Neuroendocrine carcinoma of the breast

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Breast Masses with neuroendocrine differentiation

- Neuroendocrine breast carcinoma (NEBC) is rare and accounts for 2–5% of all-invasive breast carcinomas.
- Occurs between the sixth and seventh decade of life and the prevalence varies from 0.1 to 18%
- Very rarely, NEBC can present with symptoms secondary to ectopic secretion of calcitonin, norepinephrine or ACTH.

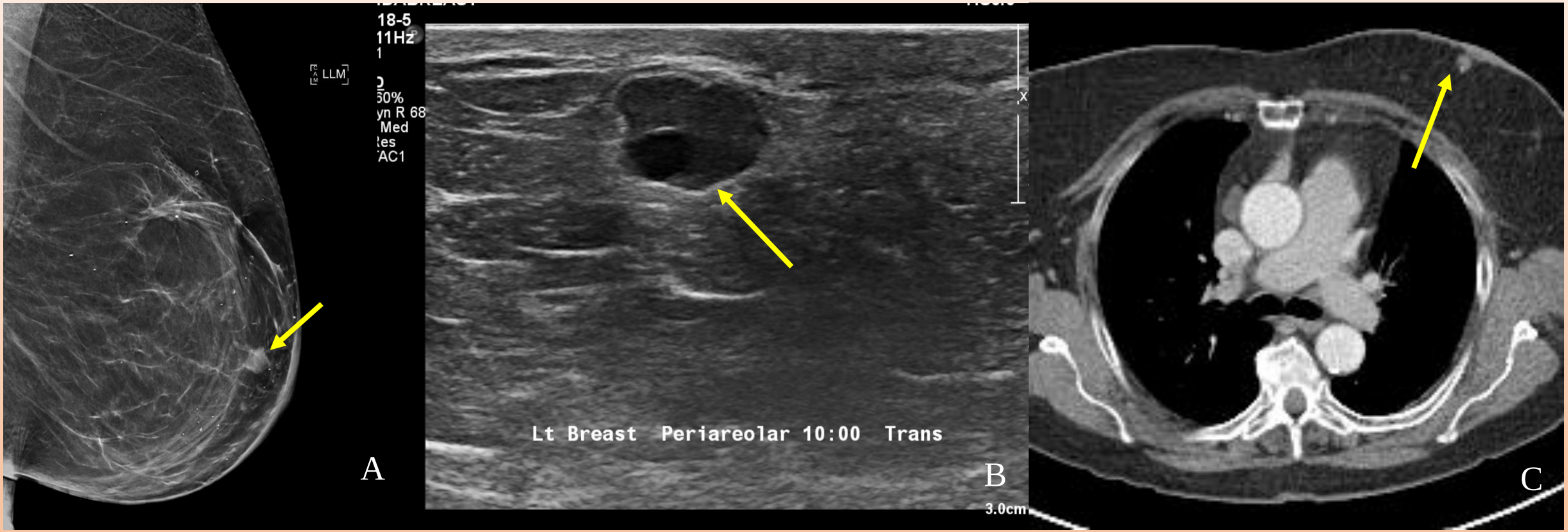
Breast Masses with neuroendocrine differentiation

- According to the 2019 WHO classification, well-differentiated NETs and poorly differentiated neuroendocrine carcinomas (NECs) are now categorized as NETs, small cell NECs, and large cells NECs.
- They are typically hormone receptors positive and human epidermal growth factor receptor 2 (HER2) negative

Breast Masses with neuroendocrine differentiation

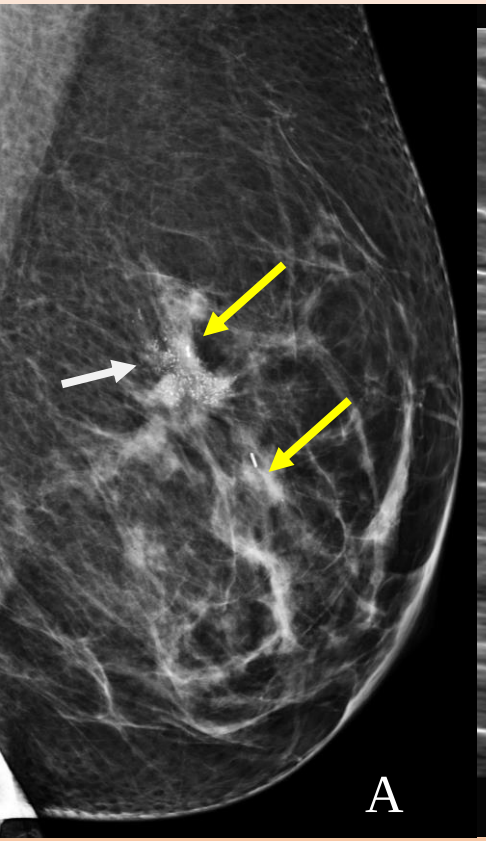
- The imaging findings in patients with NEBC are not specific and comparable to other types of breast tumors.
- NEBCs may present on mammography as well-circumscribed lesions, with no associated microcalcifications, and on ultrasonography, as hypoechogenic mass with irregular morphology and ill-defined margins, with or without cystic component.
- On magnetic resonance, NEBC occur as hypointense irregular lesions on T1-weighted sequences, with early and intense enhancement.

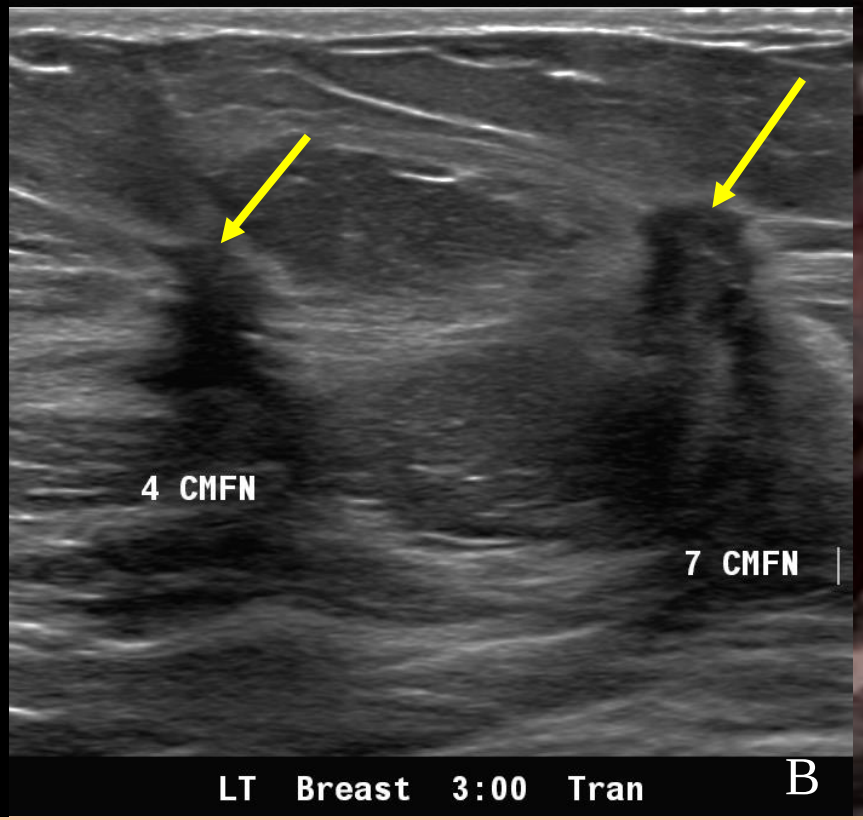
Neuroendocrine Tumors

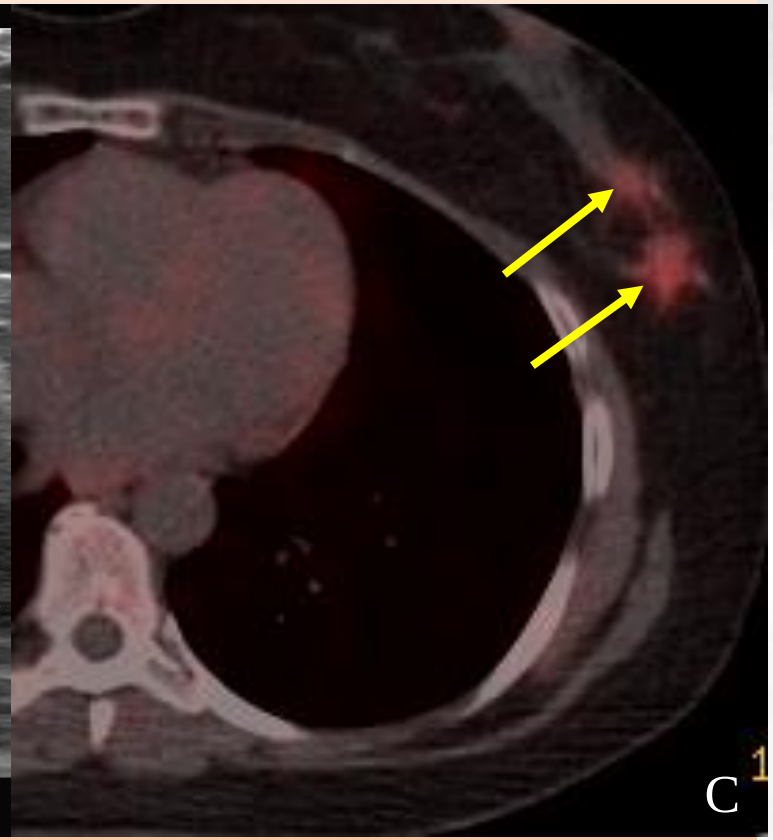


(A) Mammogram LLM view, (B) Breast ultrasound in the periareolar region, (C) Axial contrast-enhanced CT images demonstrates a well-circumscribed mass (yellow arrows) is noted posterior to the nipple and represents a neuroendocrine tumor of the breast (grade 2). Note there are no distinguishing features on imaging to differentiate a ductal adenocarcinoma from a neuroendocrine tumor.

Neuroendocrine tumors

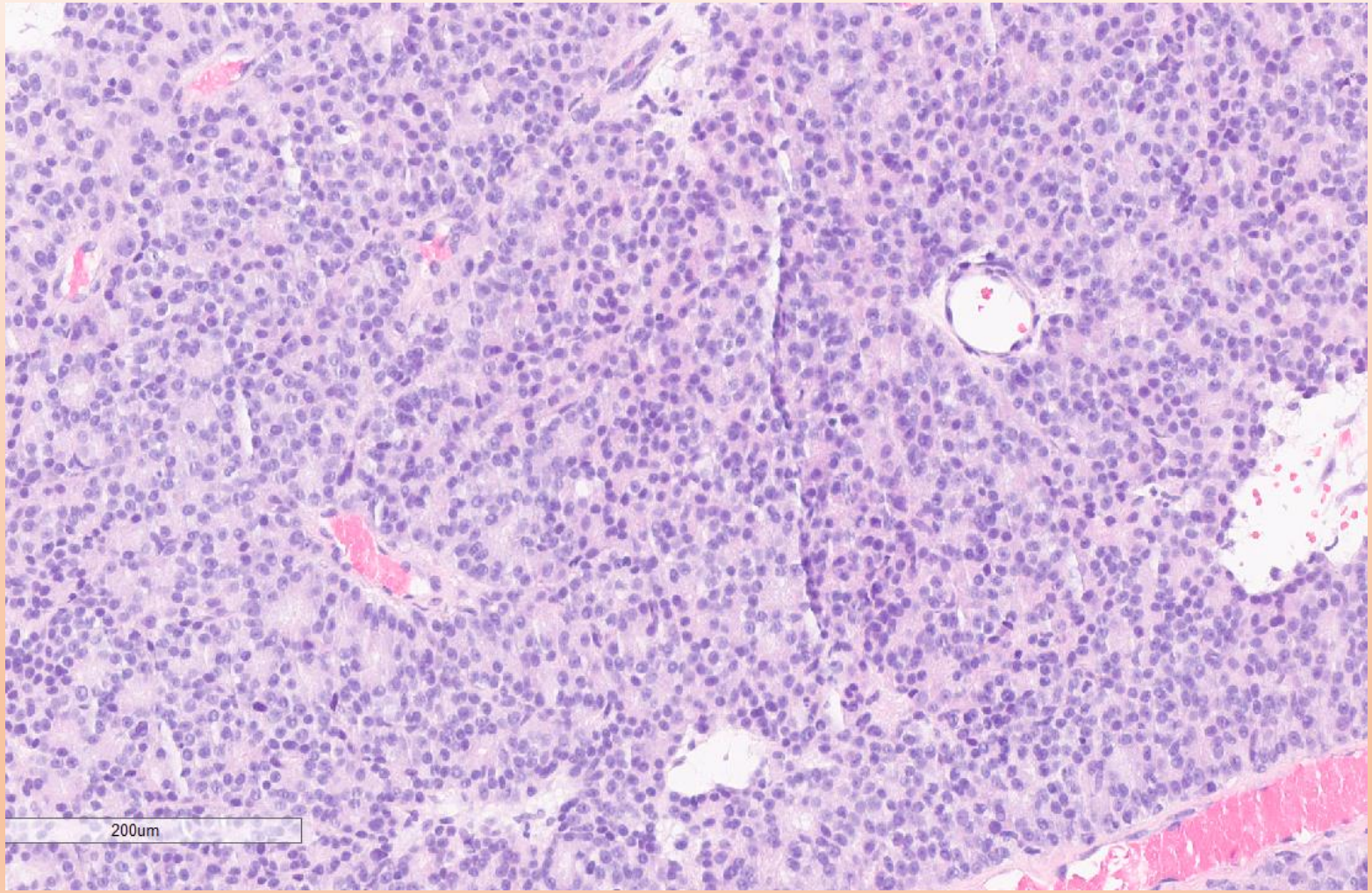






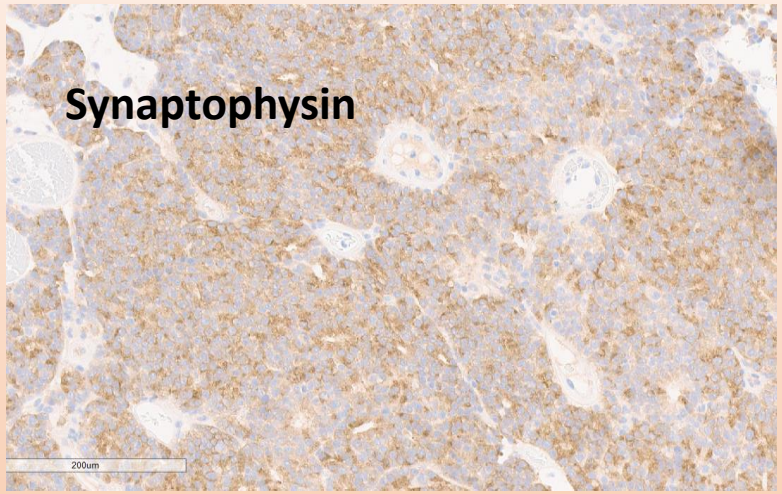
(A) Mammogram CC view, (B) Breast ultrasound, (C) Axial PET/CT and (D) Coronal MIP images PET/CT demonstrate two spiculated masses (yellow arrows) are on the mammogram and ultrasound, which shows uptake on the Dotatate study and represents a neuroendocrine tumor of the breast. (intermediate nuclear grade Nottingham histologic grade 2). Note the larger mass had calcifications within it (white arrow)

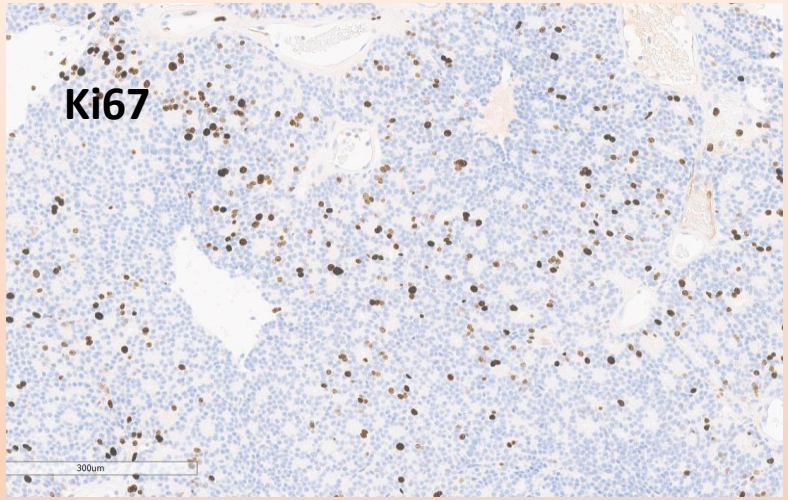
Neuroendocrine Tumors

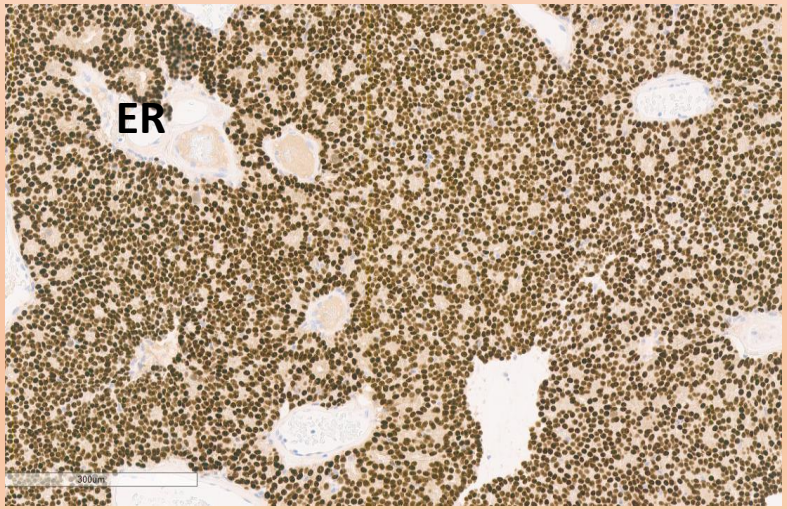


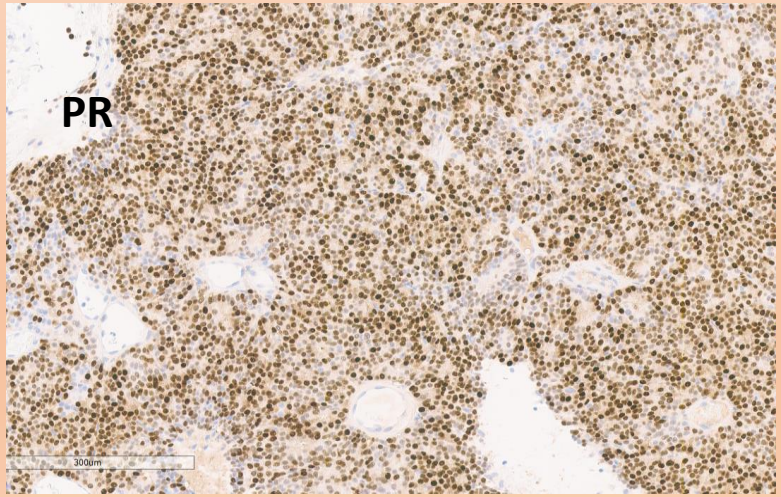
H and E, 10X: Section show rosettes of polygonal and uniform tumor cells with eosinophilic cytoplasm and round nuclei without nuclear pleomorphism or necrosis.

Neuroendocrine Tumors



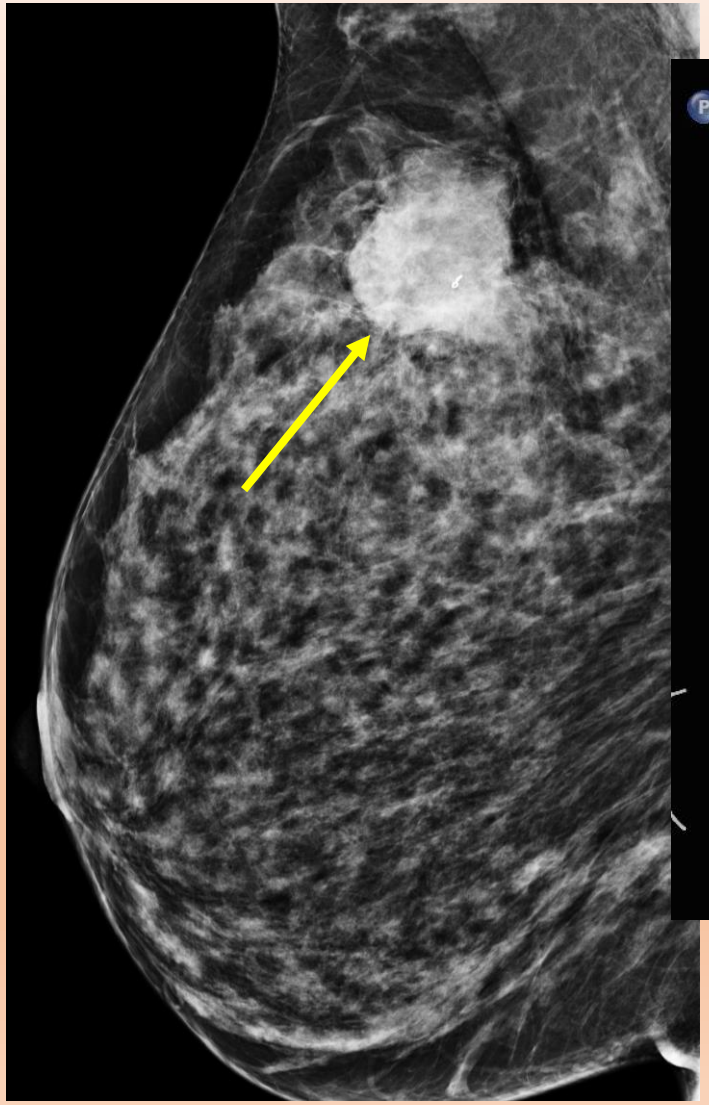


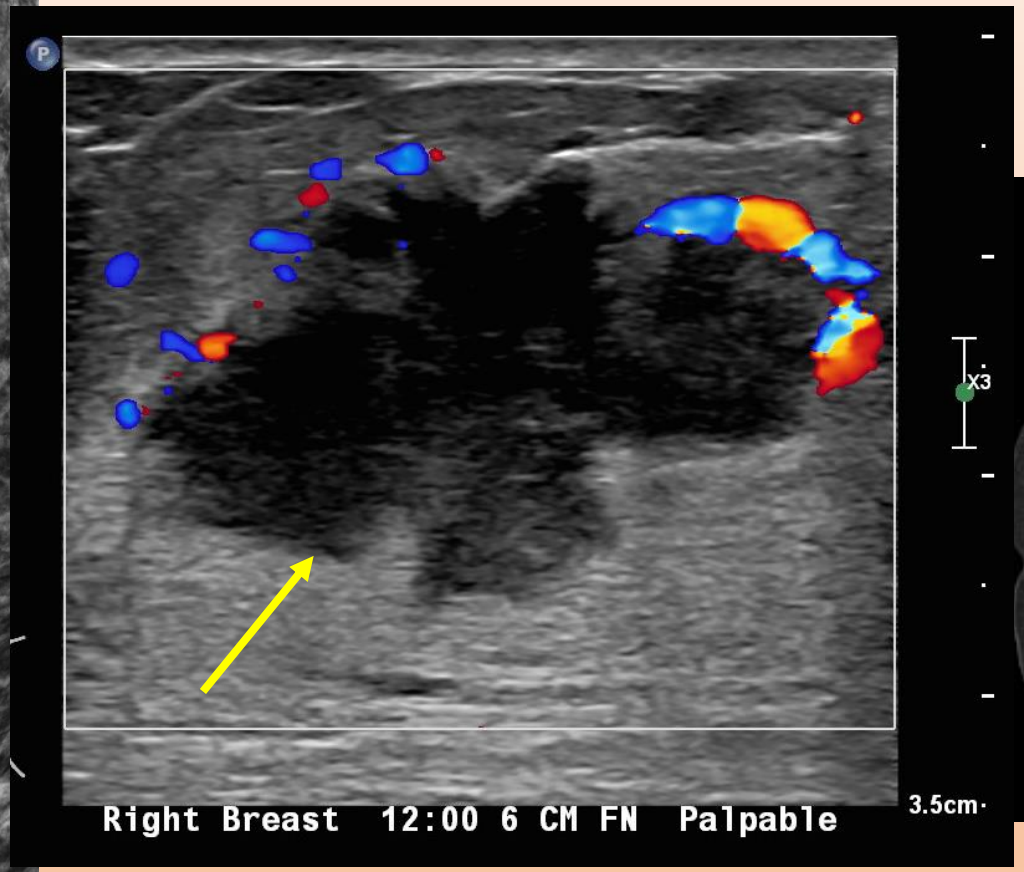


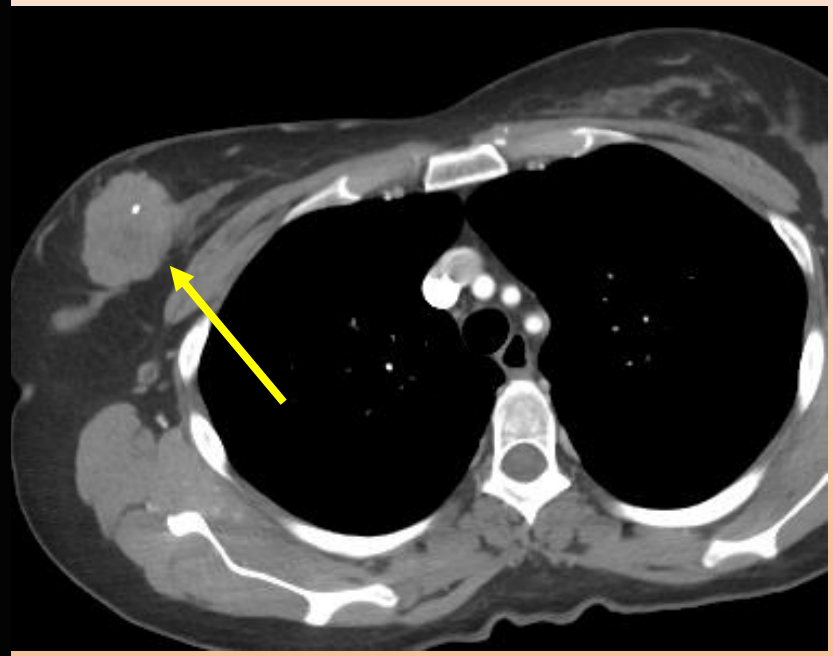


Tumor cells show diffuse membranous positivity for synaptophysin (Synaptophysin IHC, 10X); Ki67 proliferation index is about 10-15% (Ki67 IHC, 10X); they are positive for estrogen receptor (100%, strong intensity, ER, 10X) and positive for progesterone receptor (90%, strong intensity, PR, 10X)

Neuroendocrine Carcinoma





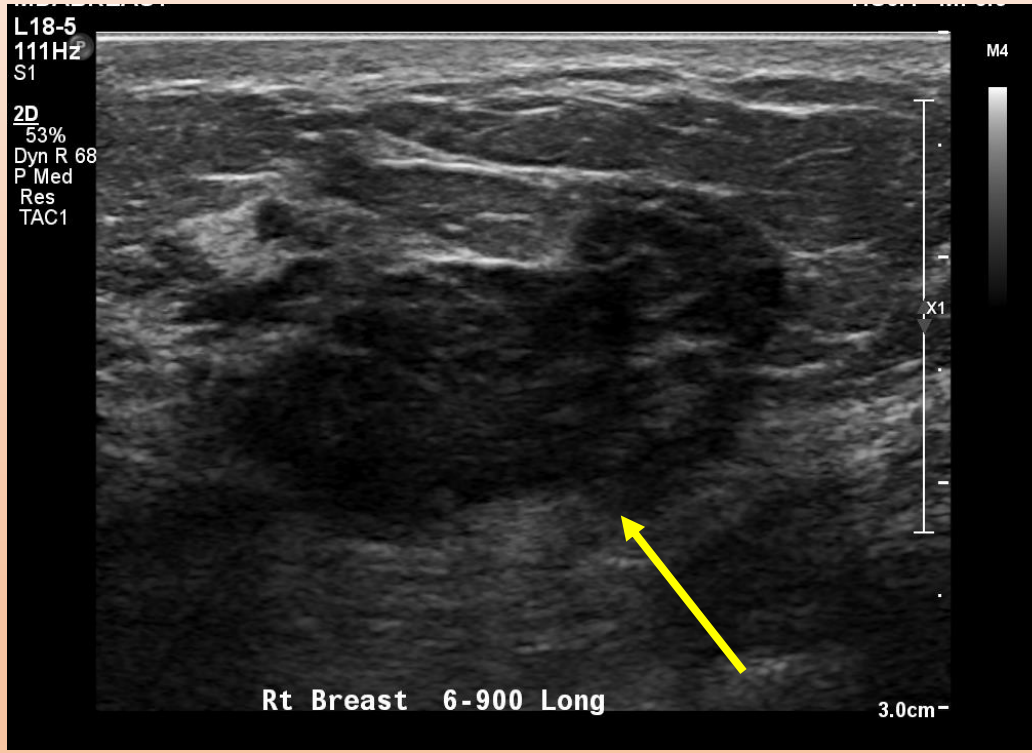


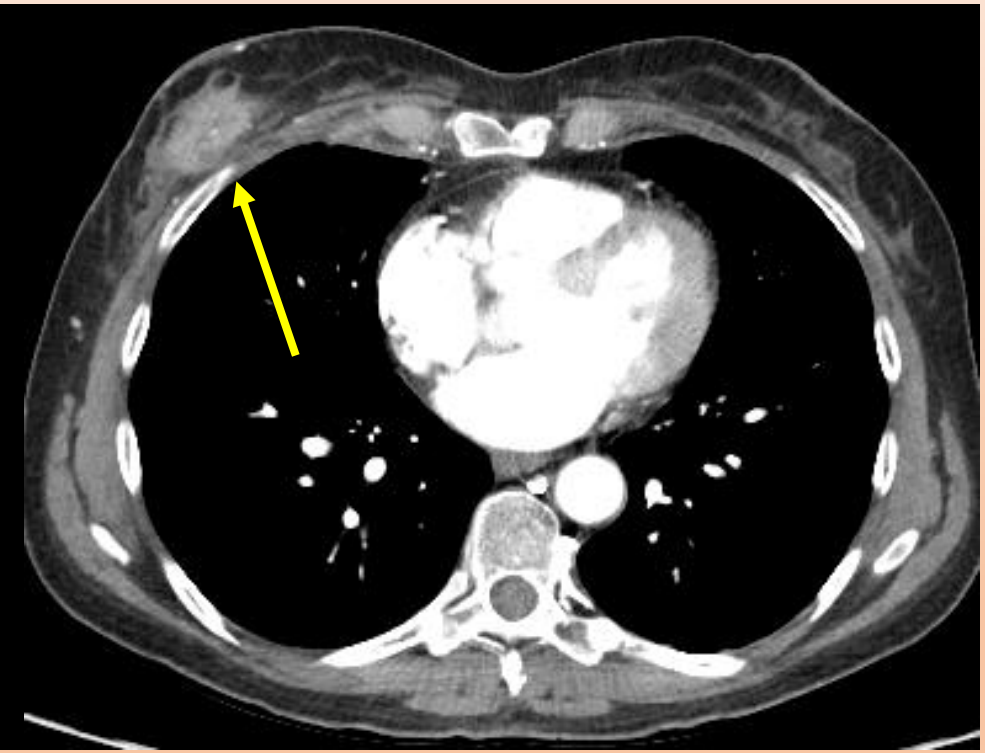
A mass with irregular margins is noted in the right breast and represents a high-grade neuroendocrine carcinoma

Neuroendocrine Carcinoma

Metastases from high grade neuroendocrine carcinoma are noted in the liver. Note they are hyperattenuating to the liver on the arterial phase and become hypoattenuating on the portal venous and the delayed phase of contrast, similar to neuroendocrine tumors of the Gastrointestinal tract.

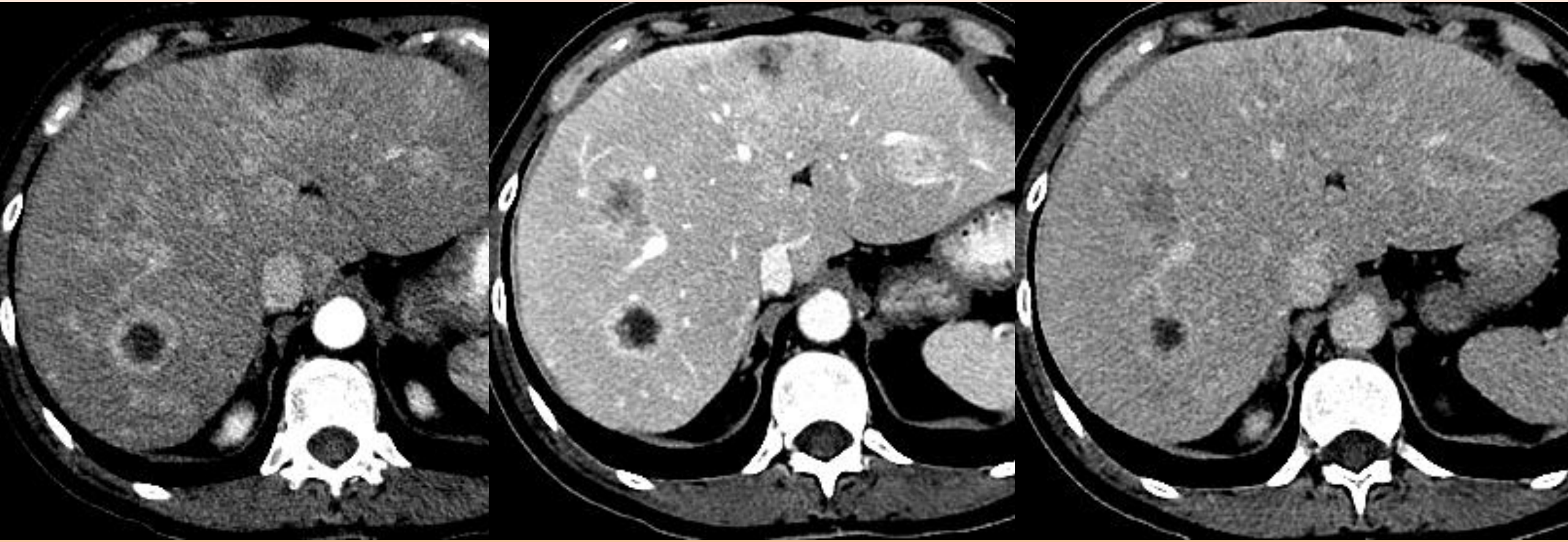
Neuroendocrine Carcinoma





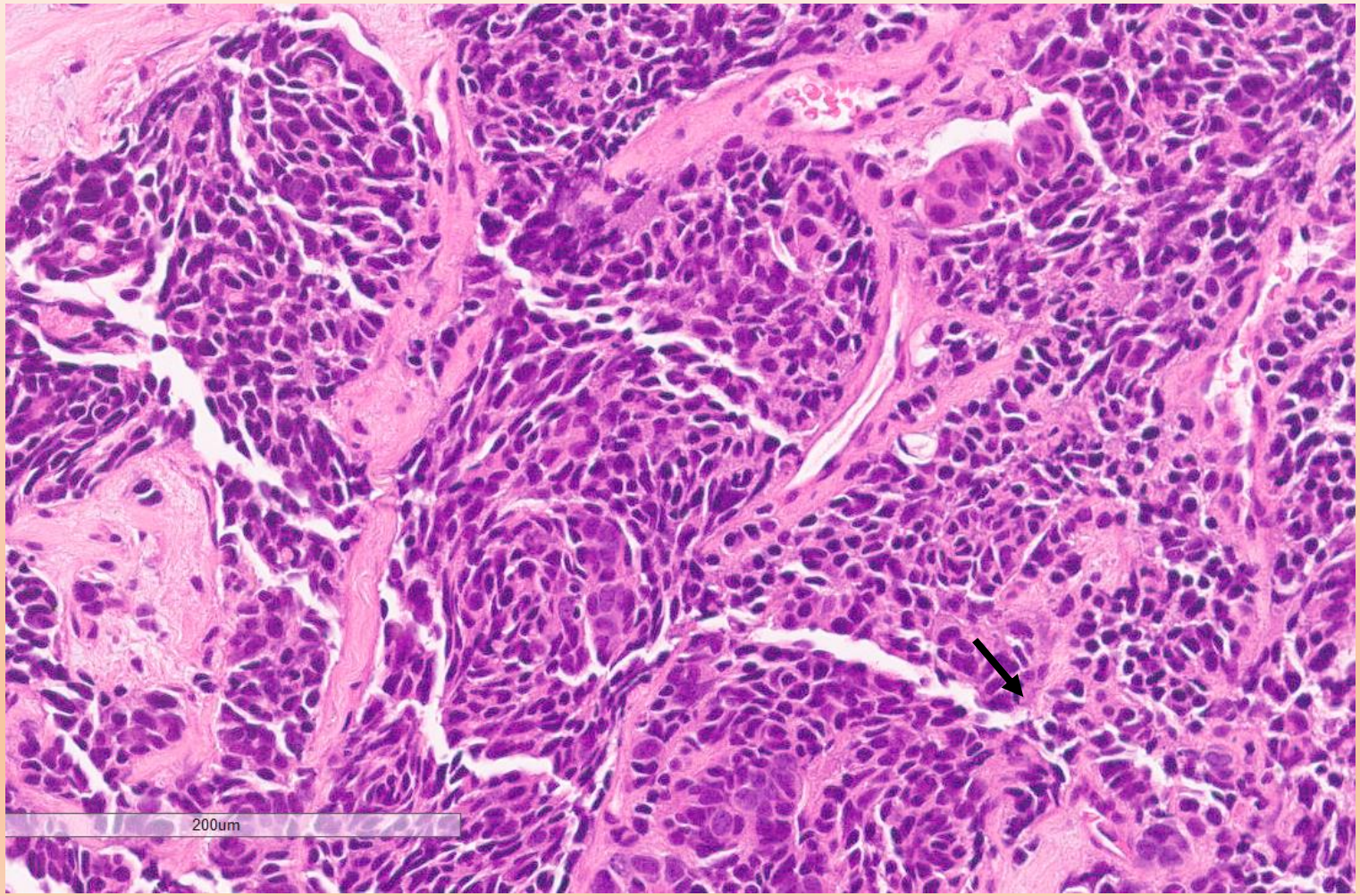
A lobulated mass is noted in the right breast and represents a poorly differentiated neuroendocrine carcinoma.

Neuroendocrine Carcinoma



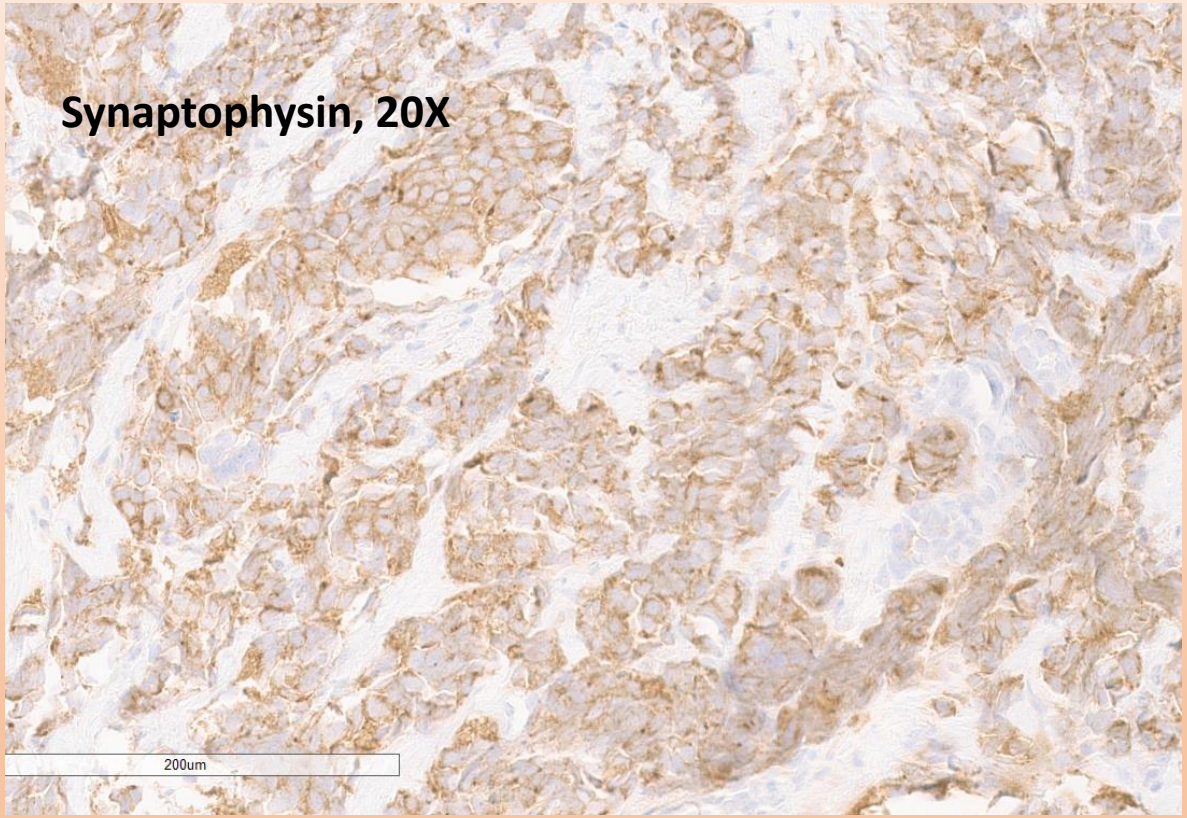
Metastases from poorly differentiated neuroendocrine carcinoma are noted in the liver. Note they have rim enhancement and targetoid appearance similar to breast cancer metastases.

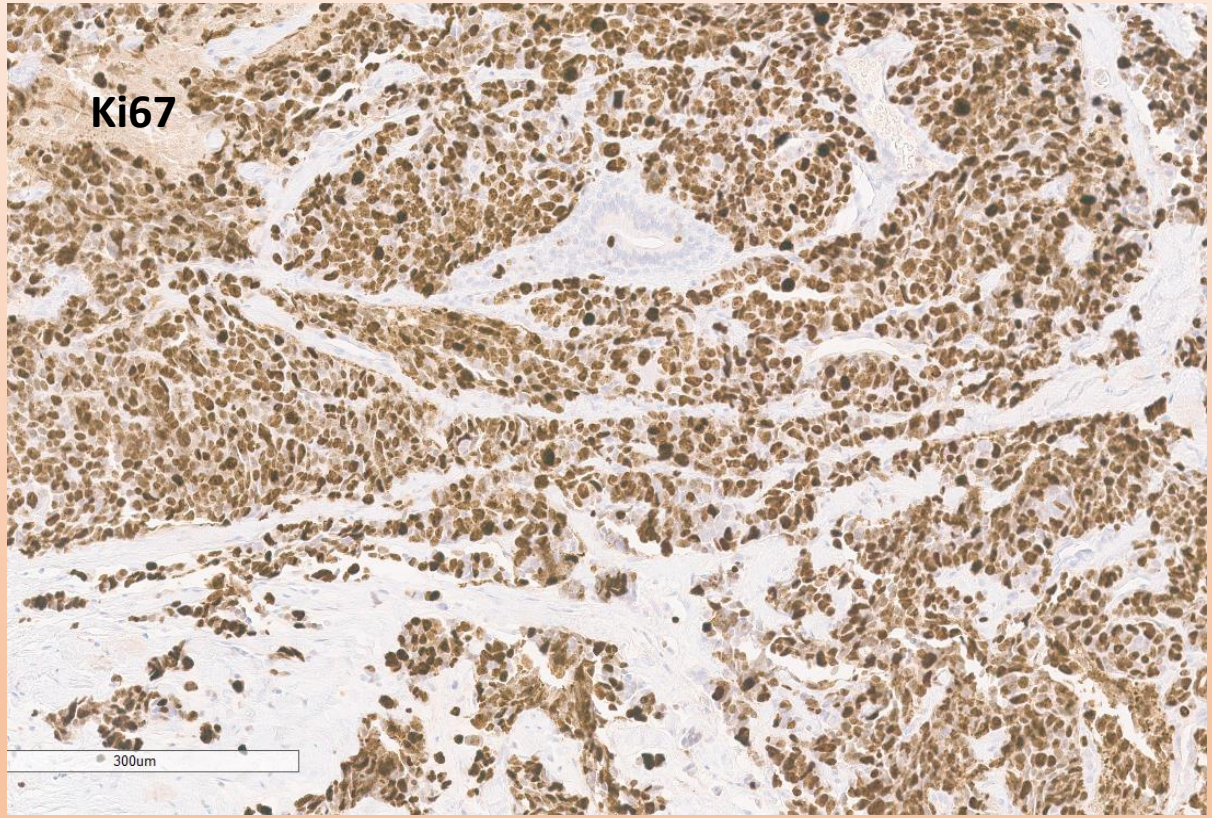
Neuroendocrine Carcinoma



Hand E, 20X: Section show tumor cells with scant cytoplasm, smudged chromatin, nuclear molding, and mitotic figures (black arrow).

Neuroendocrine Carcinoma





Tumor cells are diffusely positive for synaptophysin, supporting the neuroendocrine differentiation (Synaptophysin IHC, 20X);
Ki67 proliferation index is high >90 % (Ki67 IHC, 10X)

Treatment

- Surgery is the mainstay of the treatment for early NECB, and the choice of surgical procedure depends on the location of the tumor and the clinical stage.
- Hormone therapy can be given based on the ER/PR status, and Anti-HER2 therapy can be used in sporadic cases of NEBC with HER2 overexpression.
- Usually, poorly differentiated or small-cell NEBCs have been treated with platinum/etoposide-containing regimes.
- SSTRs are targets for biological therapy in NETs.

Conclusion

- Breast masses with neuroendocrine differentiation are rare. They have various imaging features and are seen in elderly women.

- Metastases to the liver may have similar imaging features to GI neuroendocrine metastases depending on the grade and differentiation of the tumor.

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