was also considered an indicator of small bowel NET (SBNET) primary.

**Results:** There were 197 patients presenting with metastases and unresected primaries; 134 underwent surgical exploration while 63 were managed non-operatively. Primaries were identified by preoperative diagnostic in 168 (84%), at surgical exploration in 7, and were not found in 22 patients. Overall, CT found 150/197 primary tumors, somatostatin-receptor scintigraphy (SRS) 88/155, and endoscopy 43/107. In the operative group, where the primary sites were verified, CT was statistically better than SRS and endoscopy ( $p < 0.01$ ; Table 1). The sensitivity of CT for pancreatic NETs (PNETs) in this group was 97%. Mesenteric lymphadenopathy was identified on imaging in 68/90 SBNET patients who underwent resection and was the only indication of the primary site in 35/90 (39%), giving an overall sensitivity of 82% for CT in SBNETs. SRS identified 8 tumors not seen by CT and conversely CT identified 30 tumors not seen on SRS. Surgical exploration identified 6/10 unknown primaries.

**Conclusion:** CT was the most sensitive diagnostic modality, identifying 76% of all primary tumors. The addition of SRS and endoscopy improved the identification of the primary site to 84% for all patients, and 93% for patients who underwent exploration. Mesenteric lymphadenopathy was found to be a valuable indicator for the preoperative identification of occult SBNETs.

**Table 1:** Sensitivity of the Diagnostic Modalities for Identifying Primary GEPNETs in Patients Presenting with Metastases

|                              | CT                 | SRS                | Endoscopy          |
|------------------------------|--------------------|--------------------|--------------------|
| All Patients<br>(n = 197)    | 150/197<br>(76.1%) | 88/155<br>(56.7%)  | 43/107<br>(40.2%)  |
| Operative Group<br>(n = 134) | 109/134<br>(81.3%) | 59/105<br>(56.2%)* | 28/73<br>(37.8%)** |
| SBNETs†<br>(n = 90)          | 74/90<br>(82%)     | 39/72<br>(54%)     | 14/49<br>(29%)     |
| PNETs†<br>(n = 33)           | 32/33<br>(97%)     | 18/26<br>(69%)     | 10/15<br>(67%)     |

†: Operative group only; \*: Sensitivity of CT vs. SRS,  $p < 0.01$ ; \*\*: Sensitivity of CT vs. Endoscopy,  $p < 0.01$ ; p-values calculated using McNemar's test