

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

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 collagen bundles 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.

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.



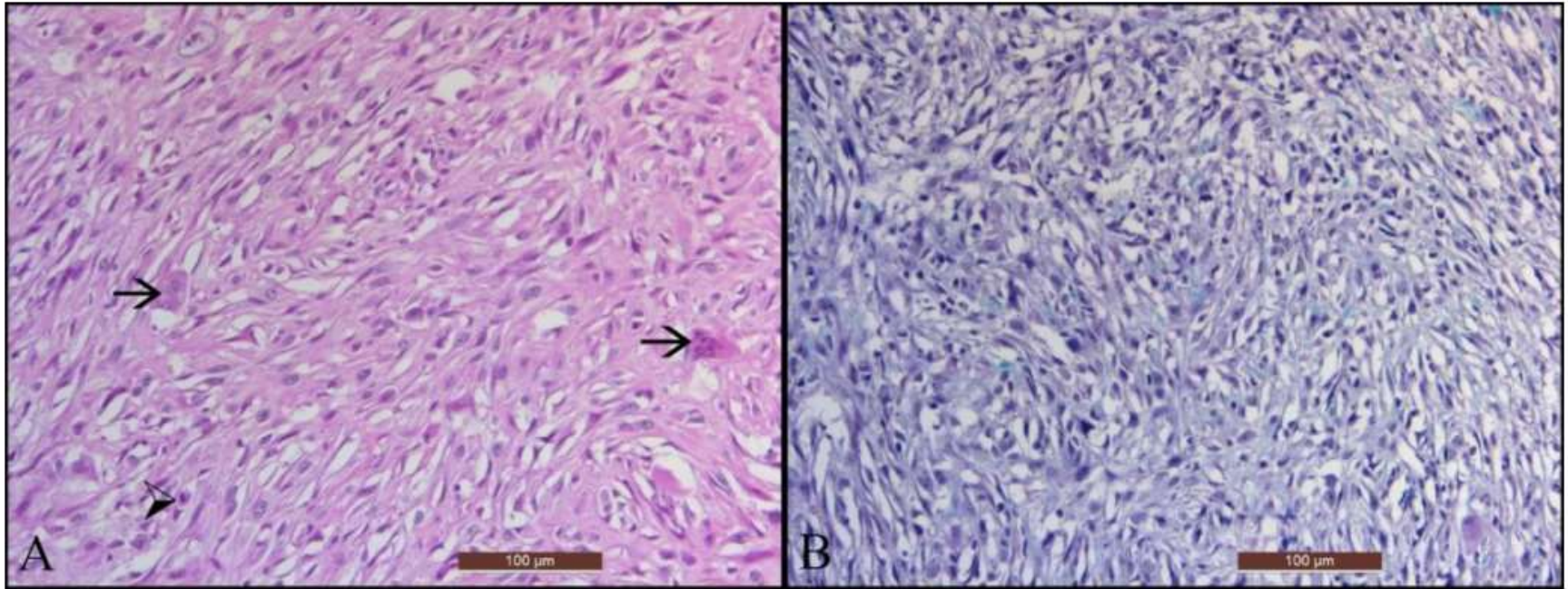
(Çalışkan and Yücel-Tenekeci, 2019)

Fibrosarcoma

- Macroscopically; tumor is in varying 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.



(Çalışkan and Yücel-Tenekeci, 2019)

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 cells 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 differentiate 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-circumscribed.
- 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.

References

- Leja, M. J., Perryman, L., & Reardon, M. J. (2011). Resection of left ventricular fibroma with subacute papillary muscle rupture. *Texas Heart Institute Journal*, 38(3), 279.
- Çalışkan, M., & Tenekeci, G. Y. (2019). Kedi Enjeksiyon İlişkili Sarkomalar: 18 Kedide Cerrahi Sonuçlar. *Veteriner Hekimler Derneği Dergisi*, 90(1), 22-29.
- Nishio, J., & Naito, M. (2012). FDG PET/CT and MR imaging of intramuscular myxoma in the gluteus maximus. *World journal of surgical oncology*, 10(1), 132.
- <http://www.pathologyoutlines.com/topic/hearttumormyxoma.html>
- <http://equinevetblog.blogspot.com/2011/01/cow-strangulating-lipoma.html>
- <https://radiopaedia.org/articles/lipoma>
- <http://www.pathologyoutlines.com/wick/softtissue/liposarcoma%20pleomorphic%20type%20micro5.jpg>
- <https://en.wikipedia.org/wiki/Leiomyoma#/media/File:Leiomyoma.jpg>
- https://en.wikipedia.org/wiki/Leiomyosarcoma#cite_note-9
- <http://www.pathologyoutlines.com/topic/hearttumorrhabdomyoma.html>

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 heterotopic 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 lobbed, 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.