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Clinical and Pathologic Characteristics of Gastric Neuroendocrine Tumors in a Tertiary Care Center

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Background: Gastric neuroendocrine tumors (NETs) are categorized into one of three types. Type 1 lesions arise in association with autoimmune metaplastic atrophic gastritis (AMAG) and appropriate hypergastrinemia, type 2 lesions occur in patients with multiple endocrine neoplasia (MEN) type 1 with gastrinomas and inappropriate hypergastrinemia and type 3 lesions occur sporadically with normal serum gastrin levels. We report the clinical and pathologic characteristics of gastric NETs treated at our center over a five year period.

Methods: A CERNER pathology database search from 1/2010 to 6/2015 revealed 49 discreet gastric carcinoid patients. Five were excluded because of incomplete data or a known NET metastasis from a non-gastric site. Clinical and pathologic features were recorded for the remaining 44 patients (61 total tumors).

Results: Type 1 gastric NETs accounted for 66% (29/44) of cases. As expected, these lesions were low grade, well-differentiated and multiple, occurring in older women with other autoimmune disorders. Metastases were rare but did occur (7%). Adenomatous dysplasia in the surrounding mucosa was uncommon. No synchronous or metachronous gastric

adenocarcinomas were noted. Type 2 gastric NETs were uncommonly seen (2/44; 4%) despite a well-established MEN-1 and gastrinoma program. Type 3 gastric NETs accounted for 30% (13/44) of cases. As expected, these lesions were solitary, and were more frequently found in older men, of higher grade and associated with metastasis.
See Table 1 for comparative data according to carcinoid type.

Conclusions: These data confirm many previously identified clinical and pathologic features of gastric NETs. However, we also show that type 1 lesions can metastasize, that degree of differentiation can vary in patients with multiple lesions and that long term PPI therapy may be an independent cause of type 1 lesions.

Clinical and Pathologic Characteristics of Gastric Neuroendocrine Tumors by Type			
	Patient Data		
	Type 1 (n = 29)	Type 2 (n = 2)	Type 3 (n = 13)
Male (%)	25	100	54
Age (years) (range)	63 (33-90)	66 (59-72)	58 (27-71)
History of other AI disorders	15/29 (52%)	0/0	5/13 (38%)
Gastric pH (range)	6.7 (1.3^-8.0)	6.0** (6.0)	1.9 (1.3-2.8)
Gastrin (pg/mL) (range)	778 (16^-3953)	6693 (6608-6778)	35 (16-56)
Endoscopic findings in background mucosa	Polyps/nodules (88%) Atrophy (44%)	None	None
Multiple gastric tumors (confirmed by pathology)	15/29 (52%)	1/2 (50%)	0/13
Multiple tumors of variable differentiation (WD + PD)	1/29 (3%)	1/2 (50%)	0/13
Metastasis	2/29 (7%)	1/2 (50%)*	4/13 (31%)
Chromogranin A (ng/mL) (range)			
• Known metastasis	Not available	2527	574 (506-642)
• w/o metastasis	388 (6.8-1205)	Not available	106 (1-287)

Tumor data			
	Type 1 (n = 45)	Type 2 (n = 3)	Type 3 (n= 13)
Differentiation			
• WD	44 (98%)	2 (67%)	11 (85%)
• PD	1 (2%)	1 (33%)	2 (15%)
Grade			
• WHO grade 1	41 (91%)	1 (33%)	9 (69%)
• WHO grade 2	3 (7%)	1 (33%)	2 (15%)
• WHO grade 3	1 (2%)	1 (33%)	2 (15%)
Background gastric mucosa	AMAG (41/45) LGD (1/41)	NSPF	NSPF (12/13) Adenocarcinoma (1/13)^ ^

Abbreviations: AI (autoimmune) WD (well-differentiated), PD (poorly differentiated), NSPF (no specific pathologic finding), AMAG (autoimmune metaplastic atrophic gastritis), LGD (low grade dysplasia)

^ On long-standing PPI therapy

* On high dose PPI therapy

** MEN1 patient

^ ^MANEC tumor (mixed well-differentiated neuroendocrine tumor and adenocarcinoma)