Introduction: The following outlines the standard operating procedures of the NCSU Veterinary Health Complex Clinical Pathology Service:

Procedures

A. Vital Information:
   - Location: C269
   - Telephone: 3-6550
   - Supervisor: 3-6553
   - Hours of operation:
     - Monday through Friday: 8:00am - 7:00pm**
       - **Hours after 5:00pm can vary as staffing allows. All hours not covered by full-time, permanent staff will be covered by utilizing “stat lab” equipment in Small Animal Emergency Service. For spinal fluid analysis, emergency coagulation, and emergency cross matches, contact “on-call” personnel
     - Saturday and Sunday: 9:00am - 11:00am.
     - Holiday hours of operation:
       - 9 AM - 11 AM except Christmas Day
       - No regular hours on Christmas Day
     - All the hours when the lab is not open will be covered by “on call” personnel for procedures listed below.

B. Sample Collection / Handling

Each active procedure for Clinical Pathology has the type of sample needed and instructions for collection in UVIS. Click on the green “i” button beside the test being requested to view instructions.

C. Sample Identification

Biologic samples are routinely submitted for analysis to the Clinical Pathology laboratory. Thorough labeling of the sample is essential for appropriate processing, and recording of the sample for patient tracking and billing purposes. In addition, accurate labeling is needed to identify that the patient from which the sample was taken may have an infection that poses a health risk to laboratory staff. Standard operating practice for hospital personnel submitting samples for analysis includes labeling each sample with the following:

- Name of the patient
- Hospital identification number
- Species
- Date of sample collection
- Last name of the individual who collected the sample
- UVIS request ID number
- Zoonotic potential sticker, if the patient is suspected of having a zoonotic pathogen
• Cytology slides should be identified with the patient medical record number & site on the frosted end.
  o Information should be legible and written near the bottom of the frosted end in order to allow the laboratory to fill in additional accession and MR request information.
  o Laboratory specimens should be labeled either immediately before or immediately after collection.
  o Attach label so blood volume can be seen for pipetting and sampling purposes.
  o Specimens should be labeled in a way that minimizes the risk of the actual specimen being separated from the label.
    • Label the specimen container, not the lid.
    • Label the cytology slides, not the tray on which they are submitted.
    • Label the ammonia tube, not the cup of ice.
  o Samples received by the laboratory without proper identification will be sent back to the submitting service.
  o It will be the responsibility of the submitting service to definitively decide the identity of the patient.
  o If a specimen type is not blood or urine, note the “site” on the label (i.e. abdominal fluid, pleural fluid, synovial fluid, etc.)

D. Sample Submission

  o All tests should be requested in UVIS under Request Profile. Items will automatically post to the bill when you press “submit/accept” and the request will be submitted to Clinical Pathology.
    • If the “status” indicates “new” the request has not been billed or submitted for analysis to be performed. Press “submit/accept” to complete the request.
  o Submit all samples to the receiving desk located in Clin. Path. (C269) or send via pneumatic tube to station 112.
  o Submit urine in cups/tubes with lids or a syringe with a cap. OSHA regulations require that samples cannot be accepted in syringes with needles.
  o All specimens must be submitted in closed containers.
  o Submit specimens ASAP after collection to maintain sample integrity.
  o The Clinical Pathology Lab does not accept samples from patients that have been given chemo until the chemo drug has passed it’s half life.

E. Types of Analysis

  o Routine Testing:
    • All routine requests submitted before 5:00 PM, Monday through Friday will have an allowable turn- around time of 3 hours.
      ▪ Routine samples submitted after 5:00 PM, Monday through Friday will be analyzed as time allows, with emergency “stat” samples taking priority.
      ▪ Routine samples submitted after 5:00 PM, Monday through Friday can be processed to a stable state and testing completed the next day.
    • Routine cytology samples submitted by 3:00 PM will be read out and results reported the same day, Monday through Friday.

  o “STAT” Testing
    • “Stats” should be reserved for emergencies only!
    • One hour turnaround for all the tests listed except blood bank.
    • There can be a delay if an instrument is down or if an analyte requires dilution.
    • There is an extra charge for all tests requested “stat”.
    • Tests available as “stat”:
      ▪ Crossmatch – 2 hour turn-around
      ▪ All chemistry tests performed on Cobas Integra 400 plus
      ▪ All in-house coagulation tests except mixing study
      ▪ Cytologies**
        • **STAT cytology requests after 3:00 PM require a pathologist’s approval before submission.
      ▪ CBC
      ▪ Differential
      ▪ Platelet count

  o “ASAP” testing
    ▪ Used only as a “flag” to notify the lab of certain types of testing
• Oncology CBC and Chemo Heme
  • Chemo Heme has a 30 minute turnaround time.
• Dentistry CBC and Chemistry Profile
• Analysis of other samples is not stopped to process ASAP requests.
• Testing is done before the next batch of routine testing.

○ “ON CALL” testing
  • Tests available:
    ▪ Crossmatch
    ▪ Coagulation panels
    ▪ Spinal fluid analysis
    ▪ Bile acids and/or ammonia for status epilepticus
    ▪ Fluid creatinine when uroabdomen is suspected
  • On call personnel should be called at home before attempting to page them.
    ▪ 15 minutes to respond to the page
    ▪ One hour maximum to arrive at the VHC
  • Samples should be collected and brought to the lab before paging personnel

○ After-hours emergency samples
  • The “after hours” period begins at 7:00 PM Monday through Friday.
  • Equipment is located in small animal ER and large animal satellite pharmacy
    ▪ All tests performed should be requested in UVIS using product line # 780.
    ▪ Samples should be left in the small refrigerator located in each area for laboratory personnel.
    ▪ A copy of the results should be left in the bin for laboratory personnel.
    ▪ Results will be reviewed and entered into UVIS by laboratory personnel.
    ▪ Differentials and urine microscopics will be confirmed by laboratory personnel.
    ▪ Chemistry results flagged as “outside the linearity “ or “HEM / LIP / ICT” will be confirmed on main lab chemistry analyzer.
  • Tests available:
    ▪ Chemistry panel
    ▪ Hemogram
    ▪ Differential
    ▪ Fluid cell counts
    ▪ Packed cell volume
    ▪ Plasma protein
    ▪ Fibrinogen (large animal only)
    ▪ Urinalysis (small animal only)
    ▪ **Parvo (small animal only)
    ▪ **FIV / FELV (small animal only)
    ▪ Float (small animal only)
    ▪ **3DX (small animal only)
    ▪ **Ethylene Glycol (small animal only)
  **Should only be used for patients seen by Emergency / Triage. All other services should submit their requests to the appropriate laboratory.

○ After-hours non-emergency samples
  • Request tests in UVIS
    ▪ CBC
      ▪ Make 2 good smears, label. Keep at room temperature. These slides should be left on the ledge above the small refrigerator in the hallway outside Clinical Pathology.
      ▪ Place properly labeled tube of blood in the Clinical Pathology rack in the small refrigerator in the hallway outside Clinical Pathology.
    ▪ Urine
      ▪ Place properly labeled sample in the small refrigerator in the hallway outside Clinical Pathology.
    ▪ Serum and Plasma:
      ▪ Allow the red top tube to sit for 10 minutes to assure good clot.
Centrifuge sample for 10 minutes.
- Pipette serum/plasma off of cells, and place serum/plasma in capped plastic tube.
- Label. Be sure to note serum/plasma or other sample type on the tube.
- Place the sample in the Clinical Pathology rack in the small refrigerator in the hallway outside Clinical Pathology.
- Place all used equipment/tubes in biohazard container or sharps container.

- **Pharmacology Testing**
  - Tests listed under product lines 785 and 793 will be performed Tuesday, Thursday, and Friday.
  - For test interpretation, please contact Dr. Mark Papich, Ext 36221, Afterhours 919-319-1425.
  - Pharmacology website for test specific information: http://www.cvm.ncsu.edu/vhc/csds/clin_pharm.html

- **Send-out Tests**
  - These requests pose unique problems with processing and shipping.
  - Samples will be shipped, at most, the next regular working day after submission.
    - Exceptions include Fridays and Holidays where personnel are not available on the other end to receive the samples.
  - Collection information for send out tests is located in UVIS; press the green “i” button beside the test being requested.
  - When submitting tests that are not part of our protocol, please provide the following information:
    - Name and address of facility which will perform the test
    - Phone number of facility
    - Fee that will be charged to our facility
    - Storage requirements
    - Shipping requirements
    - Turnaround time
  - These tests will then be added to our protocol for future use.
  - The Clinical Pathology Lab does not ship samples internationally.
    - One exception: Erythropoietin
  - When Clinical Pathology has an established protocol for any given test, all requests for that test will be sent to the laboratory designated in the protocol.
    - Requests for changing the protocol must be made to the laboratory supervisor by the head of the service.
    - Input will be sought from the hospital before changing protocols.
  - See comments below regarding research samples to be sent to reference labs.

- **Research Samples**
  - Requests for testing research samples need to be approved and scheduled in advance by the lab supervisor or designee.
  - Researchers should assure with their accountant that the research number is set up and available for billing in the VHC.
  - Forms are available in the Clinical Pathology for requesting tests.
  - Laboratory personnel will bill requests through UVIS.
    - The electronic bill will be closed at the end of the work day.
    - And an SUB (service unit billing) will be generated back to the correct department.
    - The next working day, a paper invoice is supplied to the appropriate bookkeeper indicating that the invoice has been paid.
  - Research samples should be submitted by 3:00 pm
  - Due to limited personnel, and limited hours of operation, research will not be accepted or run on weekends or holidays.
  - The goal of the lab is to report results for all research within 24 hours of submission.
    - If there will be a delay, the researcher will be notified.
  - Number of samples accepted in one day:
    - Unlimited chemistry samples. Turnaround times may be extended for larger studies.
- Unlimited mammalian hematology samples. Turnaround times on differentials may be extended for larger studies.
- No more than 5 samples for complete urinalysis at a time.
- No more than 3 exotic / avian samples for complete blood counts should be submitted at one time.
- No more than 5 parasitology samples should be submitted at one time.
- No more than 5 cytology fluid samples with cell counts should be submitted at one time.
- Unlimited cytology samples that do not require cell count, protein, and specific gravity.
  * Note: Studies involving cytology samples should be scheduled with a pathologist in addition to the laboratory personnel. The same pathologist should read all cytologies from one study.
- Notify the laboratory staff of any sample for which the animal is sick. Research samples are not normally done “stat”, but we will make every effort to analyze sample for sick animals in line with clinical samples.
- The rationale for this policy is based on the relatively small size of the Clinical Pathology Laboratory Staff. Significant fluctuations in workload are difficult to compensate for with limited personnel.

- Blood gases are performed by the attending researcher, student, or technician on analyzers located in ICU and LA surgery.
  - A research request form should be submitted to the lab indicating proper billing information.
  - The blood gases will be requested / billed by lab personnel, Monday through Friday.
- Non-clinical research samples to be sent to reference labs are not processed or shipped by Clinical Pathology.
  - Researchers may obtain any available protocol from laboratory personnel.
  - Clinical research, where the animal is a patient of the VHC, will be handled like a clinic case.

F. LAR samples

- Samples from LAR are treated the same as clinical samples.
- Requests can be made either “routine” or “stat” in accordance with the procedures outlined above.
- It is not necessary for the animal to be admitted to the Veterinary Health Complex.
- LAR personnel should request the test(s) on the multi-colored “research” form.
- Necessary information:
  - Animal’s name or identification #
  - Clinician requesting the analysis
  - Date and time that the sample was collected
  - Test requested
  - Account number to be billed
- Laboratory personnel will request the tests in UVIS for billing and resulting.
- Finalized results will be placed in the wall pocket labeled “LAR”, located in the hallway outside Clinical Pathology.

G. General Practice

- All General Practice requests should be submitted through UVIS using product lines 793 and 795.

H. Sample Retrieval / Testing on previously submitted specimens

- If the service would like our laboratory to use a previously submitted specimen, they should notify our staff.
- Before submitting the request:
  - Click on the “goggles” to the right of the procedure.
  - Click on the “questions” button located on the right side of the screen
  - Enter information in the “comment” box that indicates what specimen to use and the date the specimen was submitted.
  - If the specimen was submitted to another lab, the student, technician, or clinician should retrieve the specimen for submission to Clinical Pathology.
- Our staff will pull samples from previous Clinical Pathology submissions for additional testing in our lab.
- The student, technician, or clinician can pull samples from our refrigerator for submission to other labs.
- If the specimen is taken from the Clinical Pathology Lab, it should be “signed out” on the sheet located in the pocket on the refrigerator door. This assures that the specimen can be located if needed.
- All samples, except feces, are kept for 7 days in the refrigerator.
There is a UVIS line item that can be requested for a specimen to be frozen and kept for 6 months.

I. CVM Client Pets

- The Clinical Pathology Lab will accept sample for staff, student and faculty’s personal pets.
- Patient must have an established medical record number.
- All requests need to be made by a DVM, and come through a VHC service.
  - Service opens a bill.
  - Service requests tests
  - Results go back to the requesting DVM
  - Results will not be released directly to the owner unless he/she is a DVM
  - Results will be available in the hospital information system for future reference.

J. Non-human Primates

- Because of the risk of zoonosis, the Clinical Pathology Lab will not accept non-human primate samples.
- Clinicians requesting work on non-human primates should be directed to a private laboratory such as Antech.
- One exception:
  - If a primate is brought to the Vet. School as a patient, and has been born and raised in captivity, we may approve for labwork to be performed.
  - Approved on an individual basis.
  - The clinician should communicate with the lab before drawing the sample.
  - These cases will always be handled with the health and well-being of our staff as the primary concern.