NEOPLASIA: BENIGN & MALIGNANT – EPITHELIAL (ADENOMA & CARCINOMA) & NEURO-ECTODERMAL & ODONTOGENIC NEOPLASMS

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OBJECTIVES

- Definition of neoplasia
- Describe features of a benign neoplasm
- Describe features of a malignant neoplasm
- Compare & contrast benign & malignant neoplasms
- NETS & Odontogenic Tumors

INTRODUCTION

- Neoplasia = new growth arising from a single cell, hence referred to as a clone; abnormal mass of tissue, the growth of which exceeds and is uncoordinated with that if normal tissue and persists in the same excessive manner after cessation of the stimuli which evoked the change
- The changes result as a result of:
  - Persistence of genetic alterations passed down the progeny of tumor cells
  - Epigenetic factors such as hormones, chemical, infections & physical factors
- The neoplastic cells become autonomous of the physiologic stimuli as well.

BENIGN NEOPLASMS

- These do not metastasize therefore their effects are local; They generally have a suffix ‘-oma’
  - Leiomyoma
  - Osteoma
  - Chondroma
  - Fibroma
  - Papilloma
  - Adenoma
- Neoplasms are classified according to cell of origin
- Benign lesions are very well differentiated to resemble the tissue of origin both phenotypically & genotypically
- Neoplasms may have single cell or mixed tissue of origin e.g. teratoma
- Benign neoplasms may progress to malignant ones e.g. squamous papilloma; the change is generally unpredictable, but depends on the cause of the benign changes.

MALIGNANT NEOPLASMS

- These are also named depending on the cell of origin.
- Sarcomas - are those arising from connective tissue; examples include: leiomyosarcoma, osteogenic sarcoma, fibrosarcoma, chondrosarcoma
- Carcinoma – are those arising from epithelial tissue; adeno-carcinoma, squamous cell carcinoma, cystadenocarcinoma
- Malignant neoplasms may have combinations of tissue of origin - such as malignant teratoma, carcinosarcoma, adeno-squamous etc.

TOP 10 BENIGN AND MALIGNANT NEOPLASMA SEEN IN KENYA

Benign

- Breast – fibroadenoma
- Squamous papilloma – larynx, cervix, vagina
- Adenomas – colon, gastric
- Cystadednoma – ovary
- Thyroid adenoma
- Prostatic intraepithelial neoplasm
- Follicular adenoma - thyroid

Malignant

- Breast - Ductal carcinoma
- Squamous cell carcinoma
- Adenocarcinoma
- Papillary cystadenocarcinoma
- Papillary carcinoma & follicular carcinoma
- Prostatic adenocarcinoma
- Follicular carcinoma thyroid

NEUROENDOCRINE TUMORS

- NETS are relatively rare; this is associated with limited knowledge on disease management
- The natural history of NET is poorly understood
- At least 40 different entities are described arising in different organs; different terminologies have also caused confusion

CHALLENGES OF NETS

- Heterogeneous group of tumors
- Wide variety of clinical presentation predominant on females
- Late presentation
- Over 60% of NETs are advanced at the time of diagnosis
- The median survival for patients with advanced NET is 33 months
- Different terminology and classifications
- Histologic diagnosis may be difficult

TYPES OF NETS

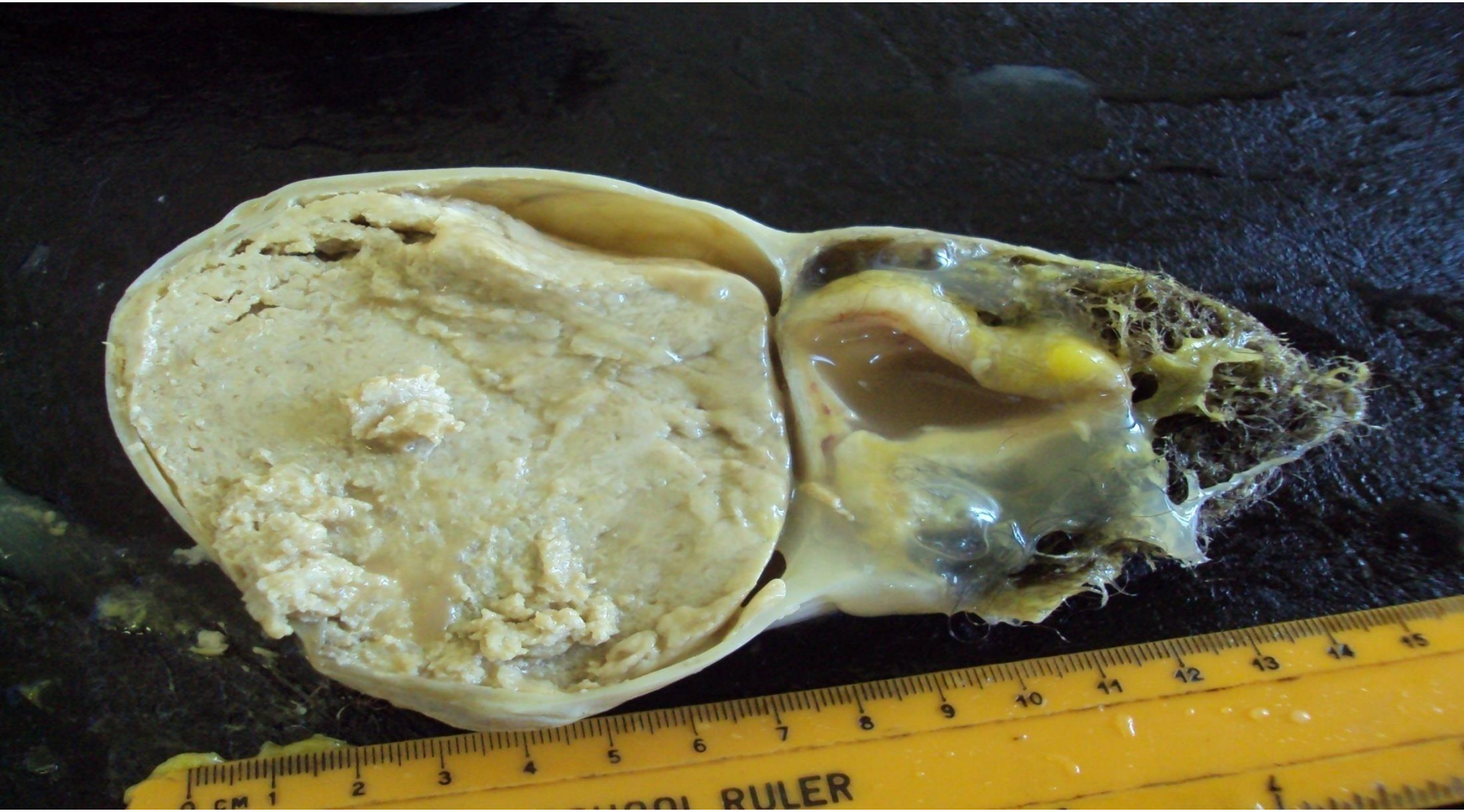
- Symptoms & include a heterogeneous group of neoplasms
- Multiple endocrine neoplasia (MEN) type 1, 2/medullary thyroid carcinoma
- Gastro-entero-pancreatic neuro-endocrine tumors (GEP NETS)
- Islet cell tumors
- Pheochromocytoma/paraganglioma
- Poorly differentiated/small cell/atypical lung carcinoid
- Small cell carcinoma of the lung
- Merkel cell carcinoma associated with polyomavirus

CLINICAL PRESENTATION

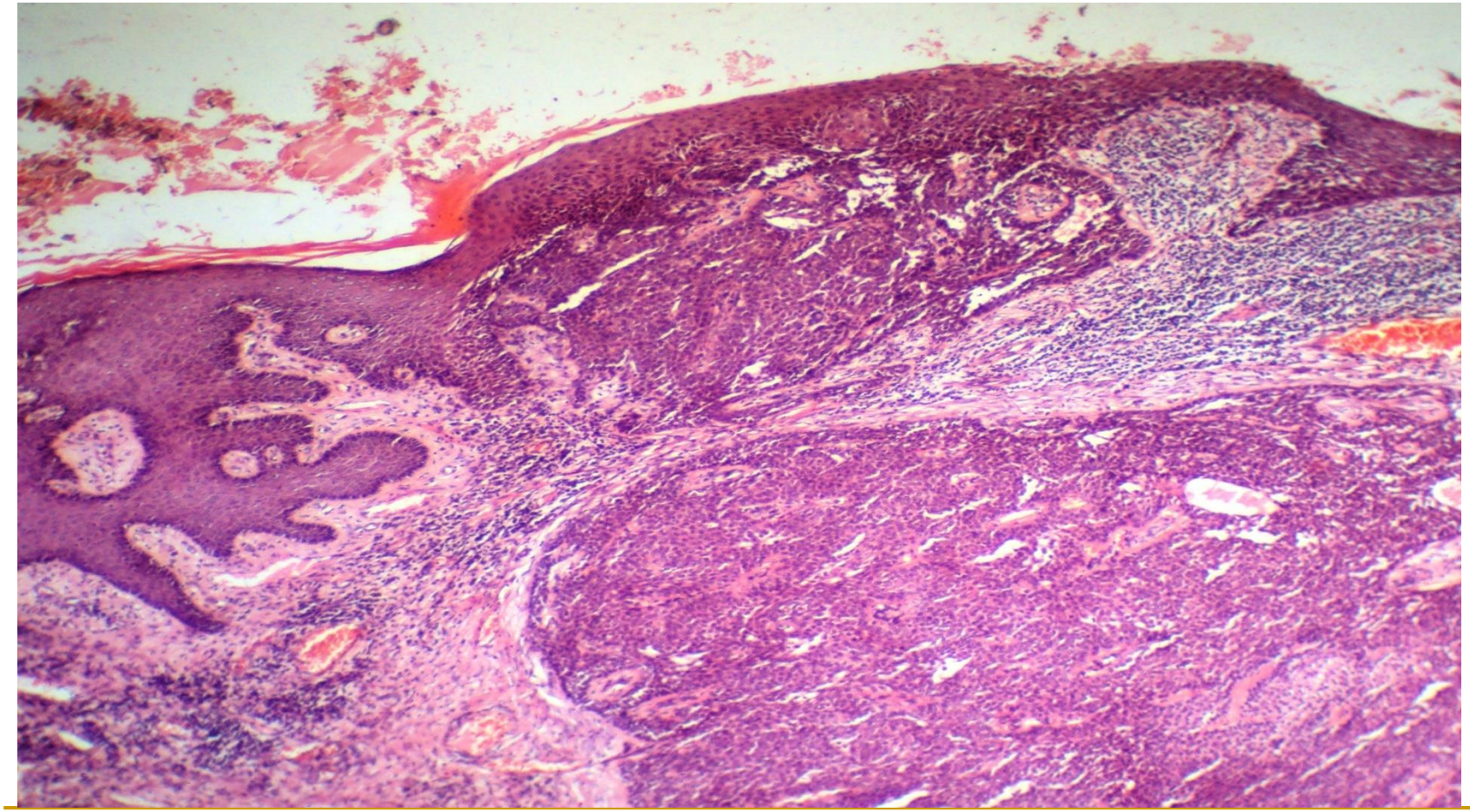
- NETs are generally characterized by their ability to produce peptides that lead to their syndrome e.g. carcinoid syndrome

Benign cystic teratoma-mixed germ cell

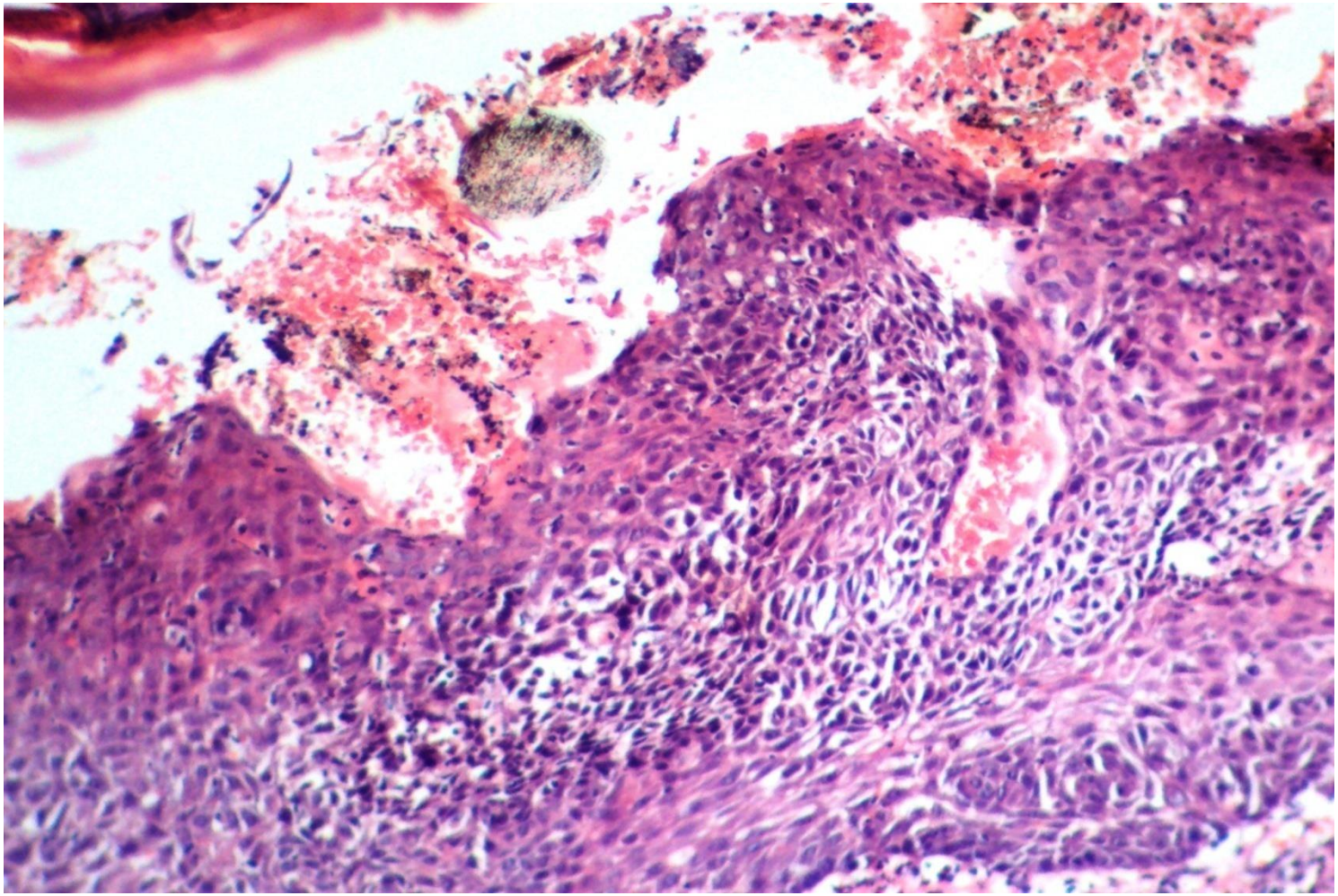
Benign cystic teratoma



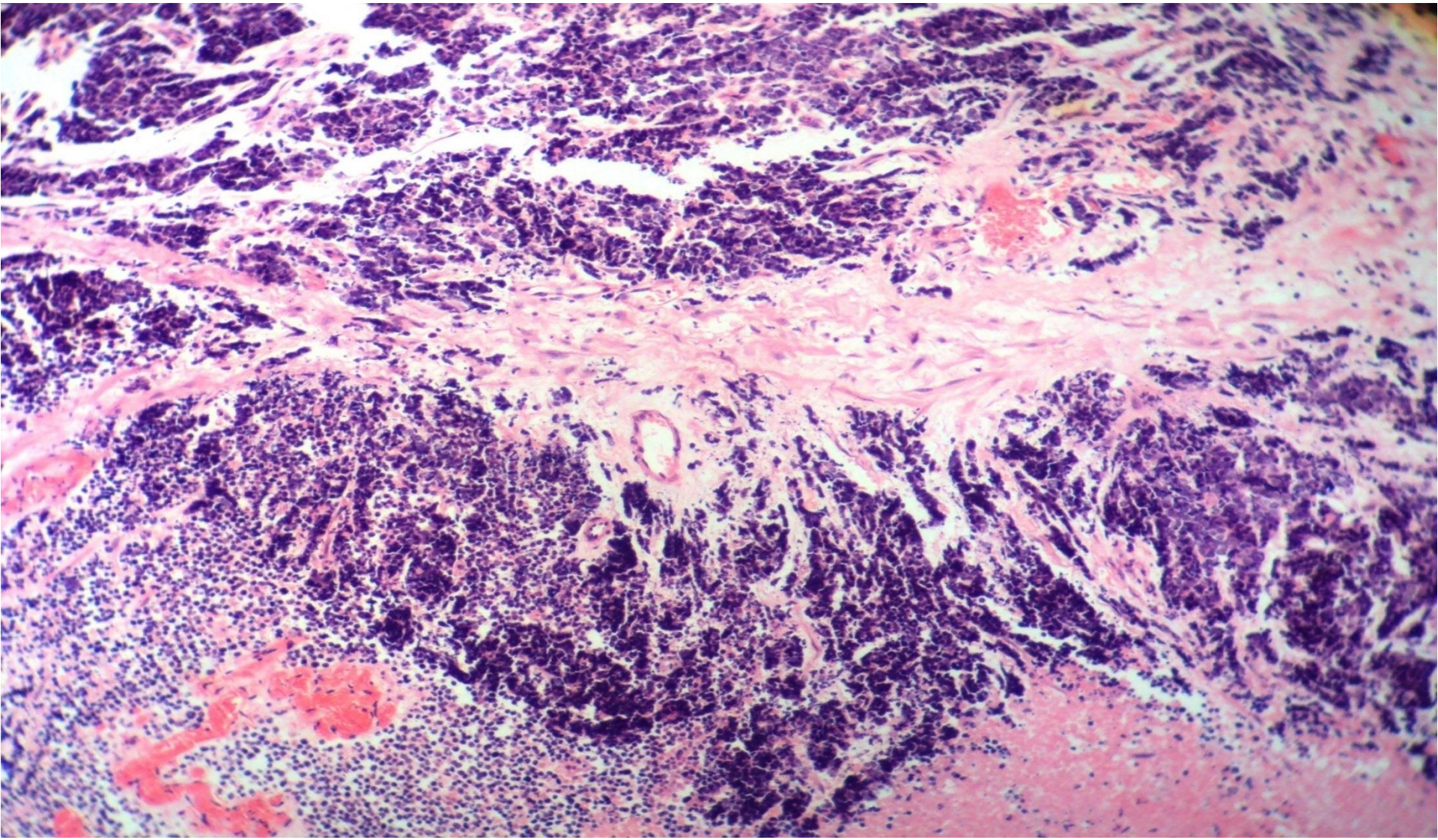
Benign skin appendage tumor-basal cell epithelioma



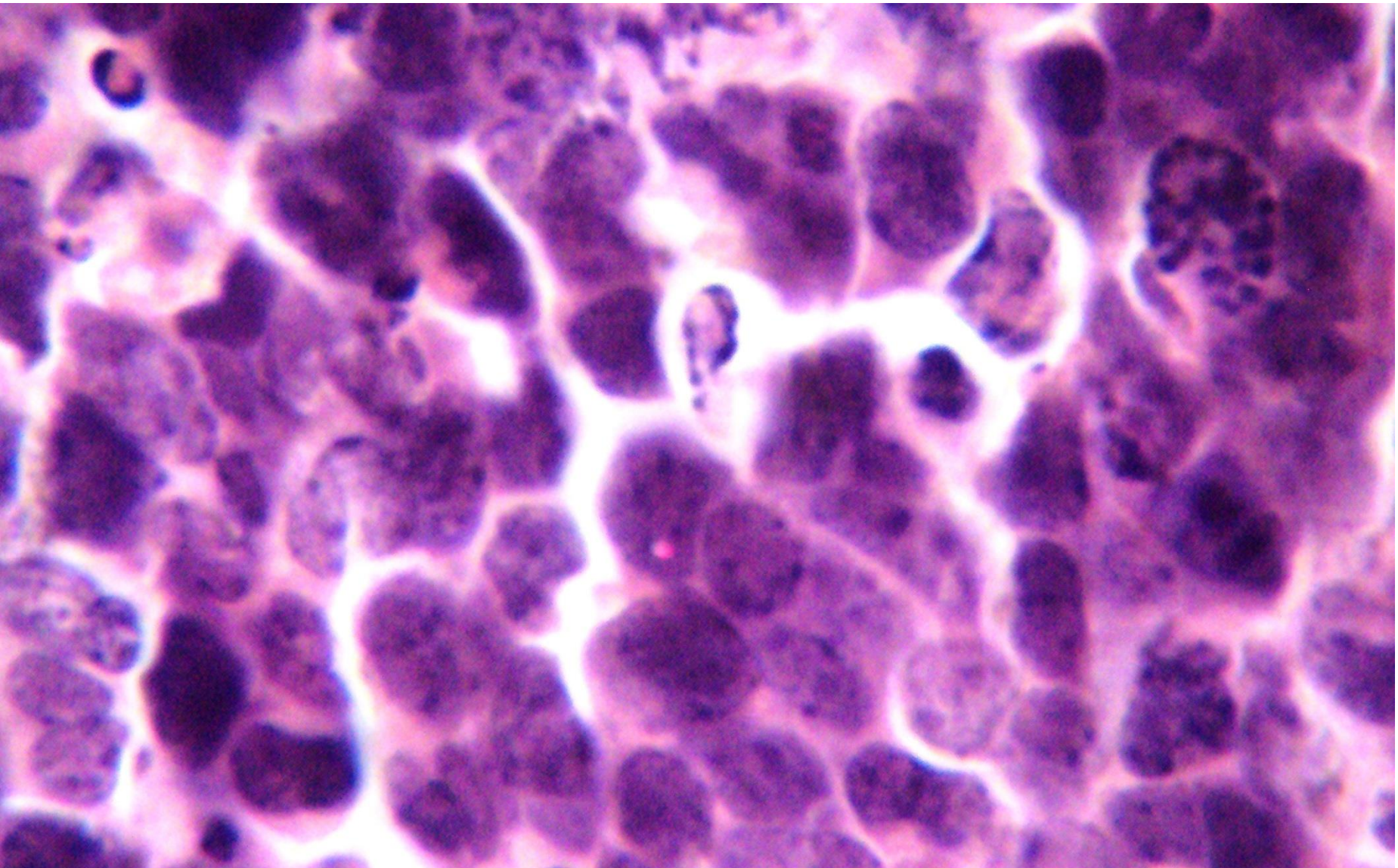
Ulcer basal cell epithelioma



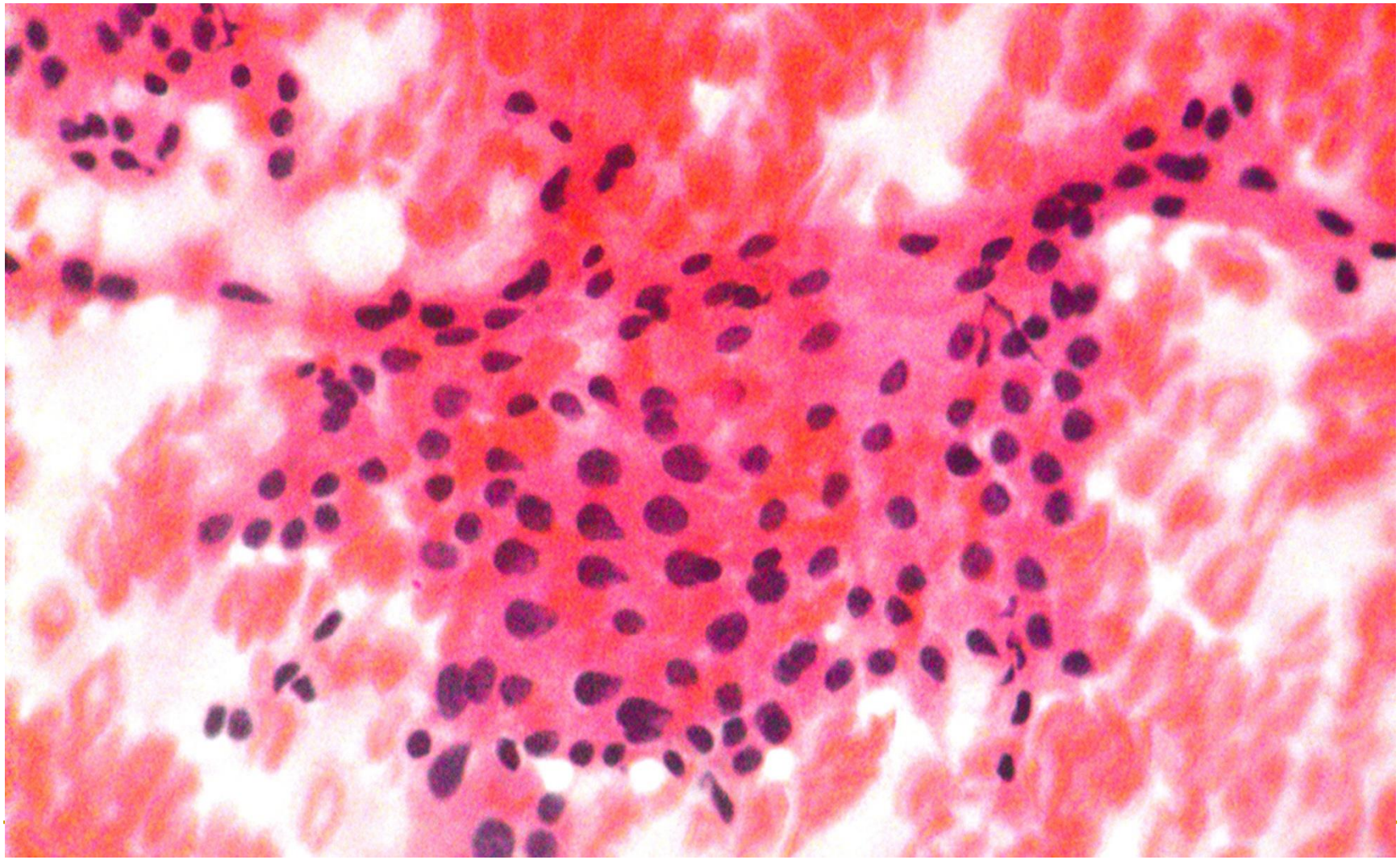
Small cell carcinoma -lung



Small cell ca- hyperchromasis, mitosis



THYROID ADENOMA-CYTOLOGY



Mammogramme breast

7.2 Side A

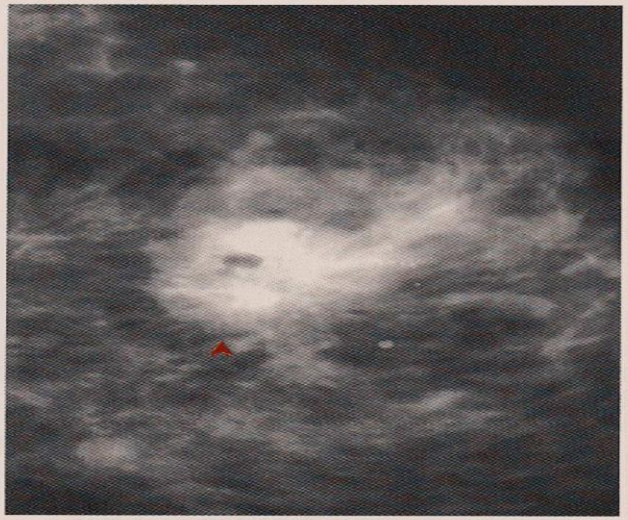
(PBD8: 269; BP8: 180)

A 25-year-old woman has felt a painless upper, outer quadrant left breast lump for 8 months. Her mother, sister, and maternal aunt all had breast cancer. On examination, the lesion is ill-defined, firm, and 3 cm in largest dimension; an enlarged, nontender axillary lymph node is also palpable. Her mammogram is shown.

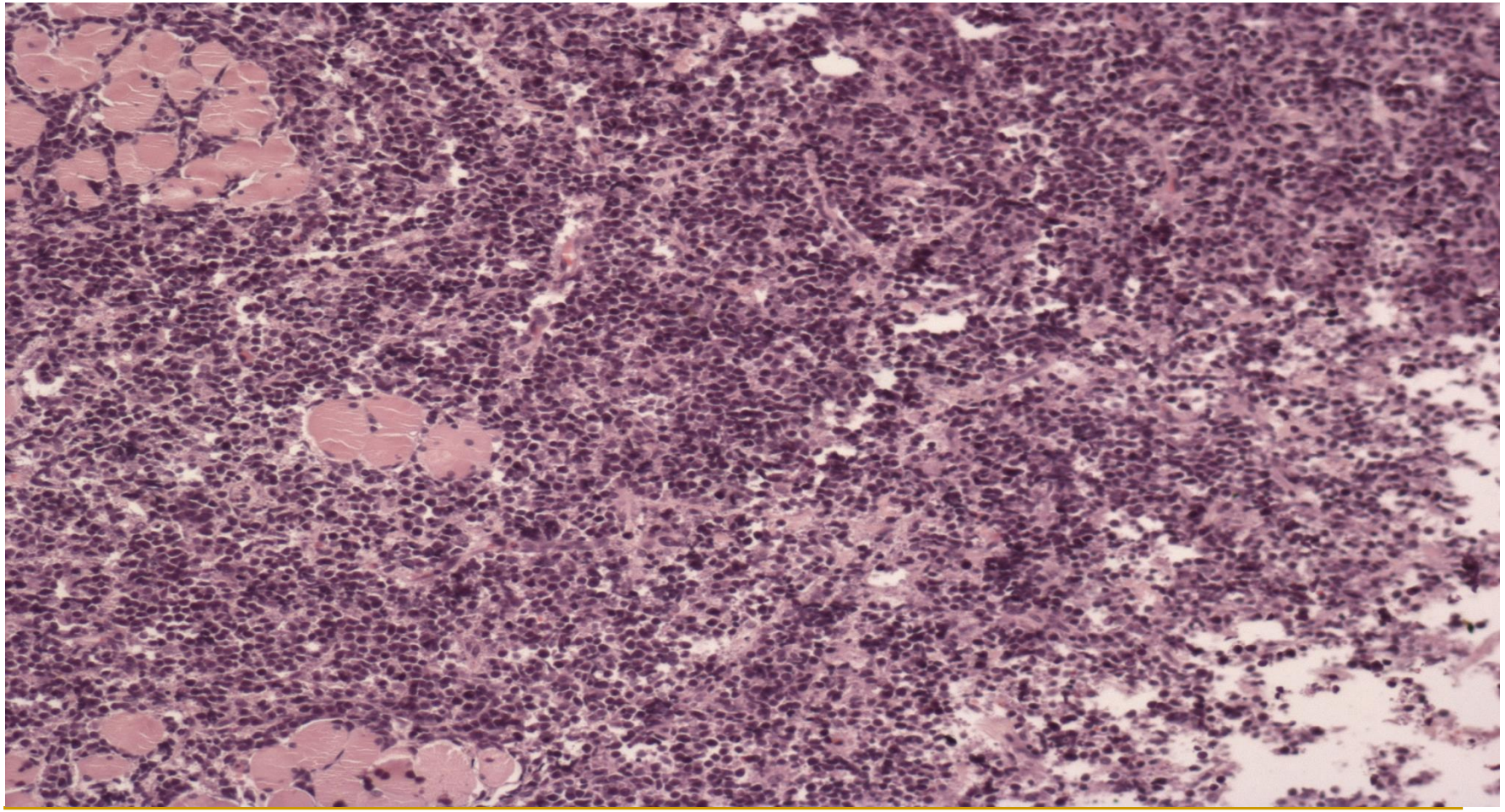
1. What is this lesion most likely to be? Why is it ill defined?
2. What does the palpable axillary node portend?
3. What gene mutation can be associated with familial breast cancer?

ANSWERS: SIDE B

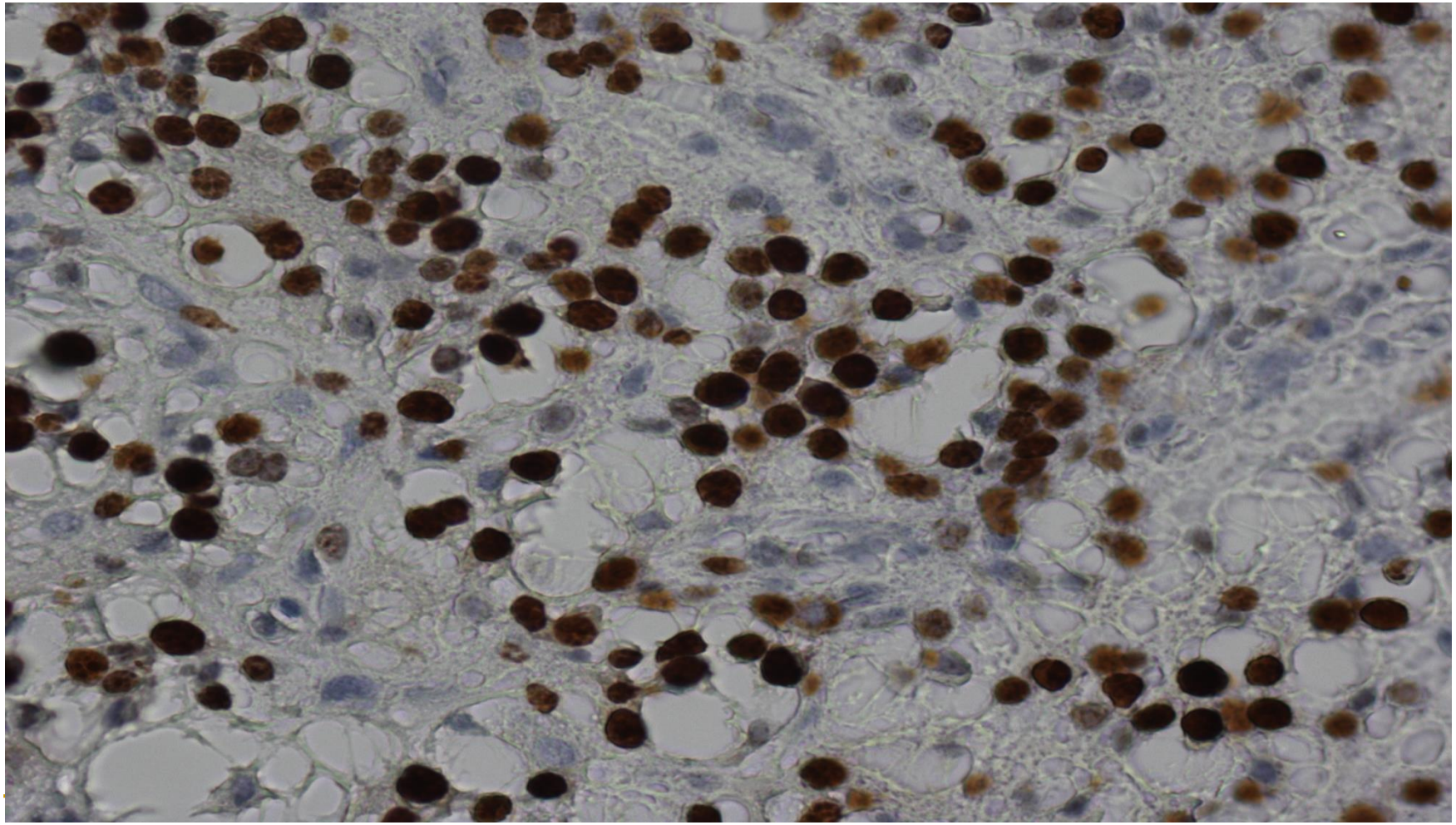
1. ***Breast carcinoma***. *There is an ill-defined pale tan scirrhous mass (■) invading into yellow adipose tissue. Fixation to the chest wall also indicates invasion that would not occur with a benign lesion.*
2. *Paraneoplastic syndromes related to malignancy can include hypercalcemia resulting from tumor production of PTHrP. Elevated serum alkaline phosphatase also is suggestive of either bony or hepatic metastases, depending on the alkaline phosphatase isoform that is elevated.*



Invasive carcinoma destroying muscle



Malignant- 50% proliferating cells MIB index



COMPARISON

Benign

- Can cause pressure locally, eg.intestinal obstruction
- may have genetic abnormalities

Malignant

- Can cause local effects
- Frequently associated with genetic abnormalities

CONTRASTS

BENIGN

Differentiation and anaplasia- well. This is the degree to which they resemble parent cell. Lack of which is called anaplasia

MALIGNANT

Well, moderately well, poorly differentiated to anaplastic

CONTRAST

The differentiation is defined by

1. Pleomorphism- ie nuclear size and shapes
2. Abnormal nuclear morphology- hyperchromasia and size of nucleoli
3. Mitoses- ie. Cells in the cell cycle . Benign show normal mitoses

- Malignant

1. Mild to high pleomorphism. The higher the pleomorphism, the higher the grade.
2. Hyperchromasia with nucleoli
3. Frequent mitoses- with abnormal ones. The higher the mitotic rate, the higher the grade

CONTRAST

- Polarity- normal in benign . This refers to the orientation in relation to the underlying tissue
- localized
- Other changes- inflammation,

- Polarity –lost; with disorganization and overlaying
- Invasion and distant metastasis; prior to invasion may be called carcinoma-in-situ
- Others- necrosis due to high turnover, ulceration, inflammation, malignant giant cells

Immunophenotyping of carcinomas

- When malignant neoplasms are poorly differentiated, one may require to define the cell of origin
- By the use of immunohistochemical stains
- These use antibodies to tag and define corresponding antigen to a specific phenotype
- The common phenotype for carcinomas are EMA-epitheilial membrane antigen, Prostatic specific antigen, cytokeratin

cytogenetics

- Demonstrates the genetic changes seen on carcinomas
- E.g BRCA 1 and 2 seen in ductal carcinoma

ODONTOGENIC TUMORS & CYSTS

- Cysts are mostly commonly seen in the jaw
- Dentigerous cysts – orginate from the crown of an un-errupted tooth; unilocular and lines by stratified squamous epithelium
- Odontogenic keratocyst – uni or multilocular on the mandible; 10-40 years; defect in the
- tumor suppressor gene PTCH

NEOPLASMA OF ODONTOGENIC TISSUE

- Epithelial
  - Benign – amyloblastoma; calcifying epithelial odontogenic tumor & squamous odontogenic tumor
  - Malignant – amyloblastic carcinoma; malignant amyloblastoma; clear cell odontogenic carcinoma
- Mesenchyme
  - Odontogenic fibroma; odontogenic myxoma, cementoblastoma

MIXED ODONTOGENIC TUMORS

- Amyloblastic fibroma
- Myloblastic fibro-odontoma
- Complex/compound odontoma