The structure of tumors

Two components:

- Neoplastic parenchyma (the distinctive tissue)
- Non-neoplastic stroma (the supporting framework) [straw = bed]
- The contrast between these components is minimal in sarcomas

Squamous cell carcinoma. Neoplastic epithelium or parenchyma (P). Fibrous stroma (S)

Sarcoma. Hard to recognize the two components
Mammary gland fibroadenoma. In this case, components are considered neoplastic. Epithelial component (P) and fibroblastic component (S)
The structure of tumors

The consistency of tumors:

- Defined by the amount of stroma
- Most feel **firm**
- Some are **hard** (desmoplasia; scirrhous carcinomas) \([skirrhos = \text{hard}]\)
- Sarcomas appear smoother in cross sections \([sarx = \text{fish flesh}]\)

Scirrhous carcinoma. S = stroma

Lymphoma (lymphosarcoma), lymph node

Scant stroma (arrows) = less firm
Gross features of tumors

- most tumors look like lumps
- some appear as hollow craters (ulcers)
- there are even some liquid tumors (leukemias)

Mammary gland carcinoma (ulcerated lump)

Squamous cell carcinoma (SCC), ulcerated

Esophageal SCC, ulcerated

From Noah’s arkive
Gross features of tumors

The cut surface of a tumor:

- Tends to be white (↓ oxidative processes, ↓ cytochromes, ↑ nucleic acids, ↓ vascularized)
- Yellow (if contain lipids or steroid hormones)

Testicle: Seminoma (white), Leydig cell tumor (yellow).

Leiomyoma. Note the fasciculate appearance (white interlacing fascicules).
Gross features of tumors

The cut surface of a tumor:

- Some are black (melanin), red (blood), green (bile), yellow (lipids, steroids)

Cutaneous hemangioma (top) and splenic Hemangiosarcoma (bottom, left) are red. Cutaneous melanoma is black.
Gross features of tumors

The cut surface of a tumor:

- Foci of **necrosis** and **hemorrhage** (ischemia due to high tissue pressure)
- Mineralization (dystrophic)

Renal cell carcinoma. Cavitated areas due to liquefaction necrosis of neoplastic tissue

Seminoma, testicle. Multifocal hemorrhage

Hair follicle tumor. Chalky areas = mineralization
Gross features of tumors

The cut surface of a tumor:

- Large spaces filled with fluid or mucus (**cysts**) → epithelial

Apocrine gland adenoma (cystic)

Mammary gland carcinoma, mucinous. M=mucus
Gross features of tumors

The tumor-host interface:

- Sharply defined edges (benign)
- If tumor margins blend with the normal tissue around it = infiltration

Seminoma, testicle. Well defined margins

Renal lymphoma. Infiltrative margins in the cortex
Cut surface of the brain (cerebral hemispheres) of an 11 year-old boxer. Please describe the lesion.

**Description:** Firm, well demarcated, grey mass, expanding and distorting one of the hemispheres, and compressing the surrounding cortex and white matter. There is a central area of necrosis (arrows), and a small cavity filled with blood (necrosis and hemorrhage) at the periphery (H).

**Q:** If you think this is a neoplasm, is it benign or malignant; why?

**Answer:** Even though these tumors are often considered benign (well demarcated, non-invasive, non-metastatic) the areas of necrosis can be a feature of malignancy in this case; regardless of this, they are space occupying lesions located in a critical area which makes them life-threatening!!

**Dx:** Oligodendroglioma, dog.
These metastatic sites are the result of numerous individual neoplastic cells that have exfoliated from the surface of the primary tumor and after random movement through the pelvic / peritoneal cavity fluid have implanted on the mesentery and grown into individual tumor masses.

Uterus from a cow with a poorly demarcated mass involving the horns and uterine body (arrow). The mesentery have numerous, variably sized nodular lesions. Assuming that these lesions are metastases from the uterine mass, which would be the most likely pathway of dissemination?

**Answer:** Seeding of body cavities and surfaces (exfoliation and implantation or transcelomic)
Examples of large tumor growths in the skin and mammary gland of dogs. Which type of local effect is present in both cases?

**Answer:** Ulceration and possible secondary infection

**Erosion:** Discontinuity of a body surface due to partial loss of surface epithelium

**Ulcer:** Full-thickness epithelial loss revealing the underlying submucosa
A 5.5 cm, exophytic mass removed from the urinary bladder of a 12 year-old female, Airedale Terrier with history of chronic hematuria. The mass has papillary appearance. Microscopically, the mass was composed of an atypical transitional cell epithelium which invaded the smooth muscle layer.

1. **Give a morphologic diagnosis.**

2. **What kind of local and systemic effects are associated with this tumor.**

**1. Answer:** Dx: Transitional cell carcinoma (papillary) of the urinary bladder.

**2. Answer:** Bleeding and anemia, also possible bladder obstruction.
A 3-4 cm, white, ovoid, pedunculated mass was incidentally found in the mesentery of an adult horse. Microscopically, the mass is composed of lobules of mature fat cells and encapsulated by a very thin capsule.

1. Give a morphologic diagnosis.

2. What kind of local effect is commonly associated with this tumor.

2. The tumor may wrap around a segment of intestine causing strangulation (s) and venous infarction.

1. **Dx:** Mesenteric lipoma (L), pedunculated.

2. The tumor may wrap around a segment of intestine causing strangulation (s) and venous infarction.
Abdominal cavity from a 9 year-old, female dog. Both ovaries are markedly enlarged and effaced by non-encapsulated masses with cauliflower appearance. Microscopically, the masses are composed of tubular (glandular) and papillary structures lined by atypical epithelial cells.

1. **Answer**: Dx: Ovarian adenocarcinoma (papillary), bilateral.

2. **Answer**: The tumor may twist or rotate along its long axis (torsion) and develop a venous infarction.
A white, firm, multinodular mass has replaced the testicular parenchyma.

*Histology*: Neoplastic Sertoli cells form trabecules with palisades surrounded by abundant connective tissue (C).

**Dx**: Sertoli (sustentacular) cell tumor.

**Comment**: Usually benign, rarely malignant, but often produces estrogen & feminizing effects.
Lion’s head. Note the facial distortion. On cut surface (transversal section) the maxilla is unilaterally expanded and effaced by a hard, white, poorly demarcated tumor (T) that extends into the nasal cavity and partially replaces the nasal turbinates. Microscopically, the mass is densely cellular and composed of atypical osteoblasts embedded in, or separated by, lakes of osteoid matrix (*) which is often mineralized (arrow). Give a morphologic diagnosis.

Dx: Maxillary osteosarcoma.
Liver from a dog. Multiple confluent nodular lesions are scattered throughout the parenchyma. Some nodules show central areas of depression (necrosis, arrows). Microscopically, the masses are composed of tubules and acini lined by atypical epithelial cells (N). L, Normal liver parenchyma.

**Dx:** Liver: Adenocarcinoma

**Comments:** Primary liver tumors in animals are uncommon compared with metastatic lesions. The main differential diagnoses should include in this case: 1) Metastatic adenocarcinoma and 2) Cholangiocellular carcinoma, which commonly form umbilicated nodules.
Clinical History:

- 8 yr-old, spayed-female, Shetland sheepdog.
- dog presented initially for impacted colon; enemas relieved impaction, but dog still had problems defecating.
- physical exam revealed stricture at colo-rectal junction.
- affected area was surgically resected.
- local lymph nodes are enlarged and 1-2 mm diameter masses are scattered throughout the omentum.
- main differential diagnoses are fibrous stricture (post inflammatory) or adenocarcinoma.
Grossly, an intestinal adenocarcinoma in the early stages, will show ulceration with variable thickening of the bowel wall (arrows)
In the latter stages of tumor development it becomes more obviously a neoplastic process by gross examination alone.
on low-power exam, there is locally extensive thickening of the intestinal wall.
at higher magnification the intestinal wall thickening is due to **transmural** infiltration by neoplastic epithelial tissue.
See the distorted abnormal intestinal glands (left, A). Right sided mucosa looks normal (N)
transmural infiltration by neoplastic epithelial tissue (dilated and distorted glands). M, smooth muscle; S, serosa.
in many areas this neoplastic epithelium forms glandular structures, many of which are dilated (cystic) and distorted. These structures are surrounded by fibrosis (F)
Note the presence of numerous mitotic figures (arrows)
Case #219

Description:
• on low-power exam, there is locally extensive thickening of the intestinal wall.
• at higher magnification the intestinal wall thickening is due to transmural infiltration by neoplastic epithelial tissue.
• in many areas this neoplastic epithelium forms glandular structures (note anaplasia); many of which are dilated (cystic) and distorted.
• latter structures are surrounded by fibrosis & variable numbers of inflammatory cells.

Morphologic Diagnosis: Intestinal (colonic) adenocarcinoma

Comment:
• this neoplasm showed extensive local invasion of the intestinal wall (it had also metastasized to local lymph nodes).
• some studies suggest that 50% of intestinal adenocarcinomas have metastasized by the time of recognition of the primary neoplasm.
• the most common metastatic sites are to the drainage lymph nodes and the liver.