Pathology - Topic 6 - Neoplastic disorders

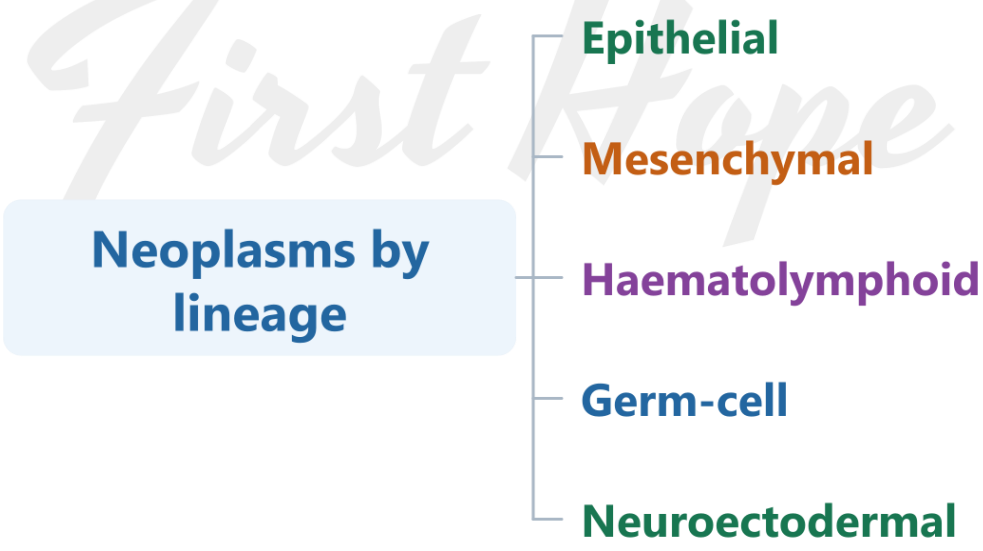
Definition and Classification of Neoplasia

- A **neoplasm** is an abnormal proliferation of cells that grows with a degree of independence from normal regulatory controls.

Neoplasms and Their Components

- The altered cell population may continue to expand after the original stimulus has disappeared.
- The neoplastic cells form the **parenchyma**, while supporting vessels, connective tissue and other non-neoplastic cells form the **stroma**.
    - Tumour behaviour reflects interactions between both components and the surrounding host tissues.
- The word **tumour** commonly refers to a neoplasm, although it historically meant a swelling.
    - Not every swelling is neoplastic, and some neoplasms, such as leukaemias, do not form one discrete mass.

Classification by Behaviour and Origin



1. Benign Neoplasms

- A benign neoplasm remains localised and does not metastasise.
    - It may still cause serious disease through compression, obstruction, bleeding or hormone production.
- A **lipoma** is a benign adipocytic tumour, while a **leiomyoma** is a benign smooth-muscle tumour.
- An **adenoma** is a benign epithelial tumour with glandular differentiation or origin in glandular tissue.
    - A papilloma has a finger-like epithelial growth pattern, and a cystadenoma contains prominent cystic spaces.

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

2. Malignant Neoplasms

- A malignant neoplasm can invade surrounding tissue and may spread to distant sites.
  - The collective term **cancer** refers to malignant neoplasia.
- A **carcinoma** is a malignant epithelial neoplasm, while a **sarcoma** is a malignant mesenchymal neoplasm.
  - Squamous cell carcinoma, adenocarcinoma, osteosarcoma and liposarcoma illustrate these categories.
- Leukaemias, lymphomas and several embryonal tumours are named according to their particular cell lineage or developmental pattern.

Important Naming Exceptions

- Some malignant tumours end in **-oma**, including melanoma, lymphoma, seminoma and mesothelioma.
  - The name alone therefore cannot reliably determine behaviour.
- A **teratoma** arises from germ cells and usually contains tissues from more than one germ layer, although specialised monodermal forms, such as **struma ovarii**, predominantly contain one tissue type.
  - Its behaviour depends on maturity, site, age and other features rather than on the name alone.
- A **hamartoma** is a disorganised overgrowth of tissues normally present at a site, while a **choristoma** is normal tissue in an abnormal location.
  - These terms describe developmental patterns and should not automatically be equated with a conventional malignant tumour.

Examples Classified by Tissue of Origin

Origin	Benign example	Malignant example
Squamous epithelium	Squamous papilloma.	Squamous cell carcinoma.
Glandular epithelium	Adenoma or cystadenoma.	Adenocarcinoma or cystadenocarcinoma.
Fibrous tissue	Fibroma.	Fibrosarcoma.
Adipose tissue	Lipoma.	Liposarcoma.
Cartilage	Chondroma.	Chondrosarcoma.
Bone-forming tissue	Osteoma.	Osteosarcoma.

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

Origin	Benign example	Malignant example
Smooth muscle	Leiomyoma.	Leiomyosarcoma.
Vascular endothelium	Haemangioma.	Angiosarcoma.

Benign and Malignant Behaviour

- Benign tumours generally remain localised, whereas malignant tumours can invade surrounding tissues and may metastasise.

Differentiation and Anaplasia

- **Differentiation** describes how closely neoplastic cells resemble the normal cells of their lineage in structure and function.
    - A well-differentiated tumour may retain gland formation, keratin production or hormone synthesis.
- **Anaplasia** is marked loss of differentiation and is a feature of some malignant neoplasms.
    - Malignancy does not require complete anaplasia because some cancers remain well differentiated.

Cytological Features of Malignancy

- Malignant cells may show **pleomorphism**, meaning variation in cell and nuclear size and shape.
    - Nuclei may be enlarged, hyperchromatic and irregular, with coarse chromatin and prominent nucleoli.
- A high nuclear-to-cytoplasmic ratio indicates that the nucleus occupies a large proportion of the cell.
- Increased mitotic activity may be present, and atypical mitoses suggest disturbed chromosome segregation.
    - Frequent normal mitoses can also occur in reactive or benign proliferations, so mitotic count alone does not prove malignancy.
- Loss of polarity and disorganised tissue architecture further support abnormal growth.

Growth Rate and Local Invasion

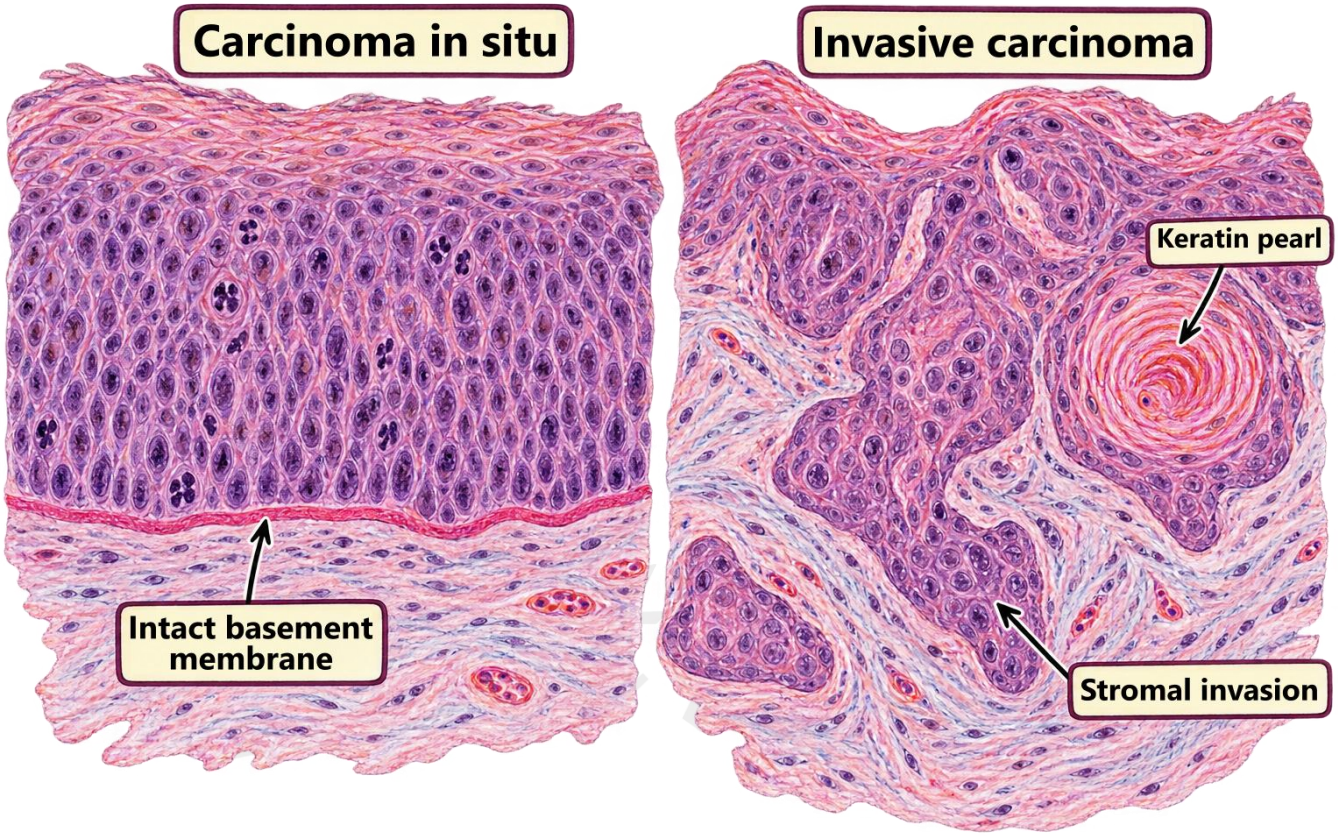
- Tumour growth depends on the proportion of dividing cells, the rate of cell division and the rate of cell loss.
    - A tumour may grow slowly despite active division if many cells also die or leave the proliferating population.
- Benign tumours often grow expansively and may form a well-defined capsule.

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

- Some benign lesions are unencapsulated, while some malignant tumours have deceptively circumscribed borders.

- Malignant tumours commonly infiltrate and destroy neighbouring tissue.
  - Desmoplasia is a prominent fibrous stromal response that can make some carcinomas hard and irregular.

Carcinoma in Situ and Invasion



Carcinoma in situ remains above the basement membrane, whereas invasive carcinoma enters the underlying stroma

- **Carcinoma in situ** remains confined to the epithelial compartment above an intact basement membrane.
  - It has not yet acquired the anatomical access associated with stromal invasion.
- Invasive carcinoma crosses the basement membrane and grows in the underlying stroma.
  - It may then enter lymphatic or blood vessels and gain the ability to establish metastases.

Comparison for Revision

Feature	Benign tumour	Malignant tumour
Differentiation	Usually resembles tissue of origin	Variable; may be well differentiated or anaplastic

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

Feature	Benign tumour	Malignant tumour
Border	Often expansile and circumscribed	Often infiltrative
Growth	Often slower	Variable; may be rapid or slow
Metastasis	Absent	Possible; frequency varies
Clinical effects	May still be serious	Local destruction and possible systemic spread

Spread of Malignant Tumours

- Malignant tumours spread through local invasion and, in many cases, dissemination to distant sites.

Routes of Spread

1. Direct Invasion

- Tumour cells infiltrate adjacent tissue and may spread along tissue planes, nerves or other structures.
  - Perineural invasion can cause pain and influence local tumour behaviour.

2. Lymphatic Spread

- Tumour cells enter lymphatic vessels and may lodge in regional lymph nodes.
  - This route is common in carcinomas, but route preferences are not absolute.
- A **sentinel lymph node** is a node that first receives drainage from a tumour region.
  - Whether it should be assessed depends on the tumour type and the clinical setting.

3. Haematogenous Spread

- Tumour cells entering veins can travel to distant organs through the bloodstream.
  - The lungs and liver are frequent destinations, although organ preference also depends on tumour biology.
- Sarcomas commonly spread through blood, and many carcinomas also use this route.

4. Seeding of Body Cavities

- Tumour cells can spread across a serosal cavity and implant on other surfaces.
  - Peritoneal dissemination of an ovarian carcinoma is a classic example.

Copyright by Engacy Learning Private Limited. All rights reserved. Reproduction or distribution without written consent is strictly prohibited.

FREE PREVIEW

Click here to visit our website

MBBS PREMIUM NOTES

Complete MBBS notes for every subject and year are available only in the FirstHope app.

Scan or click here

Click here to get the app >

Available on Google Play

Browse MBBS notes by year

firsthope.co.in/mbbs

Click here to explore MBBS >

Scan or click here

FirstHope Medical on Instagram

@firsthope.medical

Click here to follow

App and notes help

Find answers about access and downloads

Click here for help

YEAR 1 / YEAR 2 / YEAR 3 / YEAR 4