Mesenchymal Tumors

- Connective tissue tumors
- Adipose tissue tumors
- Muscle tissue tumors
- Cartilage tumors
- Bone tumors
  - Blood and lymph vessels tumors
  - Tumors originating from serous membranes
    - Histiocytoma
    - Mastocytoma

Connective tissue tumors

- Fibroma
- Fibrosarcoma

- Myxoma
- Myxosarcoma

Fibroma

- It is a benign tumor originating from connective tissue (fibroblast, fibrocyte and collagen fiber).
- There is no breed, gender or age predisposition, it can occur in all animals.
- Sometimes the tumor develops as a single tumor, sometimes more than one in the organism (Fibrom**atosis**).

Tumor is classified into two:

- Fibroma molle (Soft consistency; fibroblasts and fibroblasts are mostly present and collagen bundles are rare)
- Fibroma durum (Firm consistency; Collagen bundles are too much, cellular structures are few.)

Fibroma

- Tumor is mostly formed in the dermis and subcutis, but it can be seen everywhere where the connective tissue is.
- Macroscopically, they are round to oval masses. They are usually encapsulated, firm, rubbery, and gray/white on cut surface.

Fibroma

- Microscopically, this tumor is well circumscribed.
- The neoplastic cells are repetitive and are usually arranged in interwoven fascicles, more rarely in whorls.
- Tumor cells are fusiform and have elongated nucleus. Mucinous changes may be found.
- Sometimes fibromas can be mixed with other types of tumors. (ex. Fibropapilloma, Fibroadenom, Fibrolipom, Fibrochondrom)

- Fibroma is a tumor with good prognosis, not usually recurs after surgery.

Fibrosarcoma

- Malignant tumor of connective tissue
- Although fibrosarcomas occur in all domestic species they are most commonly seen in adult and aged cats and dogs.
- No breed or gender predisposition.
- It can be seen anywhere in the body (excluding internal organs).
- It can usually be seen in the dermis and subcutis.

Fibrosarcoma

- Macroscopically; tumor is in varing sizes, nodular shaped, usually not well circumscribed, and unencapsulated.
- The tumor is lobular, gray-white and sometimes shows red-brown hemorrhage and yellowish necrosis on cut surface. Often, the surface becomes ulcerated and secondary infections can develop.

Fibrosarcoma

- Microscopically,
  - Composed of anaplastic spindle and fusiform tumor cells arranged in interwoven or herringbone pattern.
  - In tumor, cellularity is high, collagen fibers are less.
  - **Giant cells** can be seen.
  - **Mitotic figures** are common.
  - In addition hemorrhage, necrosis, inflammation and edema are common.

Fibrosarcoma

- The tumor grows rapidly and is infiltrative.
- Metastasizes to lungs with hematogenous spread.
- Recurrence may occur after operation.
- Chemotherapy and radiotherapy can also be applied.

Myxoma and myxosarcoma

- These are tumors of fibroblast origin distinguished by their abundant myxoid matrix rich in mucopolysaccharides.
- In such cases, which are considered to be fibroblastic tumors, *mucin* of intercellular matrix is the main feature that separates these tumors from fibroma and fibrosarcoma.
- It can be seen in the elderly and adults of all domestic animals, occurs rarely.
- It occurs mostly in skin of dogs. It has also been reported in unusual sites such as heart and liver.

Myxoma and myxosarcoma

- Macroscopically, It has no obvious shape. It is soft, moist, without capsule, and the cross-section is gray-white.
- Microscopically, it is difficult to distinguish myxoma from myxosarcoma. Because in both tumors, cells have similar characteristics. The tumor cells are spindled and/or stellate cels that have elongated-oval-round nucleus.
- Tumor cells have spread to a vacuolar, basophilic, mucinous stroma.
- Metastasis in myxosarcoma is very rare. Surgical excision can be done. It may recur.

Adipose tissue tumors

- Lipoma
- Liposarcoma

Lipoma

- Lipoma is a benign tumor that is originating from adipose tissue.
- Lipomas are most common in dogs. They can be seen rarely in horse, ox, cat, sheep, and pig.
- It forms more often in large breed animals and female dogs than in males.
- Female dogs and castrated male cats appear predisposed to the formation of these tumors.

Lipoma

- In dogs, lipomas can be observed in single or multiple masses, are usually observed in the subcutaneous region of the thorax, abdomen, extremities and sternum.
- In horses lipomas arising from mesentery with a stalk (*lipoma pendulum*)
- In cattle, multiple lipomas in the abdominal cavity (*lipomatosis*)
- In cat lipomas in the liver

Lipoma

- Macroscopically, the tumors are oval/ovoid (*disk*), well-circumscribed, thin-encapsulated, soft/crispy.
- They are white or yellowish in color. On their cut surface, areas such as white chalky material can be seen.

Lipoma

- Microscopically, Lipocytes are well differentiated. The tumor is divided into lobes with fibrous septa. Sometimes fibrous tissue can form a large part of the tumor (Fibrolipoma).
- Unless a fibrous capsule and connective tissue elements are present in the tumor, it is difficult to distinguish from normal fatty tissue.

Liposarcoma

- This malignant tumor is rare in domestic animals.
- It is gray-white in color and firmer than lipoma.
- Microscopically, most tumor is composed of round to polygonal cells arranged in sheets, with little or no collagenous stroma. There can be single or multinucleated cells.
- It is local invasive. It specifically metastasizes to the *lung*. It recurs after surgery and the prognosis is *poor*.

Muscle tissue tumors

- Leiomyoma
- Leiomyosarcoma

- Rhabdomyoma
- Rhabdomyosarcoma

Leiomyoma

- It is benign tumor of smooth muscles.
- It occurs in domestic animals such as cattle, dog, sheep, horse and pig.
- Leiomyomas are usually seen in female genital organs, sometimes in esophagus and seen in stomach-intestines.

Leiomyoma

Macroscopically;

- Especially the masses in uterus are stalked and most are solitary.
- On the cut surface, the masses are light white-pink in color and firm in consistency.
- Although it is usually separated from the surrounding tissues by a fibrous capsule, sometimes the capsule may not be present.

Leiomyoma

- Tumor is composed of bands created by cutting cells longitudinally or transversely.
- Longitudinally, tumor cells look like **cigar** shaped (*blunt-ended*).
- The stroma of the tumor is low. Mitosis is rare.
- The mass can be operated (removed) and a full improvement is possible.

Leiomyosarcoma

- It is malignant tumor of smooth muscles.
- It accounts for 10% of smooth muscle tumors.
- It has also been reported in kidney and ovary other than smooth muscles.
- Macroscopically; it can be varying from whitish-gray to pink color.
- They occur multiple in uterus and urinary bladder
- Occur solitary in kidney.

Leiomyosarcoma

- Microscopically; tumor is composed of spindle anaplastic cells. They have cigar-shaped nuclei.
- It may recur after the operation.

Rhabdomyoma

- Benign tumors that differrentiate from striated muscles are called rhabdomyoma.
- It usually develops in the heart and congenitally.

  Macroscopically;

- Partially encapsulated and embedded in the heart muscle. It is frequently found in the ventricles, especially in the interventricular septum.
- Characteristically yellow-brown, sometimes gray-pink in color and lobular.

Rhabdomyoma

- Microscopically,
- Tumor is composed of round to polygonal cells, with eosinophilic and granular cytoplasm. Cells are separated by vascular stroma, and mass is well-circumscibed.
- Many of tumor cells are vacuolated. Vacuolated cells with thin radiating cords of cytoplasm are called as ***spiderweb cells***.

Rhabdomyosarcoma

- Malignant tumor of Striated muscle
- Usually occurs in animals 2-3 years old.
- Tumor can also occur in organs that do not contain striated muscle (such as urinary bladder, lungs) This type is called 'metaplastic rhabdomyosarcoma' and is very rare in domestic animals.

  Macroscopically;
- Pink-gray colored, round nodules with
- Hemorrhage and necrosis may be seen in masses that are larger than 1 cm diameter.

Rhabdomyosarcoma

- An important feature of the tumor is the presence of cells that have a large granular or vacuolated cytoplasm and have nucleus with considerable varying sizes.
- In such cells there are several prominent nucleoli and mitotic figures are common. Multinucleated giant cells are visible. In giant cells there is transverse striation.

Rhabdomyosarcoma

- For diagnosis of rhabdomyosarcoma, it is important to reveal transverse striation. For this purpose, Heidenhain's iron hematoxylin, phosphotungstic acid hematoxylin or silver stainings should be applied.

- Tumor often metastasizes to lymph nodes, heart, spleen, lung, adrenal and kidneys.

Cartilage tumors

- Chondroma
- Chondrosarcoma

Chondroma

- Benign tumor of cartilage.
- **Can be originated from**
  - Costochondral junctions,
  - Trachea,
  - Bronchi,
  - Periosteum of bones
- Is usually developed in the flat bones.

  Chondromes originating from the hyaline cartilage in bone tissue are called enchondroma. Sometimes heterotropic chondroma, which occurs in the testes and kidneys; sometimes it develops congenitally and is called congenital chondroma.
- It can also be seen as a mixed tumor (fibrochondromas, mychondromas, osteochondromes, etc.).

Chondroma

- Macroscopically;

  The tumor, which is especially common in sheep and dogs, is encapsulated, smooth or lopped, firm, white-bluish and varying in size.

- Microscopically;

  There are chondroblasts located in a hyaline structure. In the stroma, there are fibrous connective tissue and blood vessels associated with the fibrous capsule.

Chondrosarcoma

- Malignant tumor of cartilaginous tissue, mostly observed in aged animals.
- Macroscopically, it has an irregular surface. It is bluish-white in color and soft (sometimes jellylike), contains a large number of hard nodular masses.

Chondrosarcoma

- Microscopic diagnosis is very difficult. It has atypical feature.
- Single or double nucleated cells, multi-nucleated giant cells and mitotic figures are seen.
- It is a slowly growing tumor, with little metastasis. Prognosis is good with surgical treatment.

Bone tumors

- Benign tumors of bone tissue:

❑Osteoma

- Malignant tumor of bone tissue:

❑Osteosarcoma

❑Fibrosarcoma

❑Hemangiosarcoma

❑Giant cell tumor of the bone

Osteoma

- More common in cattles, horses, and dogs.
- Mandibula, maxilla, nasal sinuses, head and facial bones are the most common sites.
- It is well-demarcated, protruding from the surface
- It is very firm and can be cut only with saw.
- It can be in quite sizes in horses and cattles. (reaching 14 cm in diameter).

Osteoma

- Bony growths, formed of cancellous bone.
- Composed of bone trabeculae formed by uniform bone cells. A fine connective tissue and vessels are found between them.
- Osteomas grow slowly and continuously for months. It may recur after operations.

Osteosarcoma

- This malignant tumor originating from bone tissue,
- "Periosteal osteosarcoma" (originates from the periosteum of the bone) and
- "Parosteal osteosarcoma" (originates from the surface of the bone).

- It is common in dogs and cats.

Osteomasarcoma

- The tumor is seen in dogs between the ages of 1 to 15 (average 7.5 years).
- It usually develops in head and extremity bones in young animals and in humerus, radius, femur, tibia in the aged animals.
- It is observed more in large dog breeds (Boxer, Great Dane, Saint Bernard, Irish Settler, etc.).
- The average age in cats is 10.5. Breed predisposition is unknown.

Osteosarcoma

- Microscopically, osteosarcomas can divide mainly into three subtypes:
- a. Simple type,
- b. Mixed type,
- c. Pleomorphic type.

- In all three types, anaplastic osteoblasts and spindle-shaped cells are present at varying rates.

a) Sometimes there are multinucleated osteoclastic giant cells.

b) Sometimes the amount of cartilage may be greater than bone and osteoid tissue.

c) Sometimes mitotic figures are abundant and may include spicules and trabeculae without osteoid structure.

Osteosarcoma

- 45-60% of osteosarcomas metastasize to the lungs and sometimes to the regional lymph nodes via blood.

- Amputation, chemotherapy and radiotherapy are applied in the treatment.

Bone tumors

- **Fibrosarcoma**

  It is a malignant tumor originating from the stromal elements of the bone marrow cavity.

- **Hemangiosarcoma**

  Bone vessels are derived from endothelial cells. In dogs, it is mostly found in long bones, also in pelvis - sternum and maxillary bones.

- **Giant cell tumor of the bone**

  In cats and dogs, it is a rare tumor originating from the mesenchymal cells of the bone marrow. Giant cells are formed by the combination of large, oval, or spindle shaped cells. The tumor is rich in vasculature and rarely has trabeculae in the collagen structure. Sometimes it is called osteoclastoma, which can metastasize to the lungs.