

A Submitter's Guide and Expectations for Necropsy Services at the ADDL

Necropsy

Necropsy / Animal Autopsy / Postmortem – terms used to describe the process by which a deceased animal/patient is examined, and tissues are collected with a goal of better understanding the process that led to death.

Necropsy Options:

- **Basic.** A basic necropsy at the ADDL includes a gross (changes observed by the eye) and histologic (changes observed with the microscope) examination and report. Separate charges apply for all additional tests: PCR, parasitology, bacteriology, antimicrobial susceptibility testing, toxicology, virus isolation, serology, IHC, and tests available only at other labs.
- **Comprehensive.** A comprehensive necropsy at the ADDL includes a gross (changes observed by the eye) and histologic (changes observed with the microscope) examination and report. Parasitology, bacteriology, and limited PCR testing are performed as deemed appropriate by the pathologist for no additional charge. Separate charges apply for the following tests: toxicology, virus isolation, antimicrobial susceptibility testing, serology, IHC, additional PCR, sequencing/NGS, and tests available only at other labs.
- **Insurance** (add-on). The insurance add-on to a comprehensive includes additional documentation for insurance companies.
- **Legal** (add-on). Legal necropsy cases are limited to submissions by law enforcement and regulatory agencies. The legal add-on to a comprehensive necropsy includes detailed photographic documentation and chain of custody. Communications regarding legal necropsy cases are limited to those entities as well.
- **Fetal/Neonatal/Abortion.** The fetal/neonatal necropsy protocol at the ADDL includes a gross (changes observed by the eye) and histologic (changes observed with the microscope) examination and report. Certain diagnostic tests for conditions and infectious disease are also included that are specific for that species of animal. Neonates for this protocol are animals within 24 hours after birth, and up to 3 fetuses with placenta may be submitted.

A necropsy is **helpful for conditions that have visible or structural manifestations**, but it is **less helpful for conditions that leave no visible or structural changes** (e.g., many toxins, botulism, maternal disease in the case of abortion). Selections of type of necropsy must be made up front and cannot be changed.

- There is no guarantee that a definitive diagnosis will be made on any given case.
 - **Cases without a definitive diagnosis are still meaningful, as they aid in ruling out many diseases and conditions.** Reviewing the larger clinical picture with the primary veterinarian is extremely beneficial in these situations to better understand the significance.

Timeline:

- Examination Start Time (*West Lafayette*)
 - Postmortem examinations start at 1:00 P.M. Monday through Friday. It is preferred that animal remains arrive between 8:00 – 11:00 A.M.
 - Cases that arrive after 3:00 P.M. will be held until the next day for necropsy.
 - Weekend cases that arrive before 1:00 P.M. on Saturday will be completed over the weekend. Cases that arrive after 1:00 P.M. on Saturday will be held until the following Monday.
- Examination Start Time (*Heeke ADDL, Dubois*)
 - Postmortem examinations are generally performed in the afternoon, Monday through Friday.
 - Cases that arrive after 3:00 P.M. may be held until the following business day for necropsy.
 - Cases arriving after 3:00 P.M. on Friday, or anytime on Saturday or Sunday, may be held until the following Monday.
- Reporting
 - The gross report should be sent to the submitting veterinarian within 24 hours or the next business day.
 - The finalized report requires up to two weeks to be completed. Results for toxicology, additional requests, and send out testing may delay the final report by an additional 1-2 weeks or more.

Additional Information

- **Maximum number of animals.** Animals of the same species with a similar age and clinical problem may be submitted as one necropsy case. The maximum number of animals per necropsy case/accession are:
 - Cattle: 1 adult or 2 calves
 - Cats: 1 adult or 3 kittens
 - Dogs: 1 adult or 3 puppies
 - Horses: 1 adult or 2 foals
 - Pigs: 1 adult or 3 piglets
 - Sheep/Goats: 1 adult or 3 lambs/kids
 - Fetal/Neonatal/Abortion: 3 fetuses with placenta

Errors or alterations in husbandry, environmental factors, and maternal conditions (for cases of spontaneous abortion) may be indicated during a necropsy, but these components are difficult for pathologists to positively ascertain from the deceased patient's body. These factors are, nonetheless, important and may indicate or contribute to the illness or cause of death. Collaborating with the referring veterinarian who has access to the animal's full history and personal observations of the living animal and its living conditions is extremely beneficial in these situations.

Factors that negatively impact the results of a necropsy:

- **Autolysis.** Autolysis is decomposition or decay. It starts immediately after the patient dies. Elevated or warm temperatures increase the rate of decomposition.
 - Autolysis cannot be prevented but it can be slowed down by moving the deceased patient out of direct sunlight and into a chilled environment – not a freezer if the duration of time until necropsy is <48 hours.
- **Freezing of the body.** Freezing the body introduces microscopic abnormalities (or artifact) to tissues and visual abnormalities like color changes of tissue from ruptured red blood cells.
 - If the body is ever frozen, it should be noted on the submission form to inform the pathologists. The pathologist can anticipate and account for freeze changes if they are aware of the situation. In general, the negative impacts of freezing for the overall quality of the necropsy are less than that of a body chilled for >48 hours. If there is a question, please consult the laboratory.
 - If a cooler is not available, freezing the body is a better option than warm, ambient temperatures.
- **Bacterial overgrowth.** The body is quickly colonized by bacteria that are already present in certain locations (e.g., gastrointestinal tract, skin) after death. The presence of three or more bacterial species in culture indicates probable contamination of the sample and limits the interpretation of significance. In these situations, culture results are reported as “mixed culture” without bacterial identification.

Factors that positively impact the results of a necropsy:

- **History.** A comprehensive and thorough history of the animal including vaccination status, health and behavior prior to death, and any information regarding the appearance or behavior at the time of passing is extremely important. Additionally, morbidity and mortality rates (or estimates) are helpful for cases involving herds, flocks, and other group settings of animals. Other key factors include nutrition and husbandry practices.
- **Handling and storage prior to submission.** Slow down the rate of autolysis as quickly as possible. Get the body cooled down and into a chilled environment immediately. Options for storing the body include:
 - Refrigerator
 - Cooler box with ice packs
 - Move out of direct sunlight and run cold water over the body (if it is a hot sunny day and the animal is too large to get into a chilled environment)
 - Transport the body to the ADDL so it can be kept chilled
 - For avian species, wet the carcass with soapy water, wrap in wet paper, place in plastic bag, and keep in refrigerator or cooler box with ice packs.
 - Freezer, the last resort, as mentioned above.
- **Involve the primary care veterinarian.** The diagnostic lab is not able to provide the services of a primary care veterinarian nor does a valid Veterinary-Client-Patient-Relationship (VCPR) exist.

Questions and concerns related to treatment options, management decisions, and understanding of how results apply to your deceased **or live animals** are to be discussed and addressed by the primary care veterinarian.

Examples of Diagnostic Challenges

Certain suspected conditions can create difficult clinical pictures and are often exceedingly difficult to determine a definitive diagnosis. Below are some common examples of frequently submitted case types in which it may be difficult to determine a definitive cause of death.

- **Poisoning.** Concerns of animals being poisoned or having ingested a toxin can be very difficult to diagnose. There is no singular test that surveys for “all” toxins, unfortunately. Because of this limitation, cases with poison/toxin concerns rely heavily on the history of the patient. If the poison/toxin is known or suspected, this will allow the diagnostic testing to focus on that type of compound. If the poison/toxin is not known, then testing quickly becomes very costly and often prohibitive. Some poisons/toxins create specific changes that may be identified by the pathologist during the necropsy or microscopic examination of tissues, but that is not always the case.
- **Anesthesia / Medication.** Like poisoning, diagnosis of death related to anesthesia or medication is particularly difficult. Death related to anesthetic overdose, hypersensitivity or reactions to anesthetic medications, and various other causes does not create a specific lesion or change to indicate the cause of death.
- **Heat Stroke.** If an animal is suspected to have died due to effects from heat, this is an extremely difficult diagnosis to make on a deceased patient. Changes to the tissues and cells are minimal and can be the result of other concurrent conditions not related to heat stroke. Declining health due to the suspicion of heat is best assessed by determination of body temperature and evaluations of muscle marker changes, inflammation marker changes, and blood coagulation marker changes on bloodwork when the patients are still alive and in conjunction with the patient’s history.
- **Stillborn and Miscarriage.** Cases of deceased fetuses and neonates can be particularly challenging to get a definitive diagnosis. There are many factors that play into abortion storms, stillborn fetuses, and weak/poor-doing neonates. When examining and testing a fetus or neonate, the diagnostics are limited to infectious, congenital, and some nutritional causes for abortion and poor doing. A report with negative results should not be looked at as a report with no findings; it is in fact a listing of diseases and conditions that have been ruled out for that case. Other factors regarding the health of the mother, husbandry, nutrition, and the environment need to be taken into consideration. These factors plus the necropsy findings or rule outs are best reviewed with the primary veterinarian to understand the significance and larger clinical picture.