A 63-year-old woman presents for evaluation of chronic abdominal pain and diarrhea. Earlier evaluation was negative for *Helicobacter pylori* or nonsteroidal anti-inflammatory drug use. Multiple esophagogastroduodenoscopies revealed severe esophagitis and several duodenal ulcers despite a maximum dose of omeprazole 2 years before diagnosis. Computed tomography and 2 endoscopic ultrasounds revealed only duodenal inflammation and a benign hepatic cyst. Magnetic resonance imaging found similar findings in addition to a 10-mm pancreatic cyst with no worrisome features. Stomach pH was measured at 4.0 and serum gastrin levels at 1967 pg/mL (reference range, <100 ng/L) while taking omeprazole, as any therapeutic cessation led to intolerable patient symptoms. Zollinger-Ellison syndrome was suspected. Gallium-68 (Ga-68) DOTA-TATE positron emission tomography/computed tomography scan exhibited tracer uptake in the liver (Figure 1, arrows) and peripancreatic lymph nodes (Supplemental Figure 1, arrows, available online at http://www.mayoclinicproceedings.org). Core biopsies of the liver revealed low-grade neuroendocrine tumor represented by nests of cells containing nuclei with salt-and-pepper chromatin pattern (Figure 2, left of the dashed line). The tumor cells were immunoreactive for CK7, chromogranin, synaptophysin, CDX2, and gastrin (Supplemental Figure 2, gastrin, arrows, available online at http://www.mayoclinicproceedings.org).

Cytoreductive surgery of the metastatic gastrinoma in the liver revealed a 1-cm primary duodenal gastrinoma. Since surgery, the patient’s symptoms have resolved, even with considerable reduction in omeprazole. Subsequent multiple endocrine neoplasia 1 syndrome testing found normal ionized calcium, prolactin, and parathyroid hormone levels and a negative family history. Primary and even metastatic gastrinomas in Zollinger-Ellison syndrome can be missed on preoperative imaging, yet early detection may prevent metastatic disease. Specialty imaging such as Gallium-68 DOTA-TATE, which binds to somatostatin receptors, can
substantially alter clinical management, as it is the most sensitive test to localize neuroendocrine tumors. If there is high clinical suspicion for a neuroendocrine tumor, one should consider Ga-68 DOTATATE, especially when other imaging modalities have failed. In our patient, appropriate indications for this imaging modality included localization and diagnosis, quantifying tumor burden, and surgical planning.

SUPPLEMENTAL ONLINE MATERIAL
Supplemental material can be found online at: http://www.mayoclinicproceedings.org.

Supplemental material attached to journal articles has not been edited, and the authors take responsibility for the accuracy of all data.

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