INTRODUCTION TO GENERAL PATHOLOGY VPM 152

Web Review

Paul Hanna

Jan 2016

http://people.upei.ca/hanna

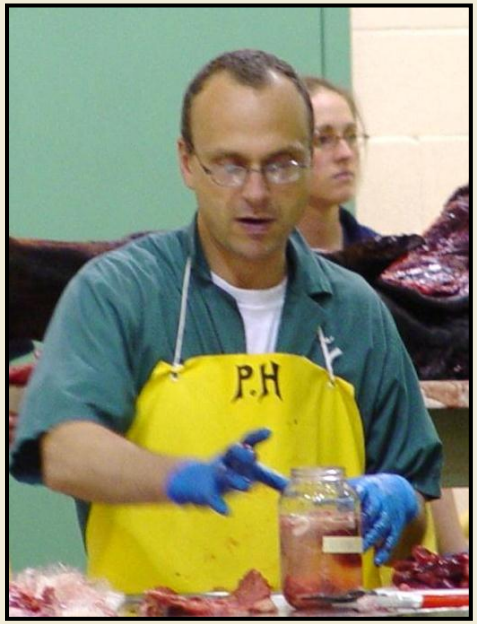
Lecture & Lab handouts, PPT's, etc

Dr Chelsea Martin's moodle page

Guidelines / Course Objectives

Schedule / Calendar

Lecturers



Dr Paul Hanna

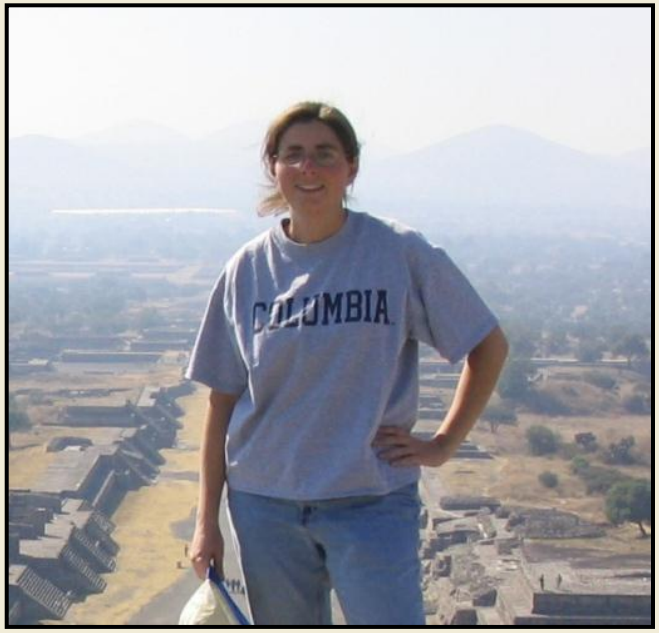
Dr Shannon Martinson

Dr Chelsea Martin
(course coordinator)

Dr Enrique Aburto

Laboratory Instructors

Dr. Andrea Bourque



Dr Maria Forzan

Lectures and Laboratories

- **2 lectures / week (Tues 8:30, Fri 9:30)**
  - **Lec Rm "C"**
- **1 laboratory / week (Fri 10:30-12:20)**
  - **1 hr. in histopathology lecture room (Lec Rm "C")**
  - **1 hr. in postmortem demonstration room (1034N)**
    - note: lab coats and plastic gloves (mandatory)

Friday Jan 8th – Necropsy Demonstration Lab (1034N)

½ Class from 10:30 – 11:20
½ Class from 11:30 – 12:20

[Remember lab coats and gloves]

Course Sections

- Introduction (1)
- Cell Adaptation / Injury / Death (6)
- Circulatory Disturbances (5)
- Inflammation / Repair (9)
- Disturbances of Growth / Neoplasia (6)

Course Goals and Objectives

1. Introduce the subject of Veterinary Pathology
2. Learn and use medical terminology
3. Distinguish normal (& artifacts) from abnormal (pathology)
4. Understand basic disease processes
5. Relate clinical disease manifestations to underlying biochemical and morphological abnormalities
6. Recognize and describe gross and microscopic changes
7. Make morphologic diagnoses
8. Understand the pathogenesis of specific diseases

Evaluations

Mid-Term Examination — **23 Feb 2016**

- ~ 30% final grade

Laboratory Examination — **15 April 2016**

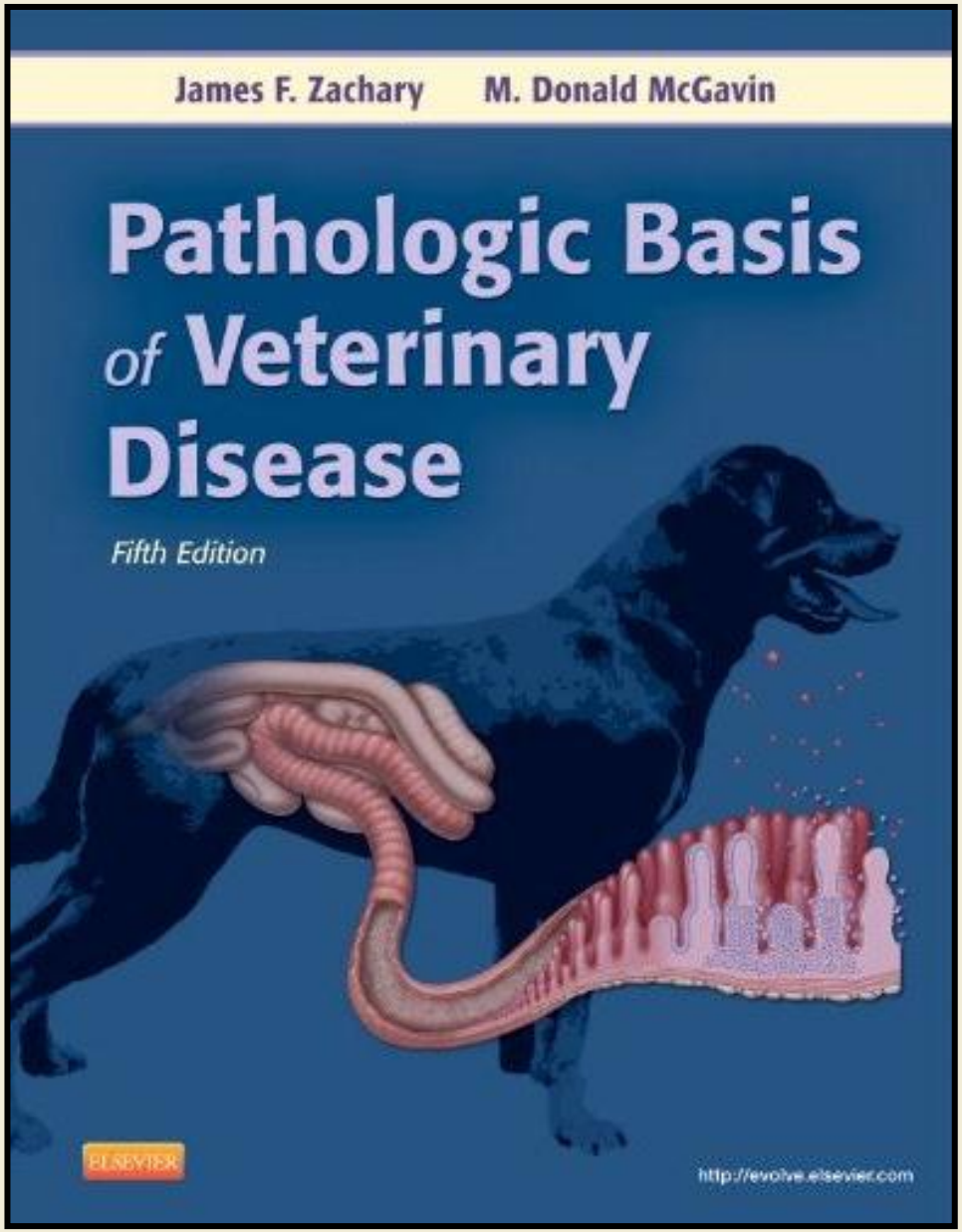
- ~ 30% final grade

Final Examination — **27 April 2016**

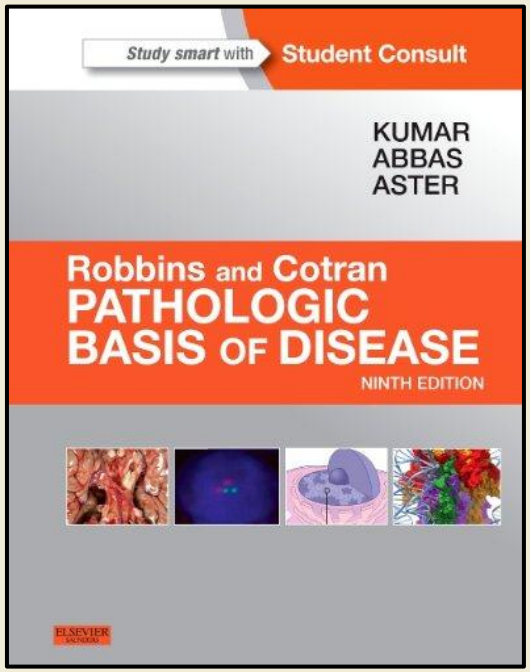
- ~ 40% final grade

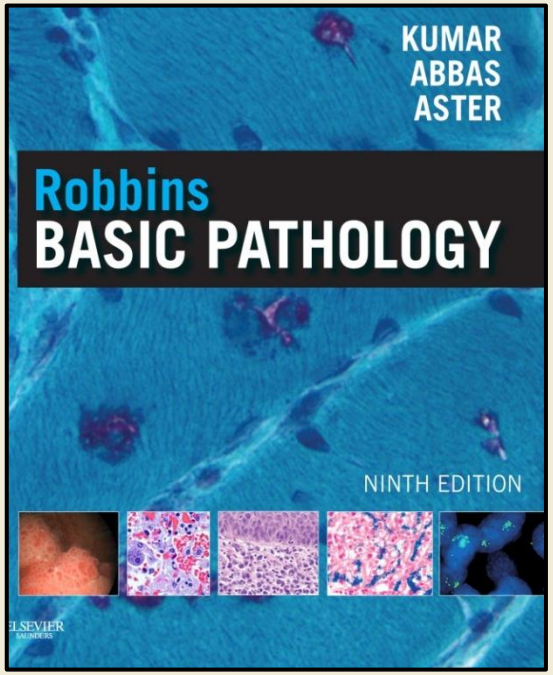
Recommended text

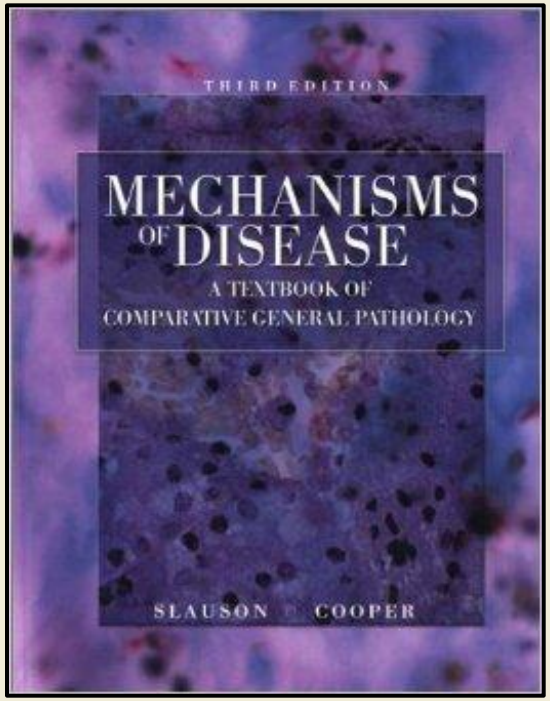
Note, new edition due out this year

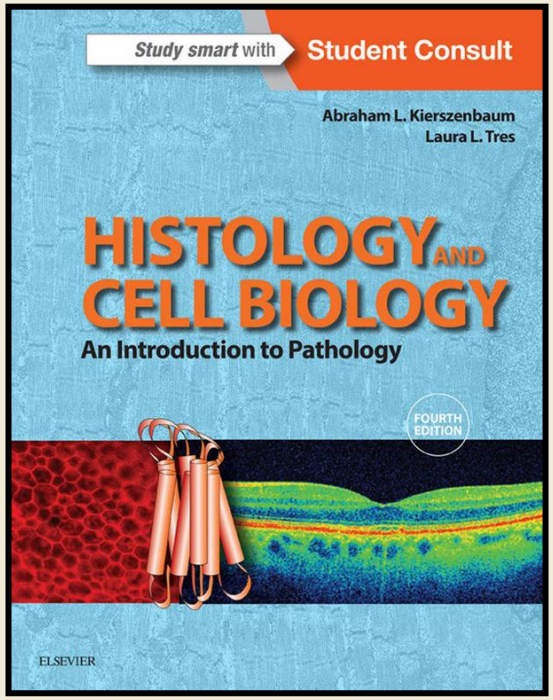


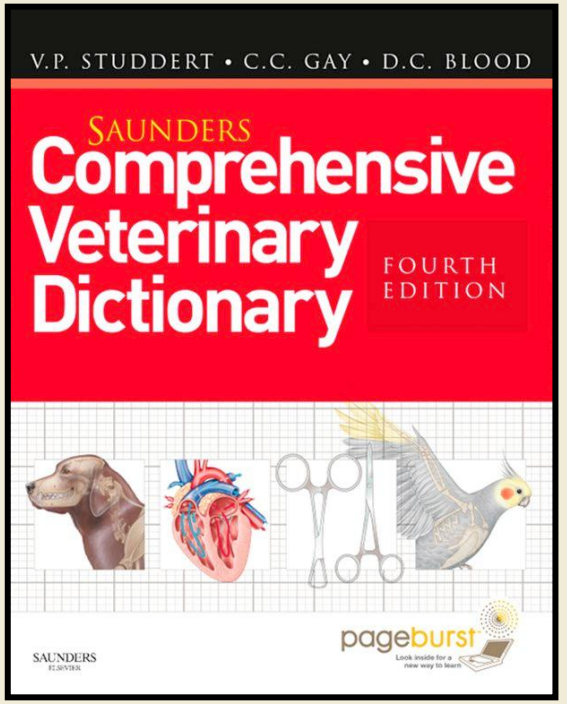
Reference Texts











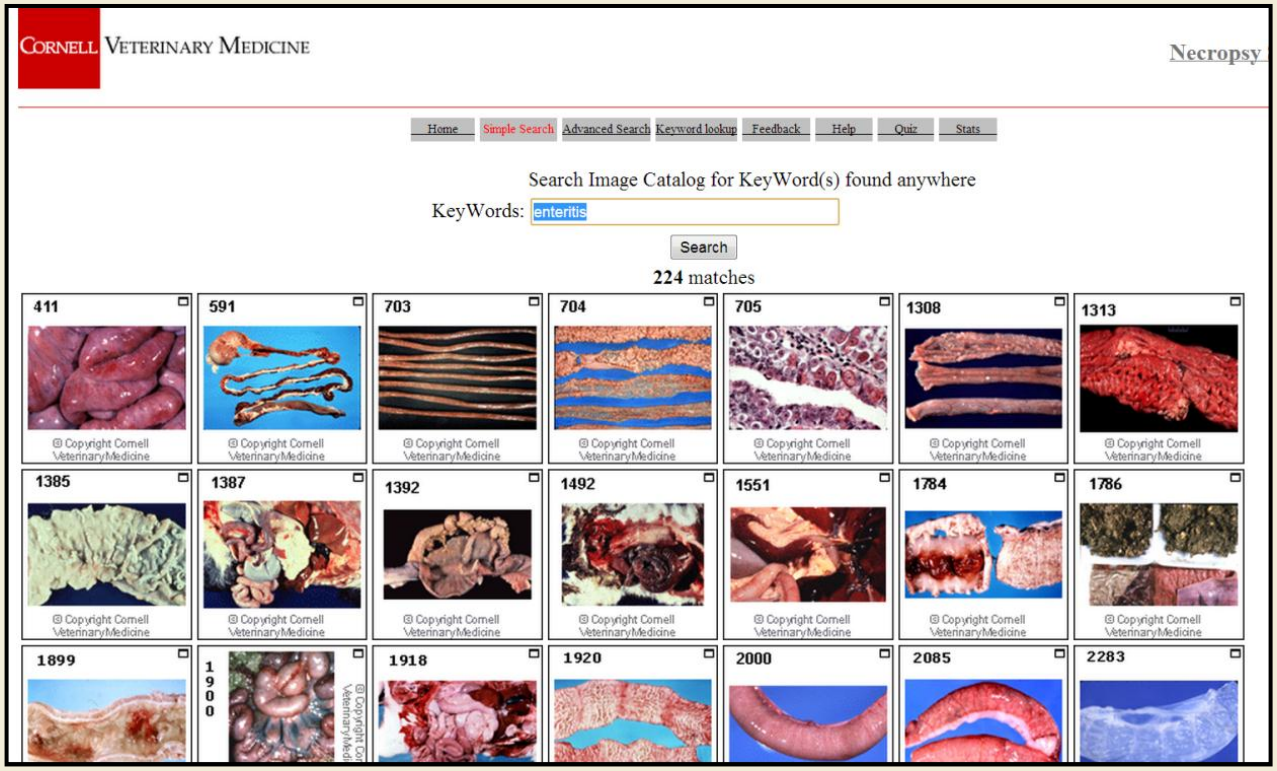
Websites

http://people.upei.ca/hanna

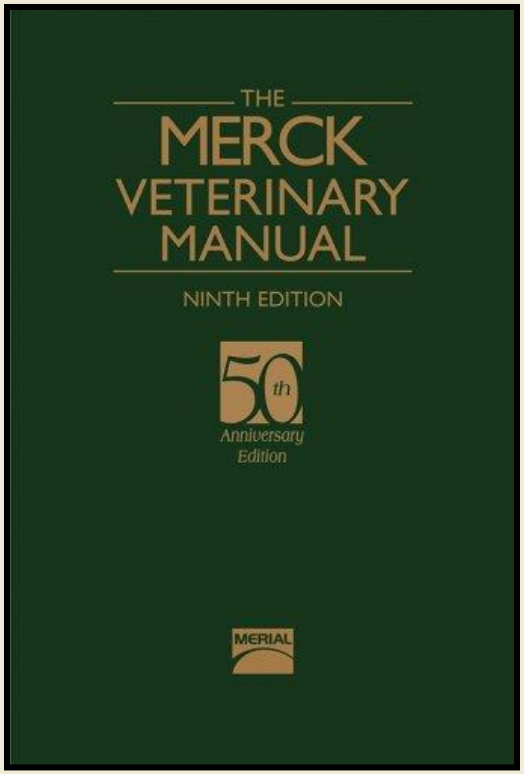
http://people.upei.ca/smartinson

http://people.upei.ca/eaburto

Dr Martin's material on Moodle



http://w3.vet.cornell.edu/nst/



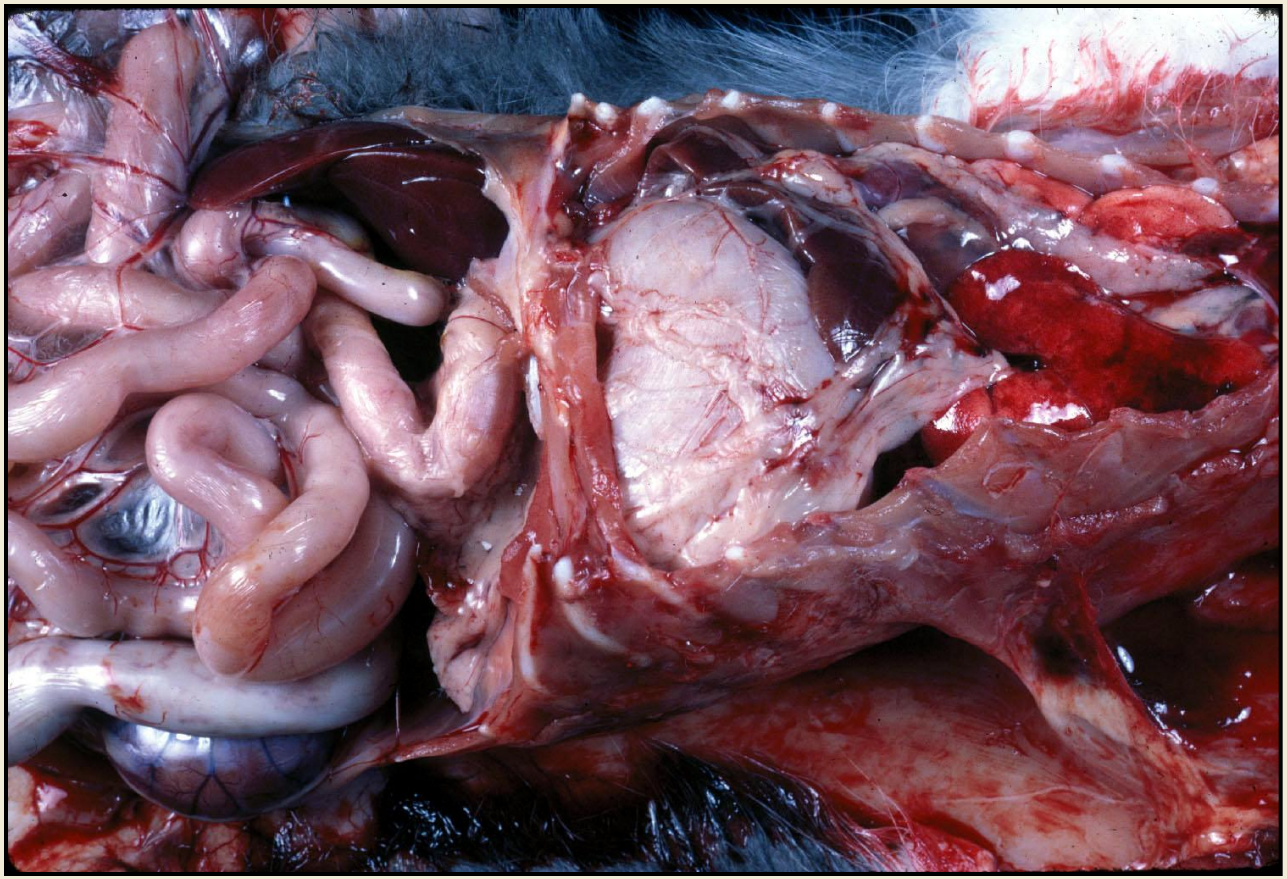
www.merckvetmanual.com


TURBO
DREAM

I. Definitions and Terminology

Disease

= a disorder of structure or function, especially one that produces specific clinical signs



Diaphragmatic hernia, dog. Note stomach & liver in thoracic cavity which would undoubtedly cause compromised respiration (dyspnea) and likely circulatory and/or GI dysfunction.

Pathology

= the study of disease

= study of the functional, biochemical and morphological alterations in cells, tissues and organs that underlie disease

Perioral vesicles (small blisters) and erosions / ulcers / crusts on lips (ruptured blisters with scab formation) in human with "cold sores"

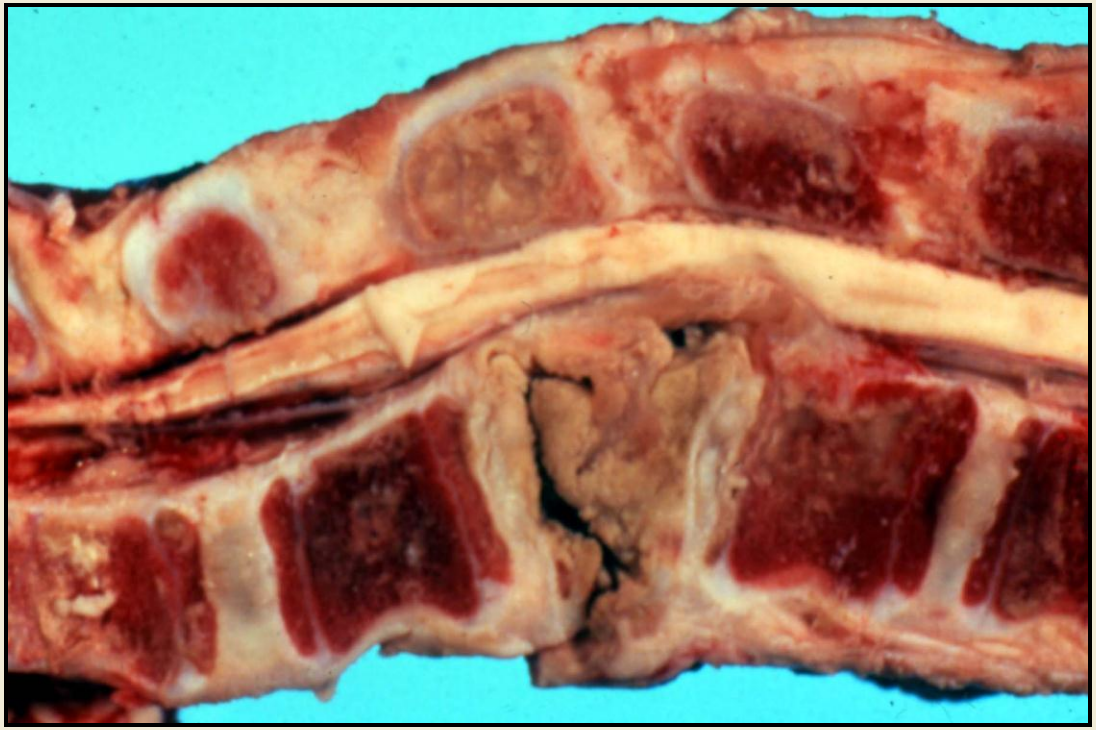
Bulla (large blister) on snout of pig with 'foot-and-mouth disease'. You will learn in later courses how certain viruses can damage the skin with resultant blister formation.

General Pathology

- the study of the basic reactions of cells and tissues to abnormal stimuli that underlie all diseases

Systemic Pathology

- the study of the specific responses of specialized organs and tissues to pathologic stimuli



Sagital section of lumbar vertebral column, pig. Infection / inflammation of a lumbar vertebra body (ie osteomyelitis) which has resulted in a fracture (ie 'pathologic fracture') with dorsal protrustion into the vertebral canal with compression of the spinal cord (ie compressive myelopathy). What effect would this have on the spinal cord? What clinical signs would you expect in the pig?

Four aspects of disease form the core of pathology:

❶ Etiology

- the cause of disease (genetic vs acquired)

❷ Pathogenesis

- the mechanism or sequence of events leading from initiation of cell or tissue injury to disease development

❸ Morphologic Changes

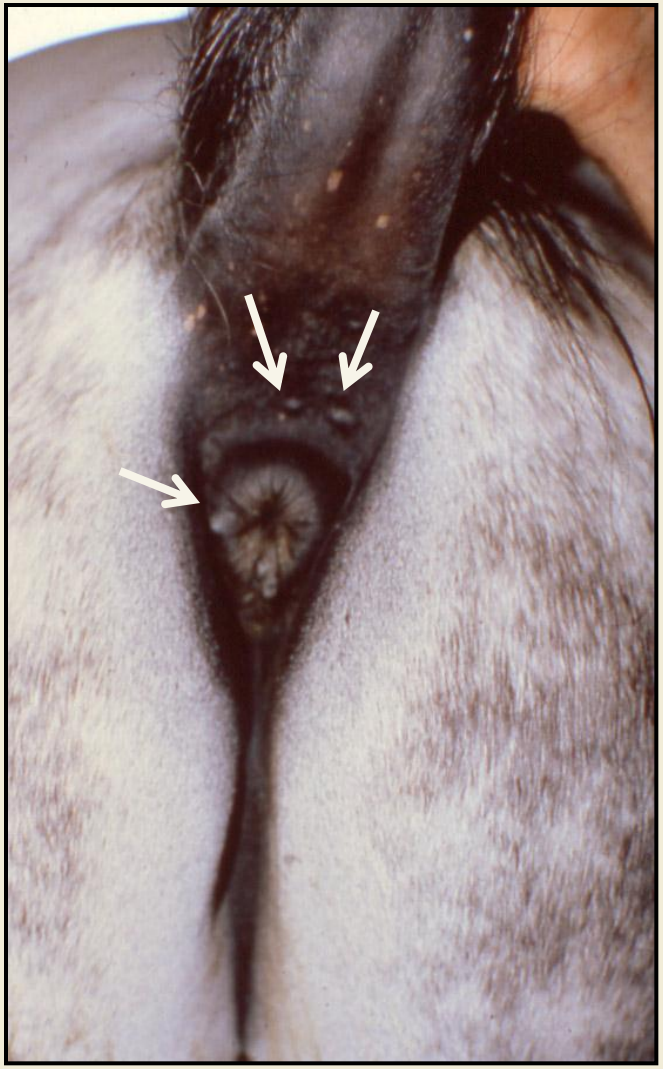
- the structural alterations in cells or tissues that are often characteristic of the disease

❹ Clinical significance

- the nature of the morphologic changes and their distribution in tissues determine the clinical signs and course of the disease

Lesion

= any structural (or functional) abnormality in an organ, tissue or cell



Small melanocytomas (ie benign melanomas) are common lesions in the perineal region of aging grey-white horses.

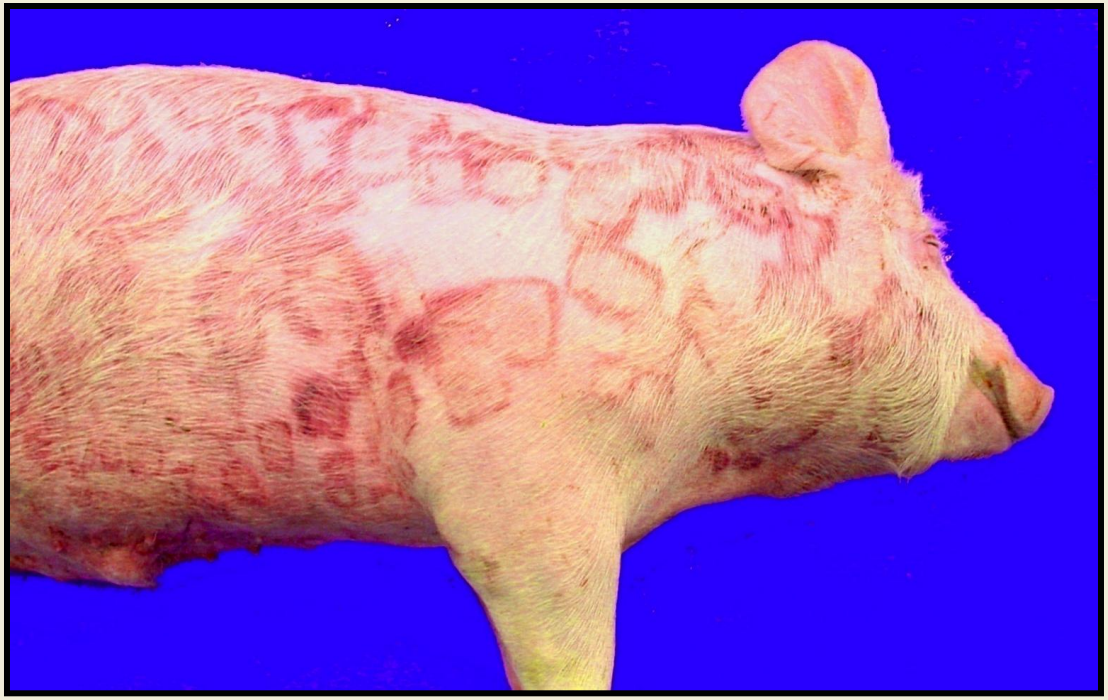
Fortunately, the malignant form of melanoma (ie 'maligant melanoma') is much less common. Note marked expansion and distortion of the tissues.

Pathognomonic

= a lesion or sign that is specifically distinctive or characteristic of a disease

The classic “bullseye” or “target” rash (erythema chronicum migrans) seen in ~80% of the cases of Lyme disease. It is a manifestation of the a local skin infection at the site where the tick attached, which typically begins 3 to 30 days after the bite. While not present in every case of Lyme disease, when it is seen, it is highly specific (ie pathognomonic) for this disease.

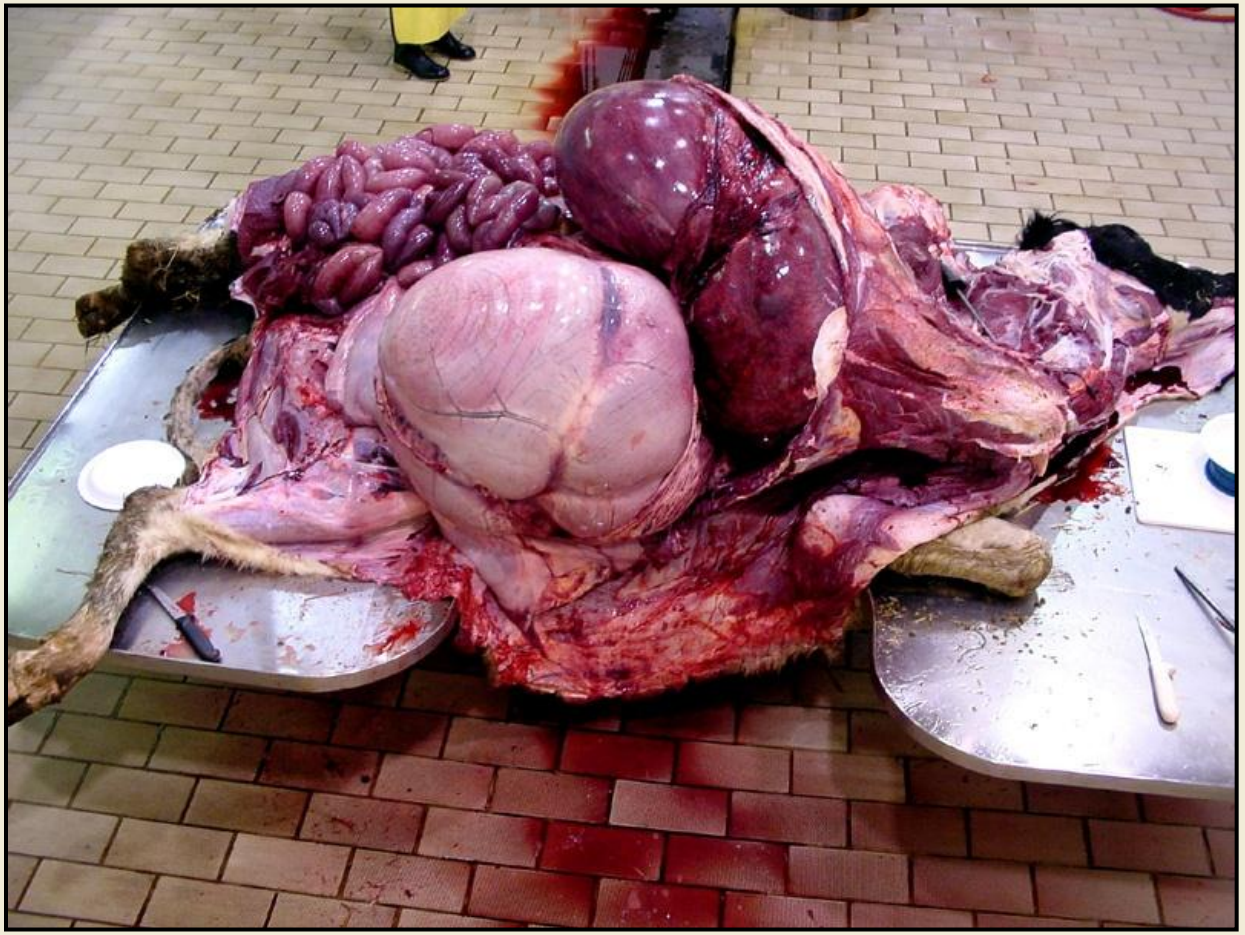
Note, most pathologists are sticklers for accurate use of terminology and are wary of the term pathognomonic. For example ringworm lesions in humans can sometimes be mistaken for erythema migrans.



‘Diamond skin disease’, pig. Most consider this lesion to be pathognomonic for infection by the bacterium *Erysipelothrix rhusiopathiae;* however there have been a few reports of similar lesions caused by *Actinobacillus suis.* So again while some lesions can be highly suggestive of a particular etiologic agent, be wary when using the term ‘pathognomonic’ to mean 100% accuracy.

Necropsy (Autopsy)

- postmortem examination of the body to determine the nature of pathological processes that contributed to death or disease



Abomasal volvulus, cow. The abomasum is displaced dorsal to the right and undergone rotation about its supporting axis (ie volvulus). In addition to affecting GI function, the rotation compresses the supplying blood vessels and with arterial pressure being higher than venous pressure, blood continues to get into abomasum, yet has difficulty leaving → note dark red color of distended abomasum (this is an example of 'venous infarction')

Biopsy

= the removal & examination of tissue from the living body to establish a precise diagnosis

Biopsies of the skin are routinely done in veterinary practice; typically with a 6 mm biopsy 'punch' (essentially a 'cookie cutter-like' razor blade). Biopsies of lymph nodes, liver, kidney, gut, spleen are also frequently performed.

Diagnosis (Dx)

= a concise statement or conclusion concerning the nature, cause or name of a disease process

❶ Differential Dx

- a list of disease diagnoses that could account for the clinical signs or lesions in a case

❷ Clinical Dx

- a diagnosis based on the data obtained from the case history, clinical signs and physical examination

❸ Morphologic Dx

- a diagnosis based on the predominant lesion(s) in the tissues

❹ Etiologic Dx

- a diagnosis that names the cause of the disease

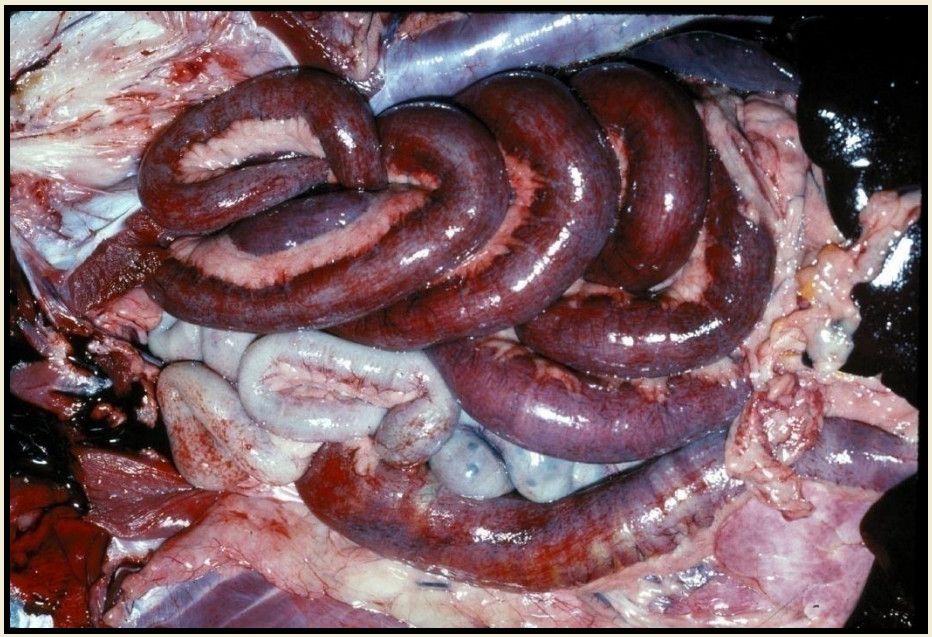
❺ Disease (Definitive) Dx

- a specific diagnosis that states the **"name of the disease"**

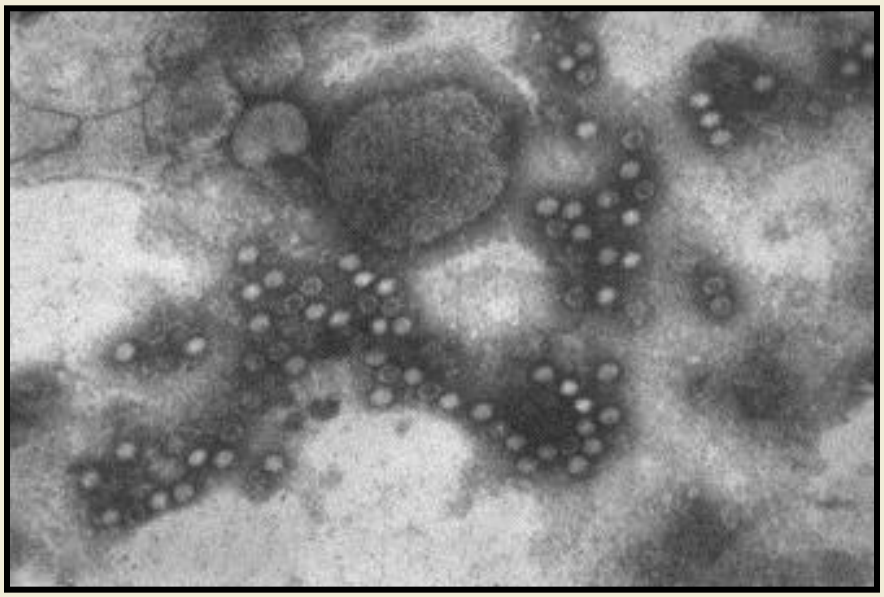
EXAMPLE:

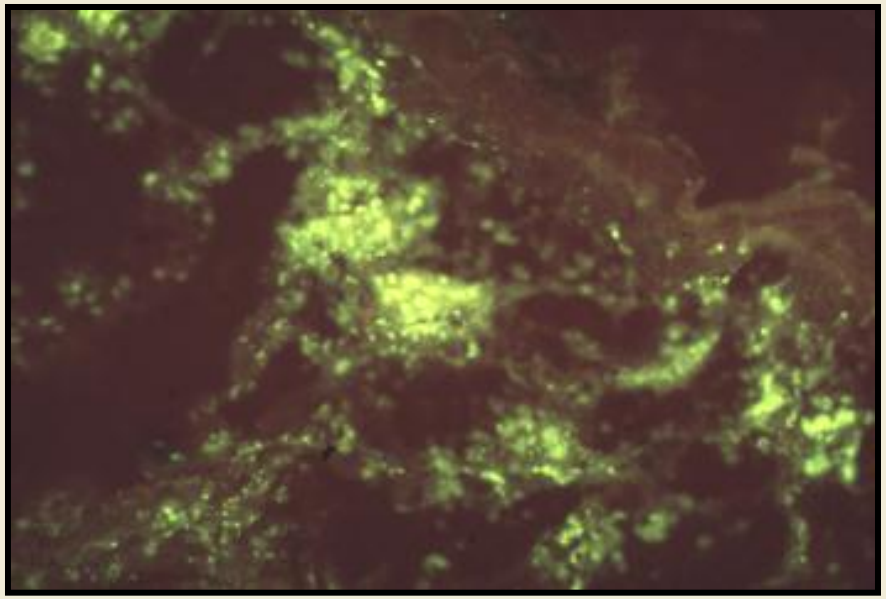
- 8 month-old pup presented to vet clinic with severe bloody diarrhea of 2 days duration
- puppy died prior to complete clinical work up; necropsy performed

1. **Clinical Diagnosis**..... **Hemorrhagic diarrhea**



2. Morphologic Dx .... Severe, acute, diffuse, necrohemorrhagic enteritis





3. **Etiologic Diagnosis**..... **Parvoviral enteritis**

4. **Disease Diagnosis**..... **Canine Parvovirus**

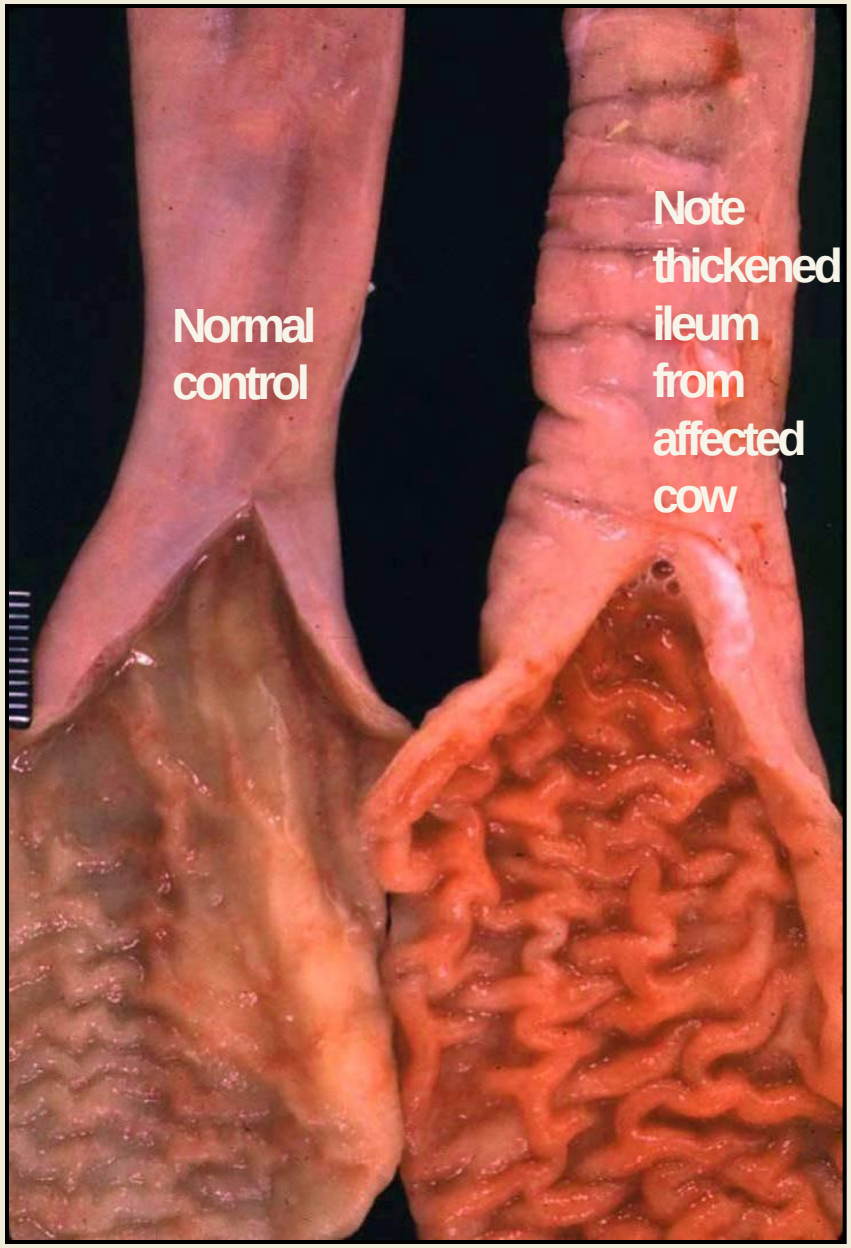
EXAMPLE:

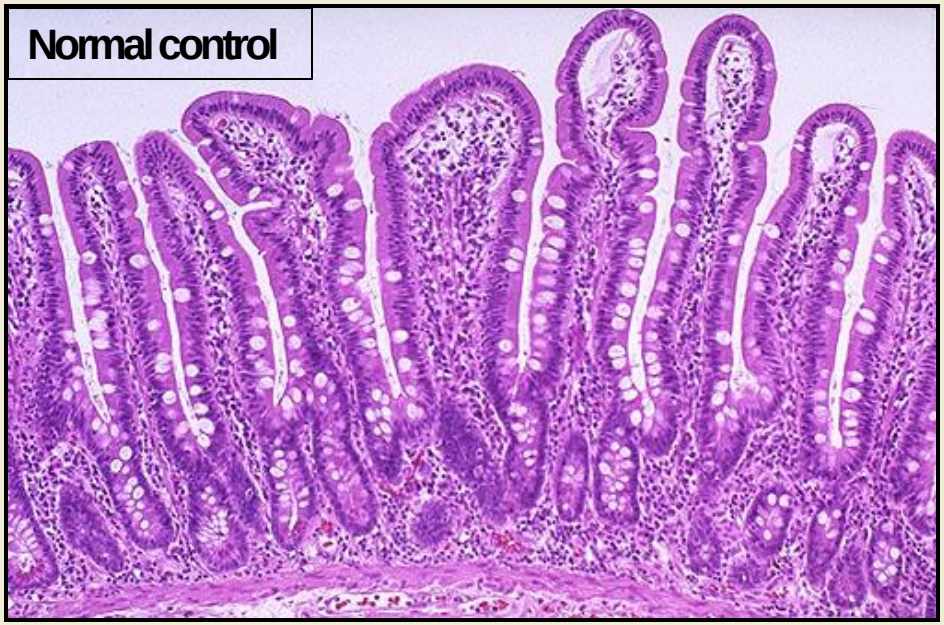
- 4 yr-old dairy cow with a history of chronic diarrhea and emaciation


www.nd.gov/ndda/JohnesInAction.jpg


www.vetnext.com/fotos/cowjohn1.jpg

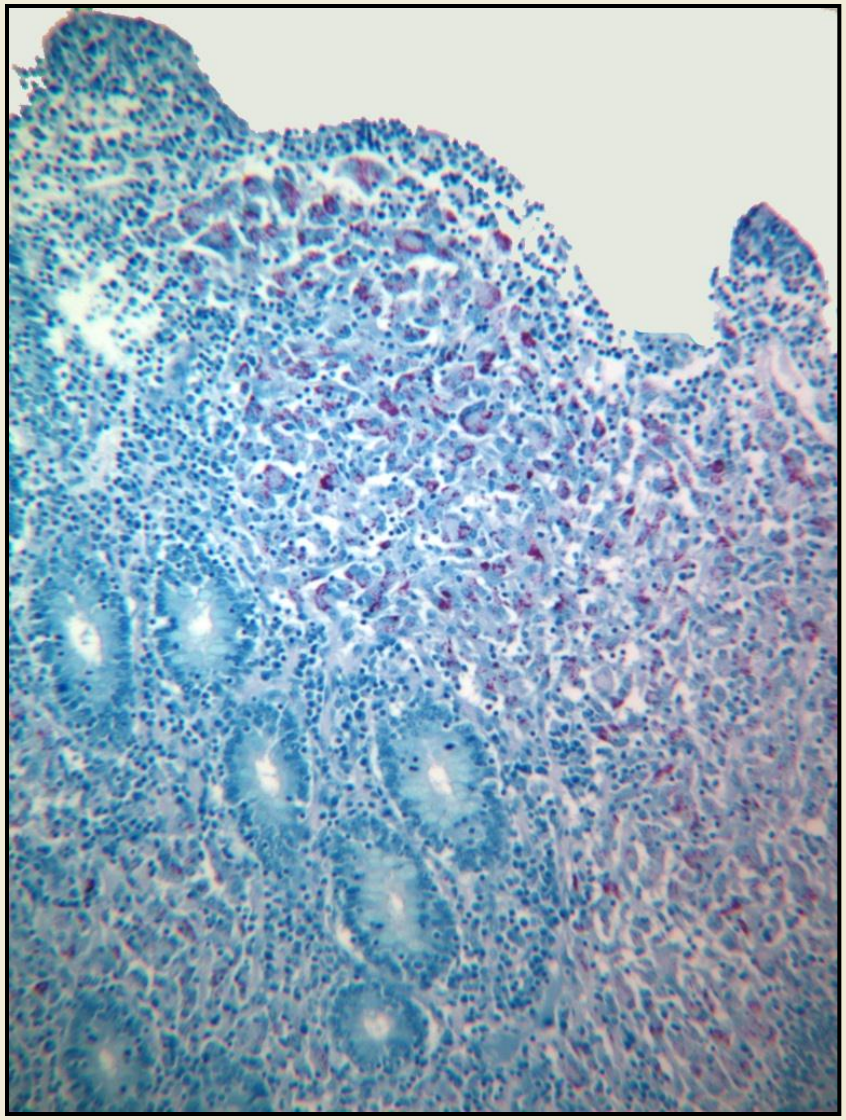
1. **Clinical Diagnosis**..... **Chronic diarrhea / emaciation**

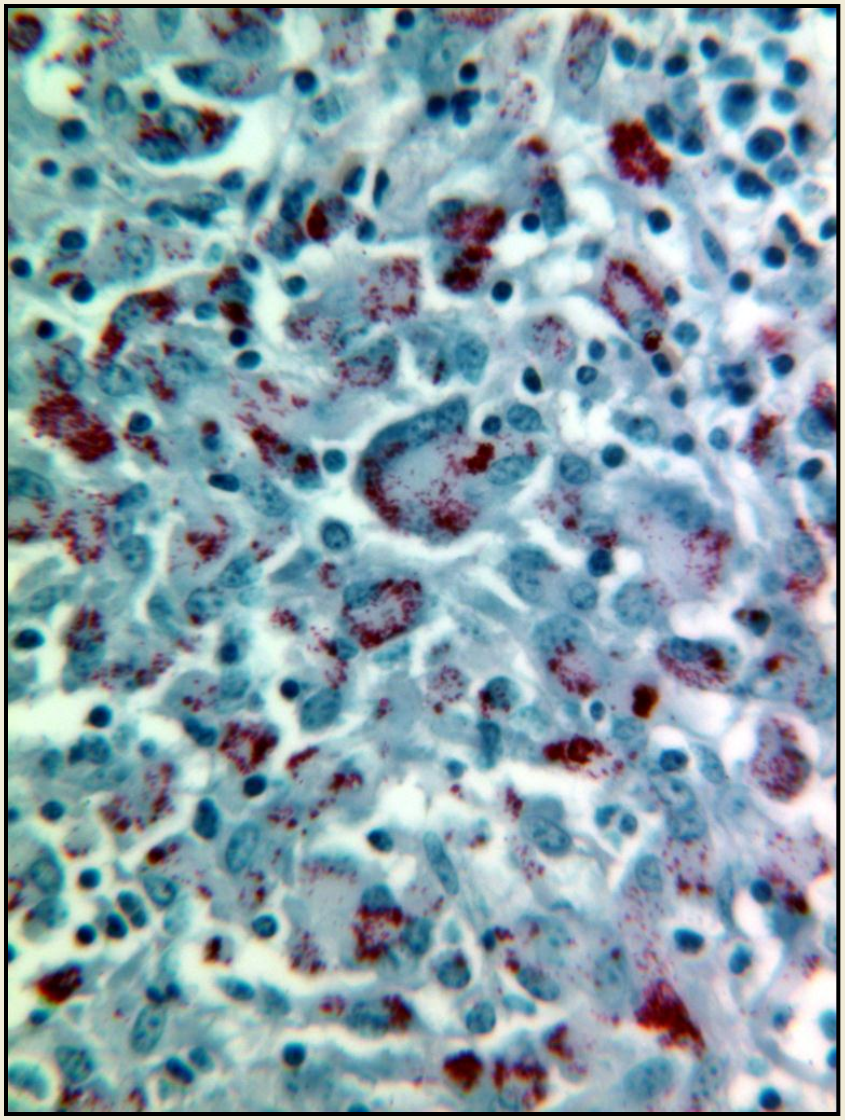




2. Morphologic Dx .... Severe, chronic, segmental, granulomatous enteritis

Higher magnification with acid fast staining – large numbers of inflammatory cells, predominately macrophages and giant cells (ie granulomatous inflammation) which contain acid fast bacilli, are expanding the lamina propria





3. **Etiologic Diagnosis**…… **Mycobacterial enteritis**
4. **Disease Diagnosis**…… **Johne's Disease (Paratuberculosis)**

II. Who are Pathologists?

❶ Morphologic (Anatomic) Pathologist

- study morphologic manifestations of disease

Clinical Pathologists

- laboratory analysis of disease in living patients

❷ Veterinary Pathologists

- mammalian, avian, zoo / wildlife, lab animals / primates, fish

Medical Pathologists

- humans

Comparative Pathologists

- animal models of human disease

II. Who are Pathologists?

❸ **Diagnostic Pathologists**
- necropsy and surgical biopsies

Experimental Pathologists
- research on pathology of infectious disease, oncology, etc

Molecular Pathologists
- study of the molecular / genetic basis of disease

Toxicologic Pathologists
- study changes elicited by chemical, pharmacological & environmental agents

II. Who are Pathologists?

❹ **Special System Pathology**

- **Neuropathologists**
- **Dermatopathologists**
- **Respiratory pathologists**
- **Ophthalmic pathologists**
- **Etc**

III. Descriptions in Gross Pathology

1. No interpretation should appear in descriptions

2. Description should be: ❶ concise
   ❷ grammatically correct
   ❸ anatomically precise

3. Minimize comparative references to food or sports equipment

4. Avoid making a description based on a preconceived diagnosis
   ❶ OBSERVE carefully
   ❷ DESCRIBE completely
   ❸ DIAGNOSE (DEDUCE or INTERPRET) confidently

5. Components of a description:

❶ **TISSUE**..…… identify the organ or structure

❷ **NUMBER** .....…… number of lesions present

❸ **DISTRIBUTION**……. focal, multifocal, locally-extensive, diffuse

❹ **SHAPE**…….... spherical, rectangular, symmetrical, etc

❺ **COLOUR** .....…… no unusual color terms

❻ **SIZE**..…….... metric → dimensions, vol., weight, % organ involved

❼ **PATTERN** .....…… zonal, reticulated, mottled / variegated

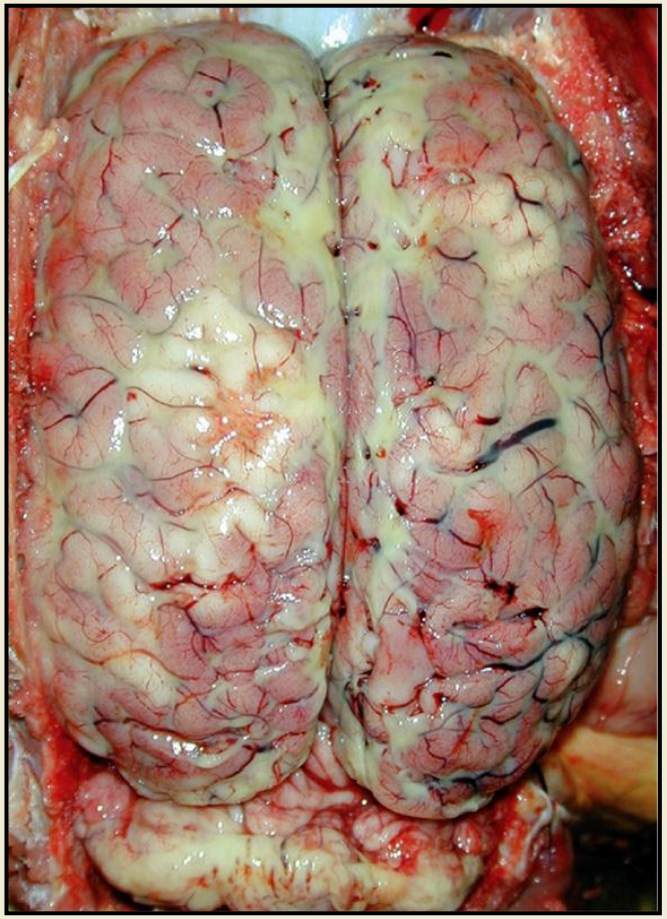
❽ **CONSISTENCY** ..…….. soft, firm, hard, fluctuant

❾ **SPECIAL FEATURES**…. polypoid (sessile vs pedunculated), papillated etc

❿ **Other:** odor, surface appearance, etc

6. Must know the **normal** before you can recognize the **abnormal**!

Normal brain (dorsal view) with dura mater partially removed, showing thin transparent leptomeninges (pia & arachnoid) overlying the surface.



Brain with leptomeninges variably thickened by a pale yellow exudate (ie what a predominately neutrophilic exudate looks like grossly) → severe acute diffuse suppurative meningitis

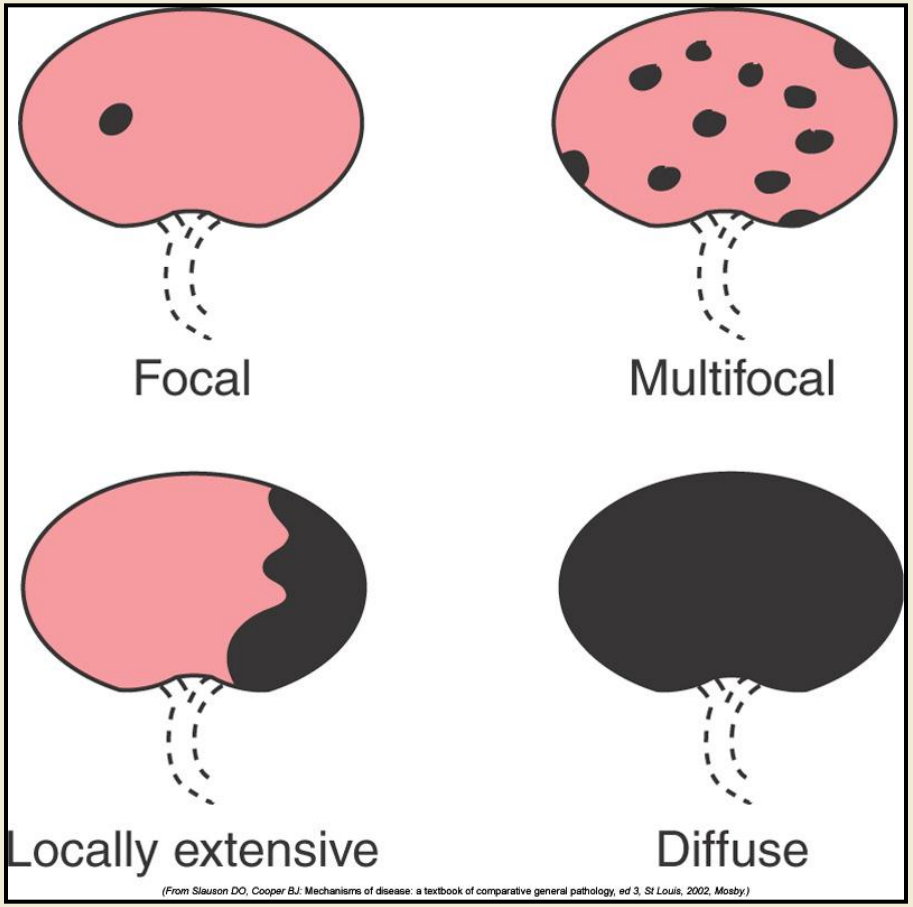
7. Avoid using the word “lesion” in the description

8. Morphologic Diagnosis

❶ **Severity** - mild, moderate, marked / severe

❷ **Duration** - acute, subacute, chronic

❸ **Distribution**



8. Morphologic Diagnosis

❶ **Severity** - mild, moderate, marked / severe

❷ **Duration** - acute, subacute, chronic

❸ **Distribution** - focal, multifocal, locally-extensive, diffuse

❹ **Nature of the lesion**

- if inflammatory – type of exudate
- if degeneration – type of degeneration
- if neoplastic – type of neoplasia

❺ **Organ (prefix) + type of disease (suffix)**

- eg nephritis, nephropathy, nephrosis

+/- subcompartments - interstitial nephritis, glomerulonephritis, pyelonephritis, etc

Anatomic Terminology

❶ **ORGAN + OPATHY** (non-inflammatory; etiology unknown / unclear)

eg, **Hepatopathy**

Nephropathy

❷ **ORGAN + OSIS** (non-inflammatory; degeneration / necrosis)

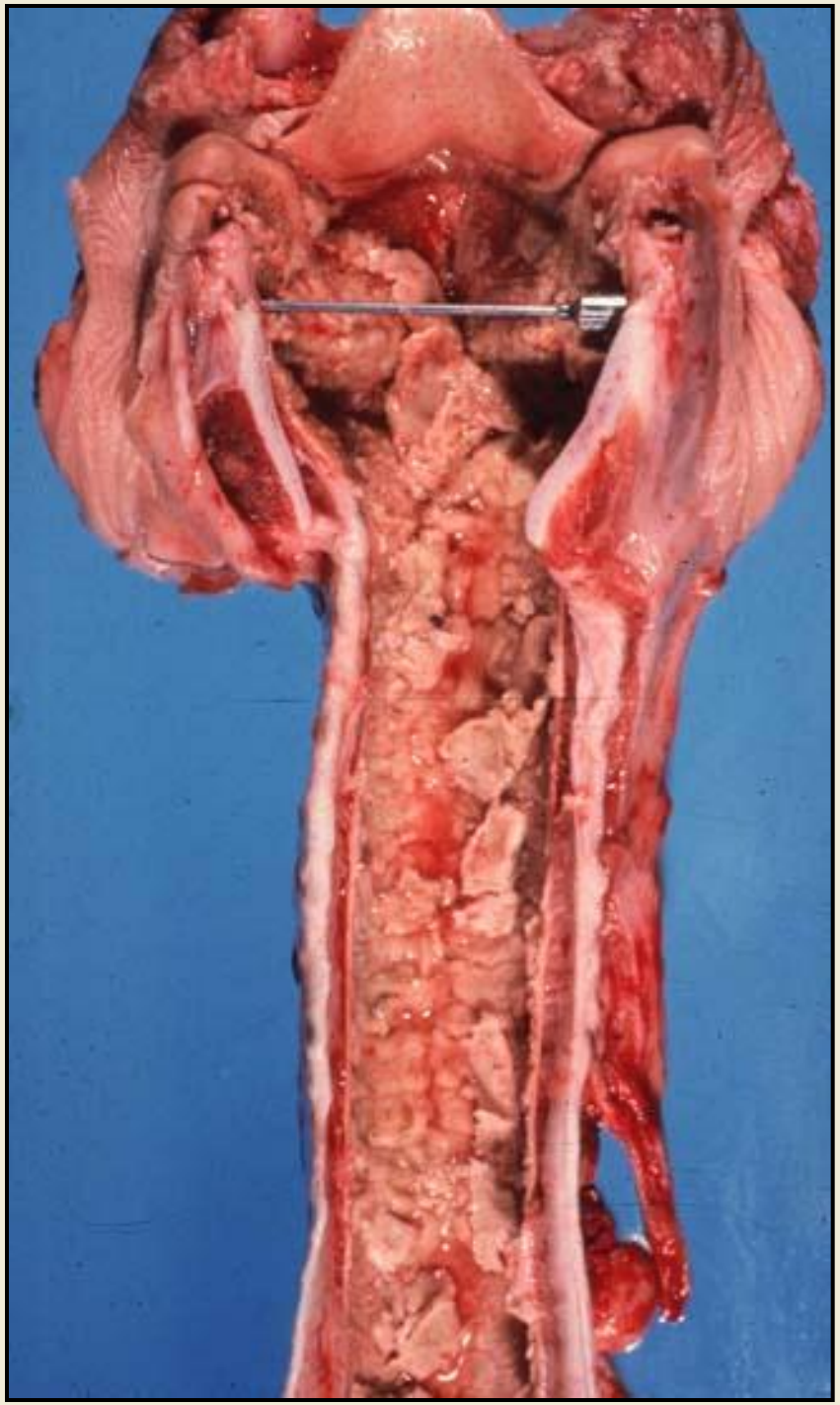
eg, **Hepatosis**

Nephrosis

❸ **ORGAN + ITIS** (inflammation)

eg, **Hepatitis**

Nephritis



Severe

Acute

Diffuse

Fibrinonecrotic

Tracheitis

TABLE 4-4 Some of the Anatomic Prefixes Used for Classification of Inflammatory Lesions (add "-itis")

WORD ROOT	ORGAN/TISSUE
Arter-	artery
Oste-	bone
Osteomyel-	bone marrow, or bone and bone marrow
Encephal-	brain
Encephalomyel-	brain and spinal cord
Bronch-	bronchi
Burs-	bursa(e)
Typhl-	cecum
Typhlocol-	cecum and colon
Col-	colon
Conjunctiv-	conjunctiva(e)
Cellul-	connective tissue (usually under the skin)
Duoden-	duodenum
Ot-	ear
Endocard-	endocardium
Esophag-	esophagus
Ophthalm-	eye (does not specify area[s] of the eye)
Panophthalm-	eye, the entire eye
Kerat-	eye, just the cornea
Keratoconjunctiv-	eye, cornea, and conjunctivae
Uve-	eye, just the uveal tract (iris, ciliary body, choroid)
Blephar-	eyelid
Cholecyst-	gallbladder
Aden-	gland (generic)
Balan-	glans penis
Gingiv-	gum
Valvul-	heart valve
Lamin-	hoof
Enter-	intestine
Arthr-	joint
Nephr-	kidney
Laryng-	larynx
Laryngotrache-	larnyx and trachea
Cheil-	lip
Hepat-	liver
Pleuropneumon-	lung and pleura
Pneumon-	lung Note: inflammation of the lung is usually, by common convention, referred to as "pneumonia," not "pneumonitis." Likewise, inflammation of the pleura and lungs is called "pleuropneumonia," not "pleuropneumonitis."
Lymphaden-	lymph node
Mast-	mammary gland(s)
Mening-	meninges
Meningoencephal-	meninges and brain
Stomat-	mouth
Myocard-	myocardium
Myos- (my-)	muscle
Neur-	nerve
Rhin-	nose
Salping-	oviduct
Pericard-	pericardium
Periost-	periosteum
Periton-	peritoneum/abdominal cavity
Pharyng-	pharynx
Pleur-	pleura
Posth-	prepuce
Prostat-	prostate
Proct-	rectum or anus, or both
Dermat-	skin
Pododermat-	skin (and often deeper structures) of the foot
Funicul-	spermatic cord
Myel-	spinal cord
Splen-	spleen
Gastr-	stomach
Synov-	synovium
Tendin-	tendon
Orch(id)-	testicle
Gloss-	tongue
Tonsil-	tonsil
Odont-	tooth
Trache-	trachea
Omphal-	umbilicus
Ureter-	ureter
Cyst-	urinary bladder
Metr-	uterus
Vagin-	vagina
Phleb-	vein

As seen in the list, by common convention some of the anatomic word roots may be linked together to indicate inflammation in two tissues or organs, such as gastroenteritis, tracheobronchitis, encephalomyelitis. These word roots may also be used, when appropriate, in combination with the suffixes "-osis" and "-opathy."
"-osis" indicates a noninflammatory insult that results in damage to a tissue or organ and is often used when necrosis is a prominent feature. Example: renal damage as a result of ethylene glycol toxicity is referred to as "nephrosis."
"-opathy" is used to indicate that there is a problem or lesion in an organ or tissue, but the cause/pathogenesis/nature of the lesion is not entirely clear. Examples: hepatopathy, nephropathy, encephalopathy.

ORGAN + itis

(greek root)

+ osis

+ pathy

Necropsy Rounds

Thursdays - 4:30 PM

Postmortem Demonstration Room (1034N)

STUDENTS VISITING POSTMORTEM ROOM

- you are welcome to visit, but when you do, you must comply with the following:

1. wear one of the labcoats hanging at the entry
2. wear rubber boots or plastic coverings (again provided at the entry)
3. if you are there to participate in a necropsy, coveralls must be worn
4. wash your hands and boots thoroughly before leaving the lab


300
PistenBully