Descriptive pathology is the recognition, characterization and interpretation of pathologic lesions or abnormalities. The proportions of each of these components may vary according to the purpose of the reporting format i.e. autopsy report, surgical biopsy report, certification examination, scientific publications or reports of new diseases and technical reports. Gross pathology concentrates on the organ or whole animal. Its value exists on several levels.

One, it provides a rapid determination of potential problems which could correlate with clinical disease and support a presumptive diagnosis. The gross lesions of some diseases are sufficiently distinct in their pattern to be presumptively diagnostic based upon autopsy alone. For many disorders, the gross morbid anatomy is highly suggestive of a particular disease or class of related diseases. Often the pattern of lesions suggests a pathogenesis or mechanisms of the clinical disease. Related disease agents or mechanisms often display similar patterns and for comparative biomedical scientists such as veterinarians who must deal with a wide spectrum of species, learning to interpret these patterns can be extremely useful in arriving at diagnoses in rare or unusual species. Commonly, the autopsy lesions are not distinct or specific and require additional diagnostic modalities to confirm or establish a diagnosis definitively. In this regard, gross pathology is the road map for what portions of the animal should be selected for histopathology, bacterial and fungal culture, virus isolation or toxin identification. Thirdly, it provides a permanent, written and legal record of the medical problems of the patient.

The role of the postmortem examination (autopsy literally means “self examination” but the context for this Latin phrase was intended to mean “to examine for yourself”) is to identify, characterize and record pathologic abnormalities at the clinical level, arrive at a presumptive diagnosis in light of the accompanying history and serve as a spring board for additional investigations if needed. This tradition is handed down to us from 2 seminal works dating from the Renaissance when dissecting human bodies became acceptable practice. Andreas Vesalius, the Flemish anatomist wrote *De Humani Corporis Fabrica* (known as “De Fabrica”) and Giovanni Morgagni, an Italian pathologist began associating clinical signs with pathologic
changes in *De Sedibus et Causis Morborum* (called “De Sedibus”). Performance of the autopsy in veterinary medicine, (frequently called necropsy which means “death examination”) is unique in its execution when compared to human medicine. Except for clinicians practicing in training institutions where a resident staff of pathologists performs the autopsies, most private veterinary practitioners must do the autopsy themselves. Thus, it is important to understand the fundamentals of the autopsy to get the most out of it. The autopsy is an ephemeral event and when it’s over, it’s over! This makes the accurate description and interpretation of the autopsy findings critical because that is what remains in the permanent record as the basis for later historical, medical and legal review and interpretation. A principal limitation of retrospective clinical studies is the lack of or a poorly conducted autopsy with inconsistent or incomplete characterization of the lesions. Although our human counterparts occasionally have the opportunity to exhume a body for re-examination at a later date that option is rarely open to veterinary pathologists.

Contrary to popular belief, the **definitive diagnosis of disease is NOT always made at the microscopic level.** The microscopic examination evaluates a tiny fraction of the organs and tissues. These histopathologic findings are integrated with the results of the autopsy and interpreted in light of the signalment, history, clinical appearance and laboratory tests to arrive at a diagnosis. **What every histopathologist wants to know above all else is “What was the gross appearance?”** This is easy when the pathologist performs both the autopsy and histopathologic examinations. However, the culture of veterinary medicine is such that most of the time the autopsy is performed by a clinician and the tissues are sent to a pathologist (often far away) for histopathology. To acquire precision and efficiency in the pathologic diagnosis of disease and maximize the results of the autopsy, the clinician must accurately observe, describe, record, interpret and communicate the results of the autopsy to the pathologist. When this is done properly, pathologists can maximize their contribution to the process often by providing not just a summary of the lesions they observe (called a “morphologic diagnosis”) but making a specific clinical disease diagnosis. All too often veterinary students do not understand this. Although trained to perform the autopsy, clinicians do not assign sufficient importance to it or perform it often enough to reduce it to reliable practice and get the most out of it when needed. **The things the pathologist most wants to know, indeed frequently needs to know, for definitive interpretation, are often out of his/her control.** As a result communication between clinician and pathologist breaks down leaving all parties dissatisfied, including the pet owners who depend upon correct diagnosis for prognosis, decision making, grief counseling, absolution of guilt and closure. Clinicians are frustrated because they are getting only morphologic diagnoses which they cannot relate to clinical diseases instead of definitive clinical disease diagnoses which they understand and know how to treat or explain to their clients. Pathologists become frustrated because they know they can provide more but lack the information essential to make a definitive diagnosis.

A post graduate continuing education effort for clinicians to rediscover the autopsy skills learned in professional school would help considerably in this matter. An organized, systematic approach to observation, description and interpretation of the lesions and changes found at autopsy would provide clinicians with the means to fill in the gaps, deliver the information
Pathologists most want to know, improve communication with the pathologist, assist in their own knowledge of the case, provide immediate feedback to interested animal owners and maximize the yield from the autopsy. In addition, the rules of gross pathology are easy to learn and apply and with minimal guidance, the practitioner can improve their interpretation skills with feedback from the pathologist. In short, continued learning and the satisfaction of professional growth at minimal expense could result in the increased information flow to clients and better management of clinical disease problems.

Although this discussion focuses upon interpreting autopsy lesions, the principals are exactly the same for surgical pathology specimens. The skills learned here should be applied to the submission of surgical biopsies with markedly improved results in a clinical setting where the patient is still alive and treatment or therapeutic options may be significantly impacted by poor communication. Often the difference between my making a specific disease diagnosis and a generic pathologic process is determined by what the gross lesion looked like, where the lesion occurred, how the lesions were distributed, the age, breed, sex of the patient and what the clinician’s working diagnosis was. As incredible as it may seem, I frequently get surgical biopsies in which I am not even told the species or the location of the sample much less the other mentioned information. Some clinicians mistakenly believe you should not “bias” pathologists by sharing information with them. Nothing could be further from the truth. I have often said that if the object of the autopsy/biopsy is to see if you can fool me, I will tell you right now, You can fool me. Easily! If, on the other hand, the object is to acquire a rapid, accurate, specific diagnosis, share what you have observed and what you think with the pathologist. Do you think physicians withhold information from human pathologists? Imagine what the malpractice attorneys would do with THAT bit of information if they did? The most common reason biopsies are returned to clinicians in some human medical centers is insufficient information. With the heightened interest in animal rights and the uncontrolled proliferation of attorneys, it’s only a matter of time before medical liability issues with pets are going to be tested in court. Delayed treatment or misdiagnosis due to poor communication resulting in an “untoward outcome” may elicit legal action in the near future.

Description versus Interpretation

Gross observations are objective and should never change. Interpretations are subjective, open to discussion and can be altered retrospectively. Interpretation is always a guess but with proper training and experience it can be a very, very good guess. Interpretation is what pathologists get paid to do but they should always justify their interpretation by accurate descriptions.

**Description:**

The lung was diffuse dark red to plum colored, heavy, wet and foamy fluid freely ran from the cut surface. It felt firmer than normal and not

**Interpretation:**

Describe first, then interpret

Diffuse pulmonary congestion and edema

Diffuse acute interstitial pneumonia
ELEMENTS OF THE GROSS DESCRIPTION

The interpretation of gross lesions begins with the observation and characterization of the abnormal findings. To do this one must know what attributes are important and what they mean when observed. The following is a list of those attributes which I believe form the elements of a good gross description of abnormalities seen at autopsy, or surgical biopsy for that matter:

1. **DISTRIBUTION** – What is the spatial arrangement of lesions?

2. **DEMARcation** – How clearly set off from the adjacent normal tissue is it?

3. **CONTOUR** - Are the lesions raised, flat or depressed

4. **SHAPE** – Do the lesions have a geometric shape?

5. **COLOR** - “Well, what color is it”? Pick one.

6. **SIZE** – absolute vs. relative; lesion, whole organ, paired organs

7. **TEXTURE** - What does the cut surface look like? Amorphous or solid

8. **CONSISTENCY** - How does the lesion feel? Fluid, soft, firm, hard

9. **SPECIAL FEATURES** - Odor, sound

10. **EXTENT** – How much of the organ or tissue is affected?

11. **CHRONICITY**

A subjective assessment; usually difficult to be precise.

*What is the “real time” definition of chronic?*

Often the following terms are used:

- **Acute** – a change that can be produced in seconds to hours? Days?
- **Subacute** – what are the gross criteria?
- **Acute and chronic** – a mixture of acute and ongoing changes
- **Chronic-active** – same as acute and chronic
- **Chronic** - at least days.
GROSS HALLMARKS OF CHRONICITY

a. **Proliferation of cells** takes time. Thus evidence of cellular proliferation makes it likely the lesion is chronic

b. **Deposition of stroma** or extra cellular matrix – *Fibrosis, hyperostosis* or Periosteal new bone (PNB)

c. **Size**- large changes in organs either way (increased or decreased) imply a passage of time. *Hypertrophy, atrophy.*

You can see fibrovascular proliferation (granulation tissue) microscopically as early as 3-5 days after the damage. So if you can see it grossly, the lesion must be at least 1-2 wks old. Is that chronic?

**THE LOGIC TEST:** Ask yourself the question…

“Is the lesion…seconds, minutes, hours, days, weeks, months or years old?”

Arrive at an estimated range of the logical time you think it took to make the lesion you observed.

12. **SEVERITY**

Also a subjective assessment; a sliding scale that is often relative and variable among pathologists. Often a 5 point scale used:

- Minimal
- Mild
- Moderate
- Marked
- Severe

A. **DISTRIBUTION** = the spatial arrangement of the lesions in the organ or tissue.

Lesions or abnormalities may occur with distinct distribution patterns which when recognized are clues to the disease process and assist in estimating severity or significance of the observed findings. Among the attributes of gross lesions, distribution is one of the most important and should be included in nearly every morphologic diagnosis. In many dermatopathies, the lesion distribution is the key to diagnosis. Distribution may reflect pathogenesis.
1. **Random** - the lesion occurs *without reference to architecture* or relationship to particular organ or tissue structures. The scattering of abscesses or tumors throughout a lung or liver may be random.

Bilateral lesions *may imply a metabolic or systemic disorder* affecting a certain group of related cells present in distinctly separated areas of the organ or tissue or the same location in paired organs. Bilateral symmetrical flank alopecia in dogs; polioencephalomalacia in ruminant brains. A symmetrical or organized appearance occurs when a pathologic process *highlights or outlines a certain anatomic or physiological subunit; often it outlines a vascular unit or circulatory bed*; airways in the lung, portal tracts in the liver, glomeruli or tubules in kidney.

2. **Symmetrical** - a pattern with *some degree of organization is apparent* in the abnormality.

3. **Focal** - a single defined lesion on a background which is either normal or itself abnormal but containing or reflecting a different process than present in the focal lesion. i.e. a
solitary tumor in the liver; an abscess in a congested lung. **One of the easiest distributions to see but with little discriminative power as to pathogenesis.**

4. **Multifocal** - more than a single discrete lesion on a background. Highly variable; several to many lesions. This may require a further characterization such as **multifocal widespread** to emphasize that the abnormality was not just 2 or 3 foci. “**Multifocality often suggests an embolic shower**” Also easy to appreciate.

5. **Multifocal to Coalescing** - when there are many lesions present that may appear to be growing together or fusing. This reflects an active **process which is expanding or not otherwise contained** or limited by the host defense mechanisms.

6. **Miliary** - a special case of ”multifocal” in which there are numerous tiny foci present that are **too numerous to count** The miliary pattern stems from miliarius which is the
Latin word for millet seed. Miliary distributions may reflect a recent embolic shower to the organ or tissue. Because the lesions are small, the implication is that the event is recent.

7. **Segmental** - a well defined portion or segment of the tissue is abnormal; sometimes a distinct geometric shape. This distribution implies that the pathologic process is restricted by anatomic or physiologic factors and so occupies a discrete portion. *Segmental lesions often define a vascular bed.*

8. **Diffuse** - *Everything in the frame of reference is abnormal or affected.* This generally implies greater severity and therefore significance than focal or multifocal lesions. Also because it takes time for a process to affect the entire tissue, diffuse lesions MAY (but not necessarily) be more chronic or older. **Often difficult to appreciate because there is no contrast with normal.**
THE PARADOX OF DESCRIPTIVE PATHOLOGY

“The most severe lesion may be the easiest to overlook because there is no normal for contrast”

Is this lung normal or not? You have to remember what the normal post mortem variation in color of the lung is to properly interpret your observation.

B. DEMARCATION = The degree to which the lesion is set off or defined from the adjacent tissue.

Iridium-rich Cretaceous-Tertiary boundary ~ extinction of the dinosaurs.
1. **Well demarcated** – The boundary between normal and abnormal is abrupt, discrete and easily seen.

   **Implication** = The lesion represents a different tissue or is well contained or separated from the adjacent normal tissue. Tumors, abscesses with capsules, pus, a rim of necrosis often produce a well demarcated lesion.

2. **Poorly Demarcated** – The boundary between normal and abnormal is blurred or not easily seen.

   **Implication** = the lesion and adjacent tissue may be similar; the process gradually infiltrates into normal or may be poorly contained.

C. **CONTOUR** = *the degree to which the lesion is elevated or depressed with respect to the adjacent tissue*
1. **Raised** - implies that “**something is added**” to the organ or tissue to cause expansion.

![Image of raised tissue](image1)

Fluids - blood, transudates, exudates, effusions, edema, urine
Gas - emphysema
Cells - normal (= hyperplasia); abnormal (= neoplasia) or exudates (=inflammation)
Stroma – fibrous tissue, cartilage, bone
Foreign Material – plant material, parasites

2. **Depressed** - implies that **something is removed or lost** Most commonly this is related to **necrosis** or **atrophy** but remember some organs are physiologically dynamic like lung, spleen, urinary bladder. The most common thing taken away from the lung is air.

![Image of depressed tissue](image2)

3. **Flat** - the lesion is neither raised nor depressed with respect to the surrounding tissues. This implies either a **recent event** which has not had sufficient time to progress or a **process that does not cause expansion or necrosis**.

![Image of flat tissue](image3)

D. **SHAPE** = beyond the contour, what geometric figure does the lesion resemble.

Is the lesion **circular, rectangular, triangular, spherical** etc. Because the vasculature of tissues is often laid out in geometric patterns or distinct shapes this may reflect a pathologic process highlighting or outlining a vascular bed. i.e. infarcts or segmental

![Geometric Shapes](image4)
lesions. Again, symmetrical shapes or patterns which appear somewhat organized rather than random may reflect a unit of architecture such as lobes, lobules, septae, hepatic portal tracts. Remember shape may also reflect the attribute of “segmental distribution” and may inform us where the lesion is located.

E. **COLOR** - one of the most obvious attributes of a lesion, especially when the lesion differs from the normal color. Normal color of a tissue or organ is determined by:

1. The **innate color** or number of cells and stroma in that tissue. Often this is colorless or white.

2. **Special pigments** or adipose tissue i.e. myelin, myoglobin, steroids, bile

3. The amount of **blood** present in the vascular bed

   Your eye sees the net effect of these 3 characteristics.

   **Dark Tissues** - high pigment/tissue ratio; muscle, spleen, liver

   **Light Tissues** - low pigment/tissue ratio or high fat content; lung, brain

4. **Red to Reddish Black** - usually means blood or **hemoglobin** pigment. The implication is congestion or hemorrhage. Differentiating between these two requires additional attributes. Congestion tends to be a wider spread phenomenon than hemorrhage and tends to be poorly demarcated.

5. **White to Gray or Yellow** - often ~ the **lack of blood**. Necrosis is often pale because of the lack of blood.

   **Coagulation necrosis** (necrosis with preservation of architecture) is an **acute event** and therefore the **foci are flat**.

   **Exudates** are also white to yellow and because **Exudates add something**, foci of exudation are often **raised**.

   **Fibrosis** is pale to white but because scar tissue fills in areas of necrosis (something removed) and contracts as it matures, foci of fibrosis are often **depressed**.

   **Hyperplasia** often light to white or the normal tissue color; granulation
tissue is pink early when it has abundant capillaries; white as it matures.

*Neoplasia* is like hyperplasia; solid proliferating tissue but it may be a different color or consistency

Meconium in tissue may be yellow.

Bilirubin stained tissues (icterus) may be yellow or even green

*Yellow discoloration in the CNS may indicate malacia*

6. **Green** – Often *bile or bile pigments*. Post mortem bile staining of tissue is called *Pseudomelanosis*.

*Coagulation necrosis* may be various shades of green

*Eosinophilic inflammation* may impart a greenish discoloration to tissues

*Aspiration pneumonia* with plant material

*Pigmented fungi* can give a green color

7. **Green – Black**

*Pseudomelanosis* = Artificial staining of tissues post mortem by bile from the gall bladder and H₂S pigments from the GI.

**usually limited penetration into organ adjacent to liver or bowel.

Aspiration pneumonia = saprophytic bacteria cause green black discoloration.

8. **Black –Brown**

Black usually means melanin

*Melanosis* = flat. Not enough to create contour

*Melanoma* = raised. Proliferating cells create contour

*Pigmented fungi* - *Cladosporium, Curvularia*

Brown = hemosiderin, pigmented fungi - *Drechslera*
“The Fine Arts 101 Rule of Colors”

“Processes producing a dark color (congestion, hemorrhage) can mask processes producing a light color (necrosis, inflammation)”

F. SIZE {LESIONS} - “Size Matters!” How big is the lesion or abnormal area? Always measure or otherwise estimate the size of lesions as this directly impacts the significance. What are the dimensions of masses, nodules, flat foci, depressions etc?

Implication = small lesions are more recent events than large ones and may be less important (but not always).

When there are multiple lesions, how does their size vary?

Uniform Size - The lesions are all about the same size. May mean the pathologic events have occurred over a short period or at the same time and are progressing at the same rate.

Non-uniform Size - The lesions are of differing size. May mean the pathologic events are separated in time or have different rates of progression i.e. the small lesions are more recent, the larger lesions are older; recurring pathologic process such as multiple waves of metastasis.

G. SIZE {WHOLE ORGANS} – “Size still matters!”

Unlike discrete lesions, organ size is often relative and difficult to “see” because of the lack of contrast; often a subjective opinion. Easiest to appreciate with paired organs but small differences in organ size may not be perceptible. i.e. hearts, livers, adrenal glands.

“The Organ Size Rule”

“Always give more weight to objective evaluations than to subjective evaluation”
Larger than normal = “something added”. Think hyperplasia, edema, neoplasia, congestion, inflammation. Organs with capsules often bulge on cut surface because the something added@ increases pressure within capsule.

Smaller than normal = “something removed/lost”. Think hypoplasia, atrophy, and necrosis. Organ may have a collapsed appearance. The organ may be completely absent.

H. SIZE {PAIRED ORGANS} – “Sorry Guys, but size STILL matters!”
When paired organs or tissues are of different sizes, which one is abnormal?

The large one or the small one? Fundamentally different processes (addition/loss of something).

Must use additional attributes to properly interpret such as shape, color, symmetry and contour.

I. SIZE {DYNAMIC ORGANS} – “OK, so sometimes size DOESN’T matter”
Some organs and tissues are physiologically dynamic i.e. they change size and shape for functional reasons or in response to physiologic demands.

1. Rapidly dynamic (sec to min) - lungs, urinary bladder
   Air and urine within the organs

2. Moderately dynamic (min to hrs) - spleen, GI, brain

3. Slowly dynamic (days to months) - heart, liver, LN=s, endocrine glands
   Increased physiologic demands resulting in hyperplasia, hypertrophy

J. TEXTURE – “What does the cut surface look like?”

1. Amorphous - semisolid, unorganized; no architecture; can’t hold shape; not cohesive.
   “You can spread it with a butter knife” = pus, exudates, necrosis
2. **Solid tissue** - has apparent structure or architecture; holds together or maintains shape; “Not spreadable with a butter knife” = usually means **viable, living cells** and tissue or stroma. **Hyperplasia, neoplasia**, stromal deposition.

“The Texture Caveat”

“Sometimes granulomatous inflammation looks like neoplasia”
(Non-caseating granulomatous inflammation may be “cohesive”)

K. **CONSISTENCY** – **“How does it feel?”**

1. **GAS** - air trapped in tissue = **emphysema**
   Bubbles in fluid

2. **FLUID** - the tissue looks or feels wet or **squishy@**, like a water balloon. Usually means edema, blood, transudates, fluid rich exudates, effusions, urine
3. **SOFT** - the tissue is fluid rich/cell or stroma poor. Exudates.

4. **FIRM** - the tissue is fluid poor/cell or stroma rich. Exudates, hyperplasia, neoplasia, scar tissue or fibrosis.

5. **HARD or Gritty** - usually means mineralized stroma or matrix; cartilage, bone, calcified tissues.

6. **FLUID**  - “Takes the shape of its container and you can pour it”
   
   a. **Serous** – Clear. Extracellular fluid, water, urine, transudates/. Edema
b. **Serosanguinous** – clear but blood tinged; common postmortem finding in body cavities

c. **Serofibrinous** to fibrinous – Cloudy with strands of opaque white to yellow

d. **Chylous** - “milky white”. = lymph.

e. **Purulent** to seropurulent – Opaque, thin to thick. Contains degenerate neutrophils (= “pus”)

L. **SPECIAL FEATURES {WEIGHT}** “Is the organ heavier or lighter than normal?”

Relative and subjective; often subtle and difficult to objectively determine. Objective determination = weighing on scale. Common in rodents because we have well established normographs; difficult for most domestic animals because of variable organ/body weight ratio. But we should weigh some organs at autopsy such as hearts, endocrine glands, livers, kidneys.

Heavy implies ‘something added’; use other attributes to fully interpret. Light implies Asomething removed/taken away@

Feline Cardiomyopathy Hw/BW ratio > 6.4gm/Kg or >20gms. N = 4.8 and 15-17gms

- **Most useful with lungs.** The most common Asomething@ added to the lung is blood and plasma (= congestion & edema). The most common “something lost is air (= atelectasis).

  **“The Bucket Test”**

  “If the lung sinks in a bucket of water, something heavier than water is added OR, the air is removed (atelectasis is pretty common!) OR both.”

M. **SPECIAL FEATURES {SOUND}** “What does it sound like?”
1. **Crepitant** - the sound of popping air = *emphysema*, gas producing bacteria, normal lung. Its absence in the lung = atelectasis.

2. **Sloshing** - the sound of fluid splashing = "Fluid where it shouldn't be"  
*Edema, ascites, pleural effusion, diarrhea*

3. **Hard** - sounds like a rock when banged on a hard surface.  
*Bone, mineralized matrix.*

N. **SPECIAL FEATURES {ODOR} "How does it smell?"**

1. **Foul** - rotting smell; putrefactive necrosis, saprophytic agents
2. **Ammonia** = usually means uremia
3. **Apple cider** - gastric hemorrhage or swallowed blood.
4. **No odor** - very common; many septic as well as aseptic processes.

O. **SPECIAL FEATURES { TASTE} Well., How does it taste?**

Hippocratic physicians used to routinely taste the blood, sweat, tears, Urine, nasal mucus, sputum and ear wax of their patients.

P. **EXTENT - How much of the organ is affected?**

Estimate % of the total organ or tissue which is affected and potentially functionally compromised. One measure of the severity and therefore the potential clinical significance of the gross lesions. Most important in lungs and kidneys where we have estimates of the physiologic reserve.
**BLOOD LOSS** Blood volume = 8% of body wt. Loss of at least 40% of blood volume is critical  

1. Weigh carcass. 
2. Collect and measure vol of lost blood. 
3. Calculate blood vol for animal. 
4. Calculate % of total blood vol that the collected hemorrhage represents. 

Example:  

10 kg dog has 0.8 kg of blood volume (800 cc) 

40% of 800 cc = 320 cc of hemorrhage

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**APPROACH TO GROSS DESCRIPTION AND INTERPRETATION**

**Step One**

"Is what you see normal or abnormal?"

- Normal
- Name a Specific Disease
  - History
  - "Corroborative Testimony"
  - "Framing"
- "Abnormal"
  - "What's the Abnormal part?"
  - "Morphologic Dx"
  - "What's the Abnormal part?"

**Step 2:** Describe the abnormal part with respect to the above listed attributes which are appropriate. Not all the attributes will be relevant to every lesion. However, most can be described with respect to **distribution, contour, color, size, consistency, extent** of the organ affected and any special features unique to it. *A description doesn’t need to be a dissertation.* Adhere to the “KISS Principle”

"One or 2 sentences is enough"
Step 3: Interpret a pathologic process from what you have described based upon what the attributes suggest. This is the fun part. It’s a chance to apply what you have learned and when done in conjunction with submitting samples to a pathologist, you get feedback about your interpretation.

For instance, The lungs were diffuse dark red, wet, heavy and fluid flowed freely from the cut surface and airways (interpreted to be pulmonary congestion and edema). There is a 3 cm white round mass in the liver which had a soft, amorphous white cut surface, spreadable with a butter knife, and a thick fibrous capsule (interpreted to be an abscess). Both kidneys were diffuse, pale, wet and bulged on cut surface (interpreted to be acute tubular necrosis or nephrosis). The brain contained miliary 1 mm flat red foci on the surface (interpreted to be petechiae, possibly DIC or acute meningitis). There was an anterior-ventral distribution involving 40% of both lungs which were plum colored, had adherent fibrinous material on the pleura, were firm and upon cut surface contained pus in the airways (interpreted to be fibrinopurulent bronchopneumonia).

This interpretation of the pathologic process is summarized into a phrase or sentence called the morphologic diagnosis. This is the stock in trade of pathologists. It is used as a sort of short hand to document or denote pathologic processes. Skillful application of accurate morphologic diagnoses is most important to pathologists and much time is spent in training learning to do this properly. It is not necessarily important for clinicians to do this but an accurate description of what they observe is so the pathologist may formulate a presumptive morphologic diagnosis from the clinician’s description which can then be verified from the histopathology.

LOOK FOR CORROBORATIVE TESTIMONY

“CORROBORATIVE TESTIMONY” = Additional information from another source that supports your findings or conclusions. i.e. in cases of pulpy kidney disease, there may be evidence of glucosuria and fibrinous pericardial effusion; focal symmetrical encephalomalacia?
DESCRIPTIVE PATHOLOGY FOR AUTOPSY REPORTS

PURPOSE OF THE AUTOPSY REPORT

A) Explain the cause of death, establish or confirm the presence or absence of a disease
B) Create a permanent record of the ephemeral events found at autopsy

Its retrospective medicine

The autopsy is an ephemeral event. The only record of the findings is what YOU record during the short period of time. It’s A Descriptive Exercise. Gross observations should dominate the autopsy report. “Paint a picture with words” then apply the “Carpenter Test”. Close your eyes. Can you see what you wrote? This is the permanent record of the gross findings. Thus provide minute detail so that another pathologist reading your report could see in their mind the image you described.

First and foremost gross pathology in the autopsy report is a descriptive exercise that forms a rational basis for the interpretation of the observations. Interpretation is secondary to accurate documentation of the lesions.

“Describe first, then interpret”

Description slows the process and opens the mind, making cognitive error in interpretation less likely, and….you generally time for this in the autopsy arena. Knowledge of the gross
appearance “Frames” the case and is extremely useful when reading microscopic. Together, the 2 make a powerful tool to get the correct diagnosis and interpretation and leaves a useful record.

**Necropsies-in-a-jar** = Clinician performed autopsy with tissues submitted to the diagnostic lab as a surgical specimen. ("The Full Catastrophe")

Often performed with poor or no documentation of the gross findings. The power of the autopsy is the combination of both gross findings and the histopathology. If there is no gross, interpretative power is list.

**GROSS PATHOLOGY FOR CERTIFICATION EXAMS**

“How to Play the Game to Win”

**A. EXAMINATION STRUCTURE & COMPOSITION**

The gross pathology portion of the examinations is a projected gross image exam, not a practical.

1. Short answer, fill in the blank format.

2. Digital photographs not wet tissue.

3. One view of the organ; cannot manipulate specimen.

4. 1 ½ min time constraint

5. Species is the only given data; **very limited framing**

**B. GROSS PATHOLOGY EXAMINATION COMPOSITION**

100 images selected from about 250 submitted. SOP requires diversity with respect to species, organ, pathologic process so expect a wide variety. Emphasis on domestic species; dog, cat, horse, cow, pig, sheep, goats, lab animals, wildlife, zoo and lower vertebrates [fish, amphibians, reptiles, birds]. The examination is a subset of what images are available to the examiners. There are only so many diseases of animals. There are only so many images of these diseases. Images get recycled. Most of the examination will consist of common diseases; don’t necessarily look for “zebras” 1st if you” hear hoof beats”.

*** New Paradigm for the ACVP Phase Two Examination

Integrated examination structure. There will be a histopath section as there is now
but the Gross path and multiple choice will be integrated. So some questions will have gross, histopath images and literature. This more closely resembles what we do in the everyday world and will provide more clues or framing.

EXAMINATION CONDITIONS

It’s a short amount of time to see the image, get oriented, recognize the tissue and lesion, make a diagnosis and answer the questions.

Lesion recognition, mental description and diagnosis must occur quickly, almost intuitively. It’s “Shoot from the hip pathology” There is a premium on experience. Specific preparation for this part of the examination is the key.

C. GROSS PATHOLOGY EXAMINATION PHILOSOPHY

The gross pathology parts of the exams are intended to test your disease recognition skills at the clinical, whole animal, organ and tissue level. They are all about **INTERPRETATION, not description.** You do the description subconsciously. Look at the lesion, collect the visual information, match the signalment given, interpret the lesions and answer the questions.

*Do Not Describe Lesions!!!* The value of a pathologist is partly determined by his/her ability to interpret and explain, generate and test hypotheses based upon what they see.

D. THE TYPES OF INTERPRETATION

**MORPHOLOGIC DIAGNOSIS** (Mx) = A phrase or short sentence summarizing the principal characteristic or dominant pathologic process present in the organ or tissue. It should include an organ and distribution modifier and a process. There is lots of latitude in Mx. Often there are many different correct ways to say the same thing.

**Chronicity and severity** modifiers are **NOT needed** in the examination arena.

- Segmental renal cortical necrosis (infarct)
- Bilaterally symmetrical hyperostotic maxillary fibrous osteodystrophy
- Diffuse granulomatous enteritis
- Osteochondrosis
- Bilateral multinodular thyroid follicular adenomas
- Leukoencephalomalacia
- Serous atrophy of fat
- Lymphoma
THE CARPENTER TEST

“Can you close your eyes and see what you said or wrote?”
It’s a good self evaluation for clarity and completeness

**CAUSE** = The specific cause of the lesion or disease depicted in the image. The same as “Etiology”.
Name a specific disease agent. A microbial agent, virus, bacteria, fungi, parasite, toxin, genetic defect (deletion, recessive gene, mutation etc) or metabolic disorder. Be specific as possible; genus and species for metazoans.

Canine adenovirus Type I
*Metastrongylus apri*
Sporodesmin or *Pithomyces chartarum*
*Rhodococcus equi*
Uroporphyrnogen III cosynthetase deficiency
Nutritional Ca/P imbalance.

**Don’t name a disease when cause is requested.**

**NAME THE DISEASE OR CONDITION** = the medical or common usage term for the disease depicted in the image. Lots of latitude. Many different regional names of diseases.

**Sometimes Mx and Name the Disease can be the same.**

*Leukoencephalomalacia*
*Osteopetrosis*
*Neoplasms – can be both*
*Fibrous osteodystrophy*
*Vesicular stomatitis*
*Pyometra*
*Palatoschisis*
*Cyclopia*

**STEP DOWN QUESTIONS** = Questions outside of the “main sequence” designed to test the depth of your knowledge about the disease or condition depicted.

These are intended to add discrimination to the gross pathology portion of the examination. How much more besides the obvious do you know about the disease?
This relates to the concept of **Integrative medicine.** As a pathologist looking at
gross postmortem findings can you correlate other disease parameters, an understanding of important mechanisms in the disease or that perhaps contributed to the lesions and can you anticipate additional findings.

a. **Name a Related Lesion** = name another pathologic lesion in another topographic location that may occur in this disease or condition. Once you have made a Dx, what else is characteristically found in animals with this lesion or disease? *Not necessarily always but often or typically.*

- *Pituitary adenoma in dogs* – **bilateral adrenal cortical hyperplasia**
- *Chronic renal disease in cats* – **bilateral parathyroid hypertrophy**
- *Bovine osteogenesis imperfecti* – **blue sclera, fractured teeth, intrauterine rib fractures**
- *White muscle disease in ruminants* – **aspiration pneumonia**

b. **Name a Related Clinical or Clinicopathologic Abnormality** = name a related clinical abnormality that is associated with the lesion or disease. Similar to above but the abnormality is hematologic, biochemical, clinical etc rather than an anatomic lesion.

- *K9 anal sac adenocarcinoma* – **hypercalcemia**
- *Uroabdomen in foals* – hypernatremia, hypochloroemia, hyperkalemia
- *Pars intermedia adenoma in horses* – hyperhidrosis, hyperpyrexia, polyuria/polydipsia, hirsutism

c. **Differential Diagnosis** = given the image, name the several diseases that could present with this or a very similar lesion. **The lesion depicted is not necessarily pathognomonic but falls within the range of several different diseases. List the possible diseases. Generally you are asked for 2-3 other diseases. There may be 10 others; give only how many others they ask for. The committee has a list of acceptable responses. **Do not give more than is asked!**

- *Multifocal petecchia on the pig kidney* –

  *DDx =* 1) Erysipelas 2) *Salmonellosis* 3) Classical swine fever *[hog cholera]* 4) African swine fever 5) *Streptococcal septicemia*

- *Bovine hemoglobinuria* –

  *DDx =* 1) Leptospirosis 2) Bacillary hemoglobinuria 3) Cu toxicity 4) Onion poisoning (n-propyl disulfide toxicity) 5) hypophosphatemia 6)
Be sure to “Name a Disease” not a “Cause”

d. **Pathogenesis** = trace an outline for the events that cause the disease or lesion

This is generally written as a series or words or short phrases with arrows separating them to show the progression of events from the initiation to the end stage or lesion.

**Deep Pectoral Myopathy of Broilers**

Edema of supracoracoid muscle → swelling → Increased pressure within the fascia → ischemia → coagulation necrosis

**Atypical Interstitial Pneumonia of Cattle**

Ingestion of excess L-tryptophane → circulation to lung → metabolism to 3-methyl indole by Clara cells → toxic intermediates → damage to Type I cells → interstitial inflammation → diffuse pulmonary edema → hypoxia → dyspnea → interstitial emphysema

**ETIOLOGIC DIAGNOSIS** = a word or phrase that captures a pathologic process with a reference of tissue and a cause or condition if possible. Not commonly used anymore but seen occasionally. There are many different ways to formulate these and no one way is correct. There is lots of latitude. This type of response to diagnosis frees you from making a formal anatomic morphologic diagnosis. There may be overlap with other forms of diagnosis. Etiologic diagnoses can be of widely varying specificity.

*Because many answers are acceptable these tend to be low discrimination answers and I think that is why they are not commonly used anymore.*

*Cutaneous acariasis*

*Verminous arteritis*

*Intestinal histoplasmosis (protozoal enteritis)*

*Toxic hepatopathy (hepatic mycotoxicosis)*

*Proliferative and exudative interstitial pneumonia (pulmonary Toxoplasmosis)*

*Protozoal myelitis (Spinal sarcocystosis)*

2. **MAJOR HISTOPATHOLOGIC ALTERATION** = what is the histopathologic appearance of the gross lesion you are looking at grossly?
Used occasionally when the characteristic microscopic lesions for which the Mx may not be obvious.

*Hemomelasma ilei in horses – hemorrhage, hemosiderosis and granulation tissue*

*Ostertagiosis (Morocco leather abomasums) – mucus neck cell metaplasia and glandular hypertrophy*

**E. WHAT DETERMINES THE TYPE OF QUESTION ASKED?**

Examiners ask the appropriate questions that are the most discriminating for that image.

Mx, Causes, Name the Disease tend to be the most common.

Practice to be able to answer every type of question for every image you look at. Remember if examiners cannot agree on an answer, how can they expect you to answer correctly?

**F. TESTMANSHIP**

If you can not see a lesion, *look in the center of the image.* Pathologists and photographers tend to center the item or interest in the middle of the image. Remember that *in situ images may have multiple lesions* in different areas NOT in the center.

If you can not get oriented as to organ to tissue, think about reproductive, endocrine or lymphoid tissues. This portion of the examination is about interpreting what you see, not formal description writing.

*Read the question again and take your cue from what is asked* about the image. If the question asks for 3 Mx’s, that is a tip off that there is more than one important Mx present in the image. Look for them! If you do not see others, how can you break up the Mx you do see into several.

Intervertebral disc disease  \( Mx = \text{Chondroid metaplasia and disc degeneration} \)

1) With dorsal protrusion  2) Rupture into spinal canal  3) Focal myelomalacia of the spinal cord.
Experience and practice pay huge dividends here. Experienced pathologists should have no problem with this but learn how to play the game to ensure success. Gross pathology images are readily available; personal collections, websites, CE courses. Try all questions for every image. Not all questions will be “appropriate” for each image. It will be obvious which are and which are not.

*Be able to “Shoot from the hip” **BEFORE** to take the examination. The idea is to have pre-formed Rx to images. Then is it only a matter of pattern recognition; you have already decided how you will respond.

“*It’s a funny profession, ours, you know. It offers unparalleled opportunities for making a chump of yourself. It helps to be good at the job, of course, but even if you’re a positive genius humiliation and ridicule are lurking just round the corner*”…..Siegfried Farnon

(From “All Creatures Great and Small” by James Herriot)

“I pass, like night, from land to land;
I have strange power of speech;
That moment that his face I see,
I know the man who must hear me:
To him my tale I teach”

Samuel Taylor Coleridge