Unit I – Problem 8 – Pathology: Neoplasia

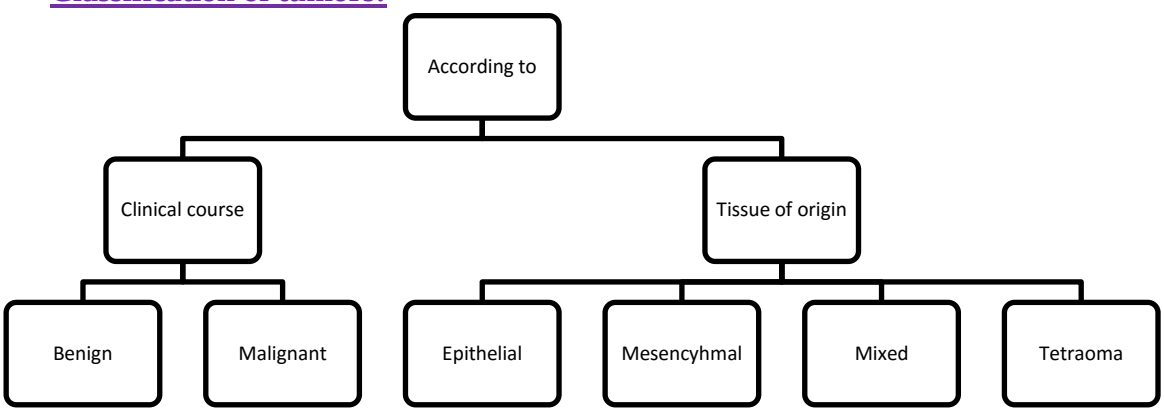
- **Neoplasia:**
  - **Definition**: abnormal mass of tissue, the growth of which exceeds & it is uncoordinated with that of normal tissues & persists in the same excessive manner after ceasation of the stimuli which evoked the change.
    - ✓ Persistence: it is true, but there are some neoplasms that regress in size after their stimuli have been removed (they are usually hormonal–depending neoplasms).
  - **Stimulation**: in many cases of neoplasm we may not be able to identify the initiating stimuli.
  - **Tumors**: are usually used to denote the swelling of inflammation but nowadays they can be used interchangeably with the word neoplasm.
- **Neoplasia vs Hyperplasia**: both deal with cell proliferation.
  - **Differences:**

	Hyperplasia	Neoplasia
Cell proliferation	Under normal control	Uncontrolled & uncoordinated
Stimulation effect	Stop, when stimuli is removed	WON'T stop, even if we remove the stimuli
Differentiation	Well – differentiated; polyclonal	Their differentiation varies; monoclonal

- **Nomenclature of neoplasia:**
  - **Tumor have two components:**
    - ✓ Parenchyma: made up of neoplastic cells. It determines the behavior & consequences of the tumor.
    - ✓ Stroma: made up of supporting tissues (CT & blood vessels). It is important for providing blood supply to neoplastic cells & it provides a frame-work on which these cells can grow.

    The cross–talk between parenchyma & stroma determines the growth of the tumor.
- **We can name tumors according to their:**
  - **Clinical course**: benign or malignant
  - **Tissue of origin.**
  - **Benign tumors**: harmless?
  - **Malignant tumors**: hard to treat, progress rapidly and harmful.
- **Nomenclature of a benign tumor:**
  - By adding the suffix "-oma" at the end of the cell of origin.
  - **Examples of benign tumors of mesenchymal origin:**
    - ✓ Fibroma: benign tumor of fibroblasts.
    - ✓ Chondroma: benign tumor of the cartilage.
    - ✓ Osteoma: benign tumor of osteoblasts.
- **Nomenclature of an epithelial-origin benign tumors:**
  - **Examples:**
    - ✓ Adenoma: benign tumor of epithelial origin that resembles a glandular pattern or a benign tumor of a glandular origin that may not resemble a glandular structure.
    - ✓ Papilloma: microscopic finger-like projections upon the surface.
    - ✓ Cystadenoma: has a cyst-like structure.
    - ✓ Polyp: macroscopic finger-like projections above the mucosal surface into the lumen. Malignant tumor of polyp is known as polypoid cancer.
- **Some terms have "-oma" at their end but they are not benign:**
  - **Hematoma**: collection of blood in an organ/tissue outside the blood vessel (not a neoplasm).
  - **Granuloma**: focus of granulomatous inflammation (not a neoplasm).
  - **Hamartoma**: disordered growth of tissue at its site of origin. (e.g in lungs there are cartilage, bronchi, blood vessels that will distributed in an wrong fashion).
  - **Choristoma**: presence of normal tissue in an ectopic location (e.g pancreatic tissue found in the intestine).

- **Nomenclature of malignant tumors:**
  - Those of mesenchymal origin can be denoted by "sarcoma" e.g. fibrosarcoma and chondrosarcoma.
  - Those of epithelial origin can be denoted by adding "carcinoma" e.g. ademocarcinoma, squamouscarcinoma… etc.
- **Nomenclature of the mixed tumor:**
  - Mixed tumors are tumors that have neoplastic cells with more than a morphological pattern (e.g tumor of salivary glands).
  - **These have morphological patterns of neoplastic cells:**
    - ✓ Epithelial pattern
    - ✓ Myxomates pattern that may have cartilages too.
  - **Even though their morphologic patterns are different, they've came from the same germ-cell layer.**
    - ✓ Teratoma comes from more than one germ-cell layer (all the 3) in the embryologic phase (endoderm, ectoderm, & mesoderm).
    - ✓ Common sites of teratoma: ovary, testis and pineal gland.
- **Classification of tumors:**



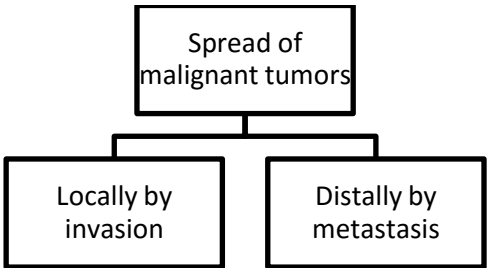
- **Characteristics of benign & malignant tumors:**
  - **Macroscopic Differences:**

	Benign	Malignant
Rate of growth	Slow-growing tumors	Rapid-growing tumors
Mode of growth	Slowly & in an expensive manner	Rapidly & in an invasive manner
Capsules	Covered by capsules	Not covered by capsules
Hemorrhage & necrosis	Absent	Present
Metastasis	Doesn't occur	Occurs

- **Microscopic differences between benign & malignant tumors:**
  - **Differentiation**: refers to the extent to which a neoplastic cell resemble a comparable normal cell (both morphologically & functionally).
    - ✓ Benign: well – differentiated.
    - ✓ Malignant: differentiation varies (well, moderate or poorly anaplastic).
      - ❖ Aggressive: poorly-differentiated.
  - **Anaplasia**: lack of differentiation
    - ✓ Benign: not anaplastic.
    - ✓ Malignant: anaplastic if poorly-differentiated.
- **Evidence of a malignant tumor: anaplasia, invasion and metastasis.**
  - **Features of anaplasia:**
    - ✓ Pleomorphism: variation in size and shape in the cytoplasm & nucleus.
    - ✓ Abnormal nuclear changes in an anaplastic cell.
    - ✓ DNA: hypercromatic cells.
    - ✓ So the nucleus-to-cytoplasm ratio will be 1:1
    - ✓ Abnormal mitosis
    - ✓ Loss of polarity.
    - ✓ Presence of giant cells (large cells with large nucleus or cell with many nuclei)
  - **Invasion:**
    - ✓ Benign: doesn't invade.
    - ✓ Malignant: invades into surrounding structures by proteolytic enzymes. For examples: lymphatics and veins.

- ✓ Some structures resist invasion: elastin, collagen and cartilage. In arteries, elastin is resistance to invasion.

- **Metastasis**: spread of tumor from its primary site to secondary site which is distant (not continuous). Found only in malignant.
- **Monoclonality**: found in both benign & malignant tumors. It means that the tumor is originally derived from one cell.



- **Different routes of metastasis:**
  - **Natural passages:**
    - ✓ E.g. malignant lung tumor spreads through the respiratory tract.
  - **Seeding through body cavities.**
  - **Through lymphatics**: usually carcinomas and some sarcomas.
  - **Through blood vessels**: usually sarcomas (through the venous system).