Protocol for the Examination of Specimens from Patients with Well-Differentiated Neuroendocrine Tumors (Carcinoid Tumors) of the Stomach

Version: 4.1.0.0
Protocol Posting Date: June 2021
CAP Laboratory Accreditation Program Protocol Required Use Date: March 2022

The changes included in this current protocol version affect accreditation requirements. The new deadline for implementing this protocol version is reflected in the above accreditation date.

For accreditation purposes, this protocol should be used for the following procedures AND tumor types:

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastrectomy (Partial or Complete)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tumor Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well-differentiated neuroendocrine tumors of the stomach</td>
<td></td>
</tr>
</tbody>
</table>

This protocol is NOT required for accreditation purposes for the following:

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biopsy</td>
<td></td>
</tr>
<tr>
<td>Excisional biopsy (includes endoscopic resection and polypectomy)</td>
<td></td>
</tr>
<tr>
<td>Primary resection specimen with no residual cancer (eg, following neoadjuvant therapy)</td>
<td></td>
</tr>
<tr>
<td>Recurrent tumor</td>
<td></td>
</tr>
<tr>
<td>Cytologic specimens</td>
<td></td>
</tr>
</tbody>
</table>

The following tumor types should NOT be reported using this protocol:

<table>
<thead>
<tr>
<th>Tumor Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poorly differentiated neuroendocrine carcinoma including small cell and large cell neuroendocrine carcinoma (consider Stomach protocol)</td>
<td></td>
</tr>
<tr>
<td>Other epithelial carcinomas including mixed neuroendocrine-non-neuroendocrine neoplasms (consider Stomach protocol)</td>
<td></td>
</tr>
<tr>
<td>Lymphoma (consider Hodgkin or non-Hodgkin Lymphoma protocols)</td>
<td></td>
</tr>
<tr>
<td>Gastrointestinal stromal tumor (GIST) (consider GIST protocol)</td>
<td></td>
</tr>
<tr>
<td>Non-GIST sarcoma (consider Soft Tissue protocol)</td>
<td></td>
</tr>
</tbody>
</table>

Authors
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With guidance from the CAP Cancer and CAP Pathology Electronic Reporting Committees.

* Denotes primary author.
Accreditation Requirements
This protocol can be utilized for a variety of procedures and tumor types for clinical care purposes. For accreditation purposes, only the definitive primary cancer resection specimen is required to have the core and conditional data elements reported in a synoptic format.

- **Core data elements** are required in reports to adequately describe appropriate malignancies. For accreditation purposes, essential data elements must be reported in all instances, even if the response is “not applicable” or “cannot be determined.”
- **Conditional data elements** are only required to be reported if applicable as delineated in the protocol. For instance, the total number of lymph nodes examined must be reported, but only if nodes are present in the specimen.
- **Optional data elements** are identified with “+” and although not required for CAP accreditation purposes, may be considered for reporting as determined by local practice standards.

The use of this protocol is not required for recurrent tumors or for metastatic tumors that are resected at a different time than the primary tumor. Use of this protocol is also not required for pathology reviews performed at a second institution (ie, secondary consultation, second opinion, or review of outside case at second institution).

Synoptic Reporting
All core and conditionally required data elements outlined on the surgical case summary from this cancer protocol must be displayed in synoptic report format. Synoptic format is defined as:

- Data element: followed by its answer (response), outline format without the paired Data element: Response format is NOT considered synoptic.
- The data element should be represented in the report as it is listed in the case summary. The response for any data element may be modified from those listed in the case summary, including “Cannot be determined” if appropriate.
- Each diagnostic parameter pair (Data element: Response) is listed on a separate line or in a tabular format to achieve visual separation. The following exceptions are allowed to be listed on one line:
  - Anatomic site or specimen, laterality, and procedure
  - Pathologic Stage Classification (pTNM) elements
  - Negative margins, as long as all negative margins are specifically enumerated where applicable
- The synoptic portion of the report can appear in the diagnosis section of the pathology report, at the end of the report or in a separate section, but all Data element: Responses must be listed together in one location.

Organizations and pathologists may choose to list the required elements in any order, use additional methods in order to enhance or achieve visual separation, or add optional items within the synoptic report. The report may have required elements in a summary format elsewhere in the report IN ADDITION TO but not as replacement for the synoptic report ie, all required elements must be in the synoptic portion of the report in the format defined above.

Summary of Changes

v 4.1.0.0

- General Reformatting
- Revised Margins Section
- Revised Lymph Nodes Section
- Added Distant Metastasis Section
- Removed pTX and pNX Staging Classification

Replaced by version 5.0.0.0 on December 13, 2023, Obsolete as of September 2024 (8 months after newest release date)
Reporting Template

Protocol Posting Date: June 2021
Select a single response unless otherwise indicated.

CASE SUMMARY: (STOMACH NEUROENDOCRINE TUMOR)
Standard(s): AJCC-UICC 8

SPECIMEN (Note A)
Author's Note: A major determinant of natural history, including outcomes, of well differentiated gastric neuroendocrine tumors is the milieu in which the tumor arises. This is likely more influential than tumor stage in most cases and is well described in Explanatory Note E. Tumor stage and underlying gastric milieu are complementary, and both should be reported in support of proper management of these tumors.

Procedure
___ Endoscopic resection
___ Partial gastrectomy, proximal
___ Partial gastrectomy, distal
___ Partial gastrectomy, other (specify): _________________
___ Total gastrectomy
___ Other (specify): _________________
___ Not specified

TUMOR

Tumor Site (Note B) (select all that apply)
___ Gastric cardia / fundus: _________________
___ Gastric body: _________________
___ Gastric antrum: _________________
___ Gastric pylorus: _________________
___ Other (specify): _________________
___ Stomach, not otherwise specified: _________________

Histologic Type and Grade# (Notes C,D)
# For poorly differentiated (high-grade) neuroendocrine carcinomas, the College of American Pathologists (CAP) checklist for carcinoma of the stomach should be used.
___ G1, well-differentiated neuroendocrine tumor
___ G2, well-differentiated neuroendocrine tumor
___ G3, well-differentiated neuroendocrine tumor
___ Other (specify): _________________
___ GX, well-differentiated neuroendocrine tumor, grade cannot be assessed
___ Not applicable
+Histologic Type and Grade Comment: _________________

Histologic Grade Determination (select all that apply)
Mitotic rate and / or Ki67 labeling index is required to determine histologic grade
___ Mitotic rate (Note D)

Mitotic Rate#
# Mitotic rate should be reported as number of mitoses per 2 mm2, by evaluating at least 10 mm2 in the most mitotically active part of the tumor (e.g., if using a microscope with a field diameter of 0.55 mm, count 42 high power fields (10 mm2) and divide the resulting number of mitoses by 5 to determine the number of mitoses per 2 mm2 needed to assign tumor grade).
___ Specify number of mitoses per 2 mm²: ____________________ mitoses per 2 mm²
___ Less than 2 mitoses per 2 mm²
___ 2 to 20 mitoses per 2 mm²
___ Greater than 20 mitoses per 2 mm²
___ Cannot be determined (explain): ____________________
___ Not applicable

AND / OR
___ Ki-67 labeling index

**Ki-67 Labeling Index**
___ Specify Ki-67 percentage: ____________________ %
___ Less than 3%
___ 3% to 20%
___ Greater than 20%
___ Cannot be determined (explain): ____________________
___ Not applicable

**Tumor Size (Note E)**
___ Greatest dimension in Centimeters (cm) (specify size of largest tumor if multiple tumors are present): ____________________ cm

+ Additional Dimension in Centimeters (cm): ____ x ____ cm
___ Cannot be determined (explain): ____________________

**Tumor Focality**
___ Unifocal
___ Multifocal

**Number of Tumors**
___ Specify number: ____________________
___ Other (specify): ____________________
___ Cannot be determined: ____________________
___ Cannot be determined: ____________________

**Tumor Extent**
___ Invades lamina propria
___ Invades submucosa
___ Invades muscularis propria
___ Invades through muscularis propria into subserosal tissue without penetration of overlying serosa
___ Penetrates visceral peritoneum (serosa)
___ Invades other organ(s) or adjacent structure(s) (specify): ____________________
___ Cannot be determined: ____________________
___ No evidence of primary tumor

**Lymphovascular Invasion**
___ Not identified
___ Present
___ Cannot be determined: ____________________
+Perineural Invasion
   ___ Not identified
   ___ Present
   ___ Cannot be determined: ______________________

+Tumor Comment: ______________________

MARGINS {Note E}

Margin Status
   ___ All margins negative for tumor

+Closest Margin(s) to Tumor (select all that apply)
   ___ Proximal: ______________________
   ___ Distal: ______________________
   ___ Omental (radial): ________________
   ___ Mucosal: ______________________
   ___ Deep: ______________________
   ___ Other (specify): ________________
   ___ Cannot be determined: ______________________

+Distance from Tumor to Closest Margin
   Specify in Centimeters (cm)
      ___ Exact distance in cm: ______________ cm
      ___ Greater than 1 cm

   Specify in Millimeters (mm)
      ___ Exact distance in mm: ______________ mm
      ___ Greater than 10 mm

   Other
      ___ Other (specify): ________________
      ___ Cannot be determined: ______________________
      ___ Tumor present at margin

Margin(s) Involved by Tumor (select all that apply)
   ___ Proximal: ______________________
   ___ Distal: ______________________
   ___ Omental (radial): ________________
   ___ Mucosal: ______________________
   ___ Deep: ______________________
   ___ Other (specify): ________________
   ___ Cannot be determined: ______________________
   ___ Other (specify): ________________
   ___ Cannot be determined (explain): ______________________
   ___ Not applicable

+Margin Comment: ______________________

REGIONAL LYMPH NODES

Regional Lymph Node Status
   ___ Not applicable (no regional lymph nodes submitted or found)
   ___ Regional lymph nodes present
      ___ All regional lymph nodes negative for tumor
___ Tumor present in regional lymph node(s)

Number of Lymph Nodes with Tumor
___ Exact number (specify): ______________________
___ At least (specify): ______________________
___ Other (specify): ______________________
___ Cannot be determined (explain): ______________________
___ Other (specify): ______________________
___ Cannot be determined (explain): ______________________

Number of Lymph Nodes Examined
___ Exact number (specify): ______________________
___ At least (specify): ______________________
___ Other (specify): ______________________
___ Cannot be determined (explain): ______________________

+Regional Lymph Node Comment: ______________________

DISTANT METASTASIS

Distant Site(s) Involved, if applicable (select all that apply)
___ Not applicable
___ Liver: ______________________
___ Lung: ______________________
___ Ovary: ______________________
___ Nonregional lymph node(s): ______________________
___ Peritoneum: ______________________
___ Bone: ______________________
___ Other (specify): ______________________
___ Cannot be determined: ______________________

PATHOLOGIC STAGE CLASSIFICATION (pTNM, AJCC 8th Edition) (Note G)

Reporting of pT, pN, and (when applicable) pM categories is based on information available to the pathologist at the time the report is issued. As per the AJCC (Chapter 1, 8th Ed.) it is the managing physician’s responsibility to establish the final pathologic stage based upon all pertinent information, including but potentially not limited to this pathology report.

TNM Descriptors (select all that apply)
___ Not applicable
___ m (multiple primary tumors)
___ r (recurrent)
___ y (post-treatment)

pT Category
For any T, add (m) for multiple tumors [TX(#) or TX(m), where X = 1–4, and # = number of primary tumors identified]; for multiple tumors with different T, use the highest. Example: If there are 2 primary tumors, only 1 of which invades through the muscularis propria into subserosal tissue without penetration of overlying serosa (jejunal or ileal), we define the primary tumor as either T3(2) or T3(m).
___ pT not assigned (cannot be determined based on available pathological information)
___ pT0: No evidence of primary tumor
___ pT1: Invades the lamina propria or submucosa and less than or equal to 1 cm in size
___ pT2: Invades muscularis propria or greater than 1 cm in size
pT3: Invades through the muscularis propria into subserosal tissue without penetration of overlying serosa
pT4: Tumor invades visceral peritoneum (serosa) or other organs or adjacent structures

pN Category
- pN not assigned (no nodes submitted or found)
- pN not assigned (cannot be determined based on available pathological information)
- pN0: No regional lymph node metastasis
- pN1: Metastasis in regional lymph nodes

pM Category (required only if confirmed pathologically)
- Not applicable - pM cannot be determined from the submitted specimen(s)
  pM1: Distant metastasis
    - pM1a: Metastasis confined to liver
    - pM1b: Metastases in at least one extrahepatic site (e.g., lung, ovary, nonregional lymph node, peritoneum, bone)
    - pM1c: Both hepatic and extrahepatic metastases
    - pM1 (subcategory cannot be determined)

ADDITIONAL FINDINGS (Note H)

+Additional Findings (select all that apply)
- None identified
- Atrophic gastritis
- Intestinal metaplasia of gastric mucosa
- Glandular dysplasia of gastric mucosa
- Endocrine cell hyperplasia
- Absence of parietal cells
- Tumor necrosis
- Other (specify): ____________________

COMMENTS

Comment(s): ____________________
## Explanatory Notes

### A. Application and Tumor Location

This protocol applies to well-differentiated neuroendocrine tumors (carcinoid tumors) of the stomach. Poorly differentiated neuroendocrine carcinomas (small cell and large cell neuroendocrine carcinoma) and tumors with mixed glandular/neuroendocrine differentiation are not included.1 Because of site-specific similarities in histology, immunohistochemistry, and histochemistry, neuroendocrine tumors of the digestive tract have traditionally been subdivided into those of foregut, midgut, and hindgut origin (Table 1). In general, the distribution pattern along the gastrointestinal (GI) tract parallels that of the progenitor cell type, and the anatomic site of origin of GI neuroendocrine tumors is an important predictor of clinical behavior.2

### Table 1. Site of Origin of Gastrointestinal Neuroendocrine Tumors

<table>
<thead>
<tr>
<th>Site</th>
<th>Foregut Tumors</th>
<th>Midgut Tumors</th>
<th>Hindgut Tumors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immunochemistry</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chromogranin A</td>
<td>86%-100% +</td>
<td>82%-92% +</td>
<td>40%-58% +</td>
</tr>
<tr>
<td>Synaptophysin</td>
<td>50% +</td>
<td>95%-100% +</td>
<td>94%-100% +</td>
</tr>
<tr>
<td>Serotonin</td>
<td>33% + 3</td>
<td>86% + 3</td>
<td>45%-63% +</td>
</tr>
<tr>
<td>Other Immunohistochemical Markers</td>
<td>Rare, + for pancreatic polypeptide, histamine, gastrin, somatostatin, vasoactive intestinal peptide (VIP), or adrenocorticotropic hormone (ACTH)</td>
<td>Prostatic acid phosphatase + in 20%-40%7.8</td>
<td>Prostatic acid phosphatase + in 20%-82%3.4.5.6.7.8</td>
</tr>
<tr>
<td>Carcinoid Syndrome</td>
<td>Rare</td>
<td>5%-39%8.10</td>
<td>Rare</td>
</tr>
</tbody>
</table>

### References

B. Site-Specific Features
Well-differentiated gastric neuroendocrine tumors are divided into 3 types (Table 2): Type 1 enterochromaffin like (ECL)-cell tumors arising in the setting of chronic atrophic gastritis (often autoimmune) with associated hypergastrinemia are the most common. These lesions are composed of enterochromaffin-like (ECL) cells and are usually found as multiple small nodules/polyps in the body of the stomach and limited to the mucosa and submucosa. Type 1 lesions are generally indolent and may regress; lymph node metastases are very rare and occur only when the tumors are large (greater than 2 cm) and infiltrate the muscularis propria.

Type 2 ECL-cell gastric neuroendocrine tumors are rare. These multifocal small tumors, which are associated with multiple endocrine neoplasia (MEN) type 1 with Zollinger-Ellison syndrome, develop in the body of the stomach, are usually smaller than 1.5 cm, and are confined to the mucosa or submucosa. However, in contrast to type 1 tumors, 10% to 30% metastasize. Tumors greater than 2 cm and invading the muscularis propria and exhibiting vascular invasion are more likely to metastasize.

Type 3 gastric neuroendocrine tumors, the second most common neuroendocrine tumor in the stomach, are sporadic solitary tumors that are unassociated with atrophic gastritis, hypergastrinemia, or endocrine cell hyperplasia. These tumors may occur anywhere in the stomach. Metastasis is common and is associated with larger mean size, angioinvasion, and invasion of muscularis propria. Surgical resection is usually advised for solitary gastric neuroendocrine tumors, particularly those larger than 2.0 cm, but tumors smaller than 1.0 cm have been rarely reported to metastasize.

In addition to the above 3 types, the new WHO book has included 3 rare variants: 1) Serotonin-producing enterochromaffin (EC)-cell neuroendocrine tumors, which have morphologic features similar to those of ileal EC-cell neuroendocrine tumors; 2) Gastrin-producing G-cell neuroendocrine tumor and gastrinoma; and 3) Somatostatin-producing D-cell neuroendocrine tumors.

References
Although specific histologic patterns in well-differentiated neuroendocrine tumors, such as trabecular, insular, and glandular, roughly correlate with tumor location, these patterns have not been clearly shown independently to predict response to therapy or risk of nodal metastasis and are rarely reported in clinical practice.

Immunohistochemistry and other ancillary techniques are generally not required to diagnose well-differentiated neuroendocrine tumors. Specific markers that may be used to establish neuroendocrine differentiation include chromogranin A, synaptophysin, and CD56.2 Because of their relative sensitivity and specificity, chromogranin A and synaptophysin are recommended. Immunohistochemistry for specific hormone products, such as gastrin, may be of interest in some cases. However, immunohistochemical demonstration of hormone production does not equate with clinical functionality of the tumor.

References
2. Williams GT. Endocrine tumours of the gastrointestinal tract: selected topics. Histopathology. 2007;50(1):30-41

D. Histologic Grade
Cytologic atypia in well-differentiated neuroendocrine tumors has no impact on clinical behavior of these tumors. The WHO classification1 and others2 use mitotic rate and/or Ki-67 index as one of the criteria for potential for aggressive behavior. Mitotic rate should be reported as number of mitoses per 2 mm², by evaluating at least 10 mm² in the most mitotically active part of the tumor. Only clearly identifiable mitotic figures should be counted; hyperchromatic, karyorrhectic, or apoptotic nuclei are excluded. Because of variations in field size, the number of high-power fields (HPF) (at 40X magnification) for 10 mm² (thereby 2 mm²) must be determined for each microscope (Table 3). For example, if using a microscope with a field diameter of 0.55 mm, count 42 HPF and divide the resulting number of mitoses by 5 to determine the number of mitoses per 2 mm² needed to assign tumor grade.

Table 3. Number of HPF Required for 10 mm² Using Microscopes With Different Field Diameter

<table>
<thead>
<tr>
<th>Field Diameter (mm)</th>
<th>Area (mm²)</th>
<th>Number of HPF for 10mm²</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.40</td>
<td>0.125</td>
<td>80</td>
</tr>
<tr>
<td>0.41</td>
<td>0.132</td>
<td>75</td>
</tr>
<tr>
<td>0.42</td>
<td>0.139</td>
<td>70</td>
</tr>
<tr>
<td>0.43</td>
<td>0.145</td>
<td>69</td>
</tr>
<tr>
<td>0.44</td>
<td>0.152</td>
<td>65</td>
</tr>
<tr>
<td>0.45</td>
<td>0.159</td>
<td>63</td>
</tr>
<tr>
<td>0.46</td>
<td>0.166</td>
<td>60</td>
</tr>
<tr>
<td>0.47</td>
<td>0.173</td>
<td>58</td>
</tr>
<tr>
<td>0.48</td>
<td>0.181</td>
<td>55</td>
</tr>
<tr>
<td>0.49</td>
<td>0.189</td>
<td>53</td>
</tr>
<tr>
<td>0.50</td>
<td>0.196</td>
<td>50</td>
</tr>
<tr>
<td>0.51</td>
<td>0.204</td>
<td>49</td>
</tr>
</tbody>
</table>

Replaced by version 5.0.0.0 on December 13, 2023, Obsolete as of September 2024 (8 months after newest release date)
Ki-67 index is reported as percent positive tumor cells in area of highest nuclear labeling (“hot spot”), although the precise method of assessment has not been standardized. A number of methods have been used to assess Ki-67 index, including automatic counting and “eyeballing.” Automated counting is not widely available and requires careful modification of the software to circumvent the inaccuracies. Eye-ballling can be used for most tumors; however, for tumors with Ki-67 index close to grade cut-offs, it is recommended to perform the manual count on the print of camera-captured image of the hot spot. It has been recommended that a minimum of 500 tumor cells be counted to determine the Ki-67 index, and a notation is made if less cells are available. Grade assigned based on Ki-67 index is typically higher than that based on mitotic count, and the case is assigned to the higher of the 2 if both methods are performed.

It is important to note that there are a small group of well-differentiated neuroendocrine tumors with a Ki-67 index >20% and a mitotic rate usually <20 per 10 HPF. In WHO-2010, these tumors were considered as G3 poorly differentiated neuroendocrine carcinomas. However, they have typical morphology of well-differentiated tumors.

Previous studies (most on pancreatic neuroendocrine tumors) have demonstrated that these tumors have a worse prognosis than grade 2 (Ki-67=3-20 % and mitosis <20/10 HPF) neuroendocrine tumors, but they are not as aggressive as poorly differentiated neuroendocrine carcinomas. In addition, these tumors do not have the genetic abnormalities seen in poorly differentiated neuroendocrine carcinomas. Furthermore, unlike poorly differentiated neuroendocrine carcinomas, they are less responsive to platinum-based chemotherapy. In the WHO-2019 blue book of digestive system tumors, and AJCC 8th edition, those with typical morphology of well-differentiated tumors are classified as “well differentiated neuroendocrine tumor” but as grade 3 (Table 4).

Table 4. Recommended Grading System for Well-Differentiated Gastroenteropancreatic Neuroendocrine Tumors

<table>
<thead>
<tr>
<th>Grade</th>
<th>Mitotic Rate (per 2mm²)</th>
<th>Ki-67 index (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well-differentiated neuroendocrine tumor, G1</td>
<td>&lt;2</td>
<td>&lt;3</td>
</tr>
<tr>
<td>Well-differentiated neuroendocrine tumor, G2</td>
<td>2-20</td>
<td>3-20</td>
</tr>
<tr>
<td>Well-differentiated neuroendocrine tumor, G3</td>
<td>&gt;20</td>
<td>&gt;20</td>
</tr>
</tbody>
</table>
References


E. Tumor Size

For well-differentiated neuroendocrine tumors in any part of the gastrointestinal tract, size greater than 2.0 cm is associated with a higher risk of lymph node metastasis. In the stomach, types 3 neuroendocrine tumors are significantly larger than type 1 tumors, which usually measure 1 cm or less (Table 2). Tumor size correlates with depth of invasion for gastric neuroendocrine tumors, with larger tumors more likely to be deeply infiltrative and thus at higher risk for metastases. Regardless of size, any nodules with invasion are defined as neuroendocrine tumors; lesions without invasion can be regarded as neuroendocrine cell dysplasia or hyperplasia.

### Table 2. Types of Well-Differentiated Gastric Neuroendocrine Tumors

<table>
<thead>
<tr>
<th>Type 1</th>
<th>Type 2</th>
<th>Type 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>80-90% of cases</td>
<td>5-7%</td>
</tr>
<tr>
<td>Multiplicity</td>
<td>Multifocal</td>
<td>Multifocal</td>
</tr>
<tr>
<td>Size</td>
<td>0.5-1.0 cm</td>
<td>~1.5 cm or less</td>
</tr>
<tr>
<td>Location</td>
<td>Corpus</td>
<td>Corpus</td>
</tr>
<tr>
<td>Hypergastrinemia</td>
<td>Present</td>
<td>Present</td>
</tr>
<tr>
<td>Acid secretion</td>
<td>Low or absent</td>
<td>High</td>
</tr>
<tr>
<td>Association</td>
<td>Chronic atrophic gastritis</td>
<td>Multiple endocrine type 1 (MEN-1)</td>
</tr>
<tr>
<td>Background gastric mucosa</td>
<td>Enterochromaffin-like (ECL) cell hyperplasia, partial or complete loss of parietal cells, intestinal metaplasia</td>
<td>Parietal cell hyperplasia; ECL cell hyperplasia</td>
</tr>
</tbody>
</table>

Replaced by version 5.0.0.0 on December 13, 2023, Obsolete as of September 2024 (8 months after newest release date)
### Clinical Behavior

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>Usually indolent: ~100% 5-year survival</td>
</tr>
<tr>
<td>Type 2</td>
<td>10-30% metastasize</td>
</tr>
<tr>
<td>Type 3</td>
<td>71% of tumors &gt;2 cm with muscularis propria and vascular invasion have lymph node metastases</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Demographic Profile</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>70-80% are females in their 50s and 60s</td>
<td></td>
</tr>
<tr>
<td>Equally in males and females, mean age 50 y</td>
<td></td>
</tr>
<tr>
<td>More common in males, mean age 55 y</td>
<td></td>
</tr>
</tbody>
</table>

### References


### F. Circumferential (Radial) Margin

For surgical resection specimens, margins include the proximal, distal, and radial margins. The radial margins represent the nonperitonealized soft tissue margins closest to the deepest penetration of tumor. In the stomach, the lesser omental (hepatoduodenal and hepatogastric ligaments) and greater omental resection margins are the only radial margins. For endoscopic resection specimens, margins include mucosal margins and the deep margin of resection. It may be helpful to mark the margin(s) closest to the tumor with ink. Margins marked by ink should be designated in the macroscopic description.

### G. Pathologic Stage Classification

The TNM staging system for gastric neuroendocrine tumors of the American Joint Committee on Cancer (AJCC) and the International Union Against Cancer (UICC) is recommended.¹

By AJCC/UICC convention, the designation “T” refers to a primary tumor that has not been previously treated. The symbol “p” refers to the pathologic classification of the TNM, as opposed to the clinical classification, and is based on gross and microscopic examination. pT entails a resection of the primary tumor or biopsy adequate to evaluate the highest pT category, pN entails removal of nodes adequate to validate lymph node metastasis, and pM implies microscopic examination of distant lesions. Clinical classification (cTNM) is usually carried out by the referring physician before treatment during initial evaluation of the patient or when pathologic classification is not possible.

Pathologic staging is usually performed after surgical resection of the primary tumor. Pathologic staging depends on pathologic documentation of the anatomic extent of disease, whether or not the primary tumor has been completely removed. If a biopsied tumor is not resected for any reason (eg, when technically unfeasible) and if the highest T and N categories or the M1 category of the tumor can be confirmed microscopically, the criteria for pathologic classification and staging have been satisfied without total removal of the primary cancer.

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TNM Descriptors
For identification of special cases of TNM or pTNM classifications, the "m" suffix and "y," "r," and "a" prefixes are used. Although they do not affect the stage grouping, they indicate cases needing separate analysis.

The "m" suffix indicates the presence of multiple primary tumors in a single site and is recorded in parentheses: pT(m)NM.

The "y" prefix indicates those cases in which classification is performed during or following initial multimodality therapy (i.e., neoadjuvant chemotherapy, radiation therapy, or both chemotherapy and radiation therapy). The cTNM or pTNM category is identified by a "y" prefix. The ycTNM or ypTNM categorizes the extent of tumor actually present at the time of that examination. The "y" categorization is not an estimate of tumor prior to multimodality therapy (i.e., before initiation of neoadjuvant therapy).

The "r" prefix indicates a recurrent tumor when staged after a documented disease-free interval, and is identified by the "r" prefix: rTNM.

The "a" prefix designates the stage determined at autopsy: aTNM.

N Category Considerations
The specific nodal areas of the stomach are listed below.2

Greater curvature of stomach: Greater curvature, greater omental, gastroduodenal, gastroepiploic, pyloric, and pancreaticoduodenal

Pancreatic and splenic areas: Pancreaticocolenal, peripancreatic, splenic

Lesser curvature of stomach: Lesser curvature, lesser omental, left gastric, cardioesophageal, common hepatic, celiac, and hepatoduodenal

Involvement of other intra-abdominal lymph nodes, such as retropancreatic, mesenteric, and para-aortic, is classified as distant metastasis.2

M Category Considerations
The liver is the most common metastatic site. Metastases to extrahepatic sites, such as lung, ovary, peritoneum and bone, are rare. Involvement of the celiac, para-aortic, and other nonregional lymph nodes is also considered M1 disease. In the AJCC 8th edition, M is subcategorized into M1a (hepatic only), M1b (extrahepatic only), and M1c (both hepatic and extrahepatic).

References
H. Additional Findings
Most gastric neuroendocrine tumors (type-I) arise in the setting of hypergastrinemia secondary to atrophic gastritis such as autoimmune gastritis (see Note B). Autoimmune gastritis may be also associated with glandular dysplasia and, in rare cases, gastric adenocarcinoma. Coagulative tumor necrosis, usually punctate, may indicate more aggressive behavior,† which is more commonly seen in type-III gastric neuroendocrine tumors, and should be reported.

References