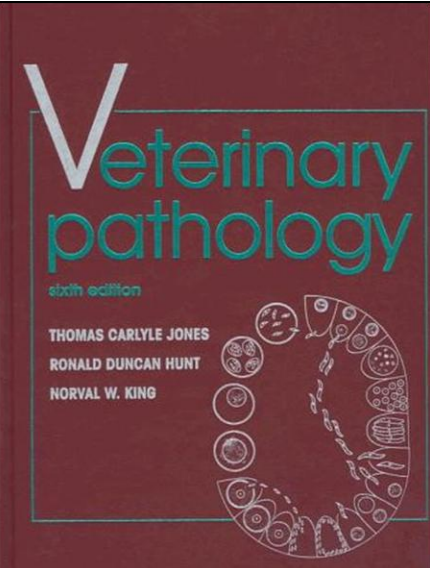




Mahidol University  
*Wisdom of the Land*

# Veterinary Pathology in Animal Biomedical Research

Neel Aziz, DVM, DACVP  
Staff Pathologist  
Center for Veterinary Diagnosis  
Faculty of Veterinary Science  
Mahidol University  
Nakhompathom Thailand



**Veterinary pathology**  
sixth edition  
THOMAS CARLYLE JONES  
RONALD DUNCAN HUNT  
NORVAL W. KING

## Veterinary Pathology

The Bridge From Cellular Changes to Clinical Disease

[www.mahidol.ac.th](http://www.mahidol.ac.th)



Mahidol University  
*Wisdom of the Land*

## Bottom Line Up Front (BLUF)

- If you are using animals for a study ...your best friends should be a LAB ANIMAL VETERINARIAN and A VETERINARY PATHOLOGIST

[www.mahidol.ac.th](http://www.mahidol.ac.th)



Mahidol University  
*Wisdom of the Land*

## Outline

- What is a Board Certified Veterinary Pathologist
- Asset to the research team and animal facility
- Common Pathology Issues

[www.mahidol.ac.th](http://www.mahidol.ac.th)



Mahidol University  
*Wisdom of the Land*

## Veterinary pathologists

- Sole veterinary medical specialist trained to bridge the gap between cellular changes and clinical disease
- Provide gross, microscopic, ultra structural and molecular analysis of tissue changes resulting from disease state, and thus are the keystone of biomedical research and animal medicine



[www.mahidol.ac.th](http://www.mahidol.ac.th)




Mahidol University  
*Wisdom of the Land*

## Veterinary pathologists

- Pathologists provide essential macroscopic, microscopic, ultrastructure and molecular studies necessary to develop animal models of human disease; provide expert diagnostic pathology support; and lead or support animal studies with predictive value for human conditions



[www.mahidol.ac.th](http://www.mahidol.ac.th)



Mahidol University  
*Wisdom of the Land*

## Pre-Requisites

- Biology I & II
- Inorganic Chemistry I & II
- Organic Chemistry I & II
- Physics
- Microbiology
- Biochemistry
- Calculus I
- Statistics

[www.mahidol.ac.th](http://www.mahidol.ac.th)



Mahidol University  
*Wisdom of the Land*

## Veterinary School

<b>Basic Sciences</b>	<b>Clinical Science</b>
<ul style="list-style-type: none"><li>• Anatomy (Gross, Micro)</li><li>• Physiology</li><li>• Immunology</li><li>• Virology</li><li>• Microbiology</li><li>• Parasitology</li><li>• Anatomic Pathology</li><li>• Clinical pathology</li><li>• Neuroanatomy</li><li>• Endocrinology</li></ul>	<ul style="list-style-type: none"><li>• Surgery</li><li>• Internal medicine</li><li>• Infectious Disease</li><li>• Laboratory animal medicine</li><li>• Food animal medicine</li><li>• Public health</li><li>• Epidemiology</li></ul>

[www.mahidol.ac.th](http://www.mahidol.ac.th)



Mahidol University  
*Wisdom of the Land*

## Veterinary Pathologists

- Types
  - Anatomic
  - Clinical
- Anatomic: 3 year Residency Diagnostic Lab, Research Institute, Zoo/ Wildlife Center
- Successful completion of a certifying exam
- **ACVP**: American College of Veterinary Pathology
- **ECVP**: European College of Veterinary Pathology
- **JCVP**: Japanese College of Veterinary Pathology

[www.mahidol.ac.th](http://www.mahidol.ac.th)



Mahidol University  
*Wisdom of the Land*

## General Pathology

- Cellular adaptations, Cell degeneration, Cell death
- Inflammation:
  - Acute
  - Chronic
- Tissue renewal and Repair:
  - regeneration
  - healing,
  - Fibrosis
- Hemodynamic disorders, Thromboembolic disease, Shock
- Genetic disorders
- Diseases of Immunity
- Neoplasia
- Infectious Diseases
- Environmental and Nutritional Pathology

[www.mahidol.ac.th](http://www.mahidol.ac.th)




Mahidol University  
*Wisdom of the Land*

## Systemic Pathology

- Large, Small, Livestock, Domestic, Zoo, Laboratory, Wildlife, Aquatic
- Bacterial
- Fungal
- Viral
- Parasitic
- Neoplastic
- Metabolic
- Degenerate
- Toxic
- Experimental
- Zoonotic
- Emerging


 [www.mahidol.ac.th](http://www.mahidol.ac.th)



Mahidol University  
*Wisdom of the Land*

## Clinical Pathology

- Interpretation of
  - Complete Blood Count
  - Blood Chemistry
  - Urine analysis
  - Endocrine and Blood function/Evaluation test
- Cytology: Smears (impression, blood, fluid), Fine needle aspirates, Centesis

 [www.mahidol.ac.th](http://www.mahidol.ac.th)



Mahidol University  
*Wisdom of the Land*

## Fundamentals

- Gross Anatomy Differences
- Postmortem Examination
- Histology (ultra structural)
- Microscopic Imaging
- Animal Model Selection
- Pathogenesis /Pathophysiology
- Cause of Death

[www.mahidol.ac.th](http://www.mahidol.ac.th)



Mahidol University  
*Wisdom of the Land*

**ASSET TO THE RESEARCH TEAM  
AND ANIMAL FACILITY**

[www.mahidol.ac.th](http://www.mahidol.ac.th)



## Veterinary Pathologist


- Member of research team
- Help Develop protocol from the ground up
- Advises animal model and process
- Selects appropriate tissues, histo stains and preservation technique
- Analyzes and interprets (“path data”) observations



## Research support


- Consultation with a veterinary pathologist at the conception of a protocol
- Animal model selection
- Tissue/Lesion sampling (training)
- Proper tissue preservation
- Ancillary diagnostic and imaging techniques



 Mahidol University  
*Wisdom of the Land*

## Contact


- **FIRST: Study/Protocol development stage**
  - Development
  - Time Line
  - End of Study
  - Days before report is due
- Animal selection
- Unscheduled deaths
- Study timeline changes

 [www.mahidol.ac.th](http://www.mahidol.ac.th)

 Mahidol University  
*Wisdom of the Land*

## Research Support

- Diagnostic pathology for unscheduled deaths of any animal
- Semi-quantitative and quantitative pathology data
- Customizable pathology report
- Publication-quality images
- Formulation of data, material, and methods for publication

 [www.mahidol.ac.th](http://www.mahidol.ac.th)




Mahidol University  
*Wisdom of the Land*

## QA/QS

- Monitoring of laboratory animals and their environment for infectious and noninfectious factors that can interfere with research and testing
- Quality Assurance
  - Approved Vendors (no quarantine needed)
  - Unapproved sources (quarantine required)
- Quality Surveillance
  - Quarterly/ annually

[www.mahidol.ac.th](http://www.mahidol.ac.th)




Mahidol University  
*Wisdom of the Land*

## Sentinels


- Certain populations cannot be directly sampled, due to study or housing limitations, and require a sentinel monitoring program.
- Sentinels are animals housed in direct or indirect association with the population of animals to be surveyed.
- After sufficient association to allow transmission of infectious agents and presumed development of the disease or serologic titers, the sentinel animals are screened to detect the agents in question


[www.mahidol.ac.th](http://www.mahidol.ac.th)

 Mahidol University  
*Wisdom of the Land*

## Deaths


- Scheduled/ End of Study
- Unscheduled
- Receipt
- Beginning of study
- Entrance in facility
- Study room

 [www.mahidol.ac.th](http://www.mahidol.ac.th)

 Mahidol University  
*Wisdom of the Land*

## Necropsy/Tissue Harvest

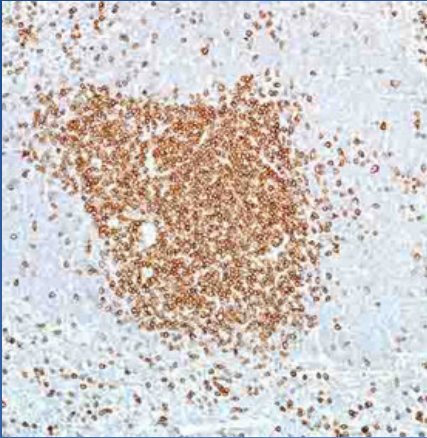
- Difference
- Training
- Gross lesion Recognition
- Selection of tissues
- Sample Submission

 [www.mahidol.ac.th](http://www.mahidol.ac.th)

Mahidol University  
*Wisdom of the Land*

## Microscopic Interpretation

- Hematoxylin & Eosin
- Special stains (Masson's, PAS)
- Immunohistochemistry (Vimentin, CD3)
- Immunofluorescence Antibody
- Selection of IHC/Special stains
- Electron Microscopy

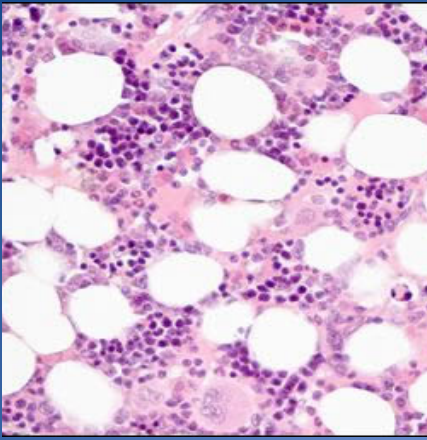


www.mahidol.ac.th

Mahidol University  
*Wisdom of the Land*

## Microscopic Imaging

- Journal/ Education Photos
- Study Update
- Label
- Interpretation



www.mahidol.ac.th



Mahidol University  
Wisdom of the Land

## COMMON PATHOLOGY ISSUES

[www.mahidol.ac.th](http://www.mahidol.ac.th)



Mahidol University  
Wisdom of the Land

### STUDY PERSONNEL AND QULAIFICATIONS

Name	Education	Procedures Performed	Training
Dr. First Last	PhD	Necropsy	Self Trained
		Histo path Slide Reading	Self Trained
		Sample Submission	Self Trained
Ms. Jane Doe	MS	Necropsy	Trained by Dr. Last
		Slide Reading	Trained by Dr. Last

[www.mahidol.ac.th](http://www.mahidol.ac.th)

 Mahidol University  
*Wisdom of the Land*

• **NO PATHOLOGY  
NEEDED**

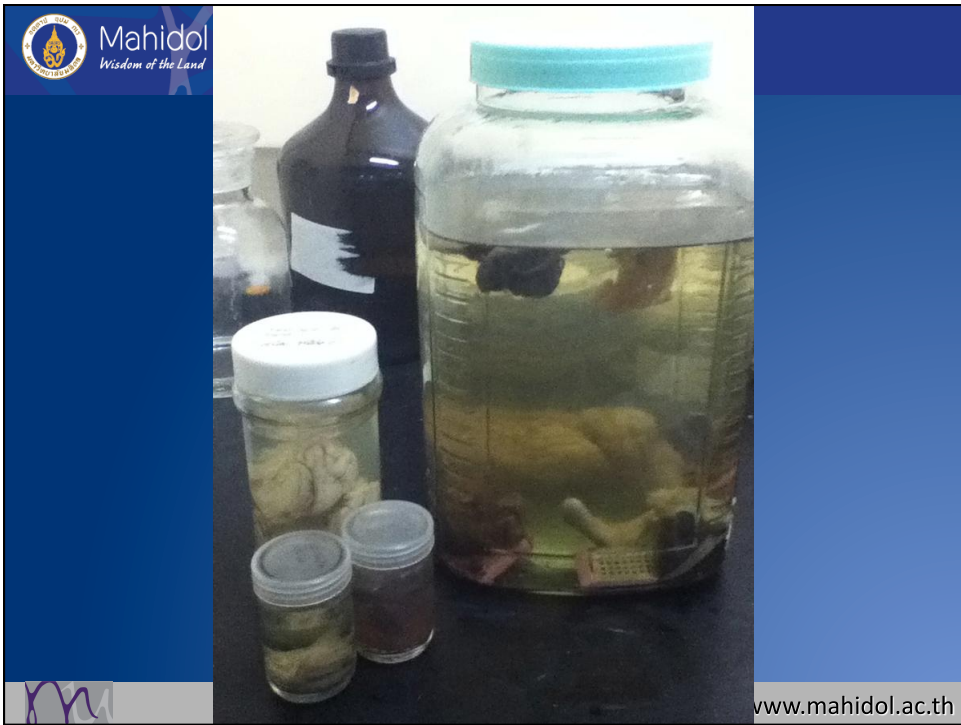
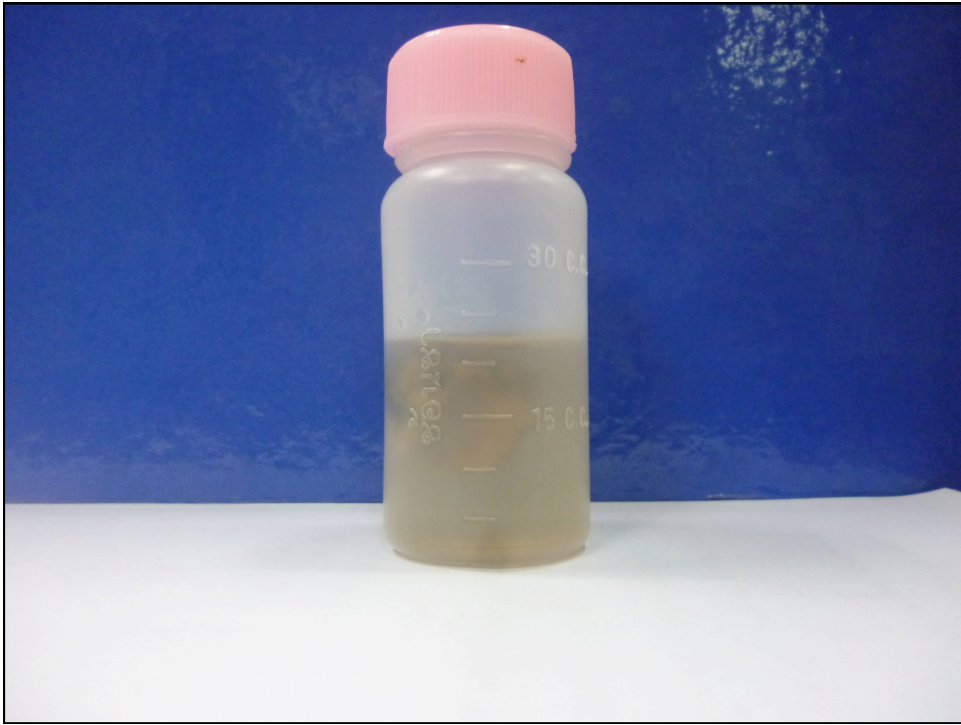
 [www.mahidol.ac.th](http://www.mahidol.ac.th)

 Mahidol University  
*Wisdom of the Land*

 [www.mahidol.ac.th](http://www.mahidol.ac.th)











Mahidol University  
*Wisdom of the Land*

## Histopath Samples Submission

- Tissue samples for hisopath evaluation, placed in 10% neutral buffered formalin
- Not more than 0.5 cm thick
- 10:1 Formalin to Tissue ratio
- Labels
- Sample selection
  - 1) Lesion
  - 2) Healthy Tissue & lesion
  - 3) Samples are relative to animal size



[www.mahidol.ac.th](http://www.mahidol.ac.th)




Mahidol University  
*Wisdom of the Land*

## Reporting

- Only what we see
- Stand alone report
- Pathology Summary
- Customizable
- Photos
- Scoring/Incidence chart

[www.mahidol.ac.th](http://www.mahidol.ac.th)




Mahidol University  
*Wisdom of the Land*

## Essential Information

- Time line of study
- Labels/Numbering
- Key study personnel
- Study type
  - Drug Efficacy
  - Drug Safety
  - Model Development
  - Experimental Design

[www.mahidol.ac.th](http://www.mahidol.ac.th)



Mahidol University  
*Wisdom of the Land*

## Correlation of Data

- Qualitative/ Quantitative
- Proteomics
- Clinical pathology
- Organ Weights

[www.mahidol.ac.th](http://www.mahidol.ac.th)



Mahidol University  
*Wisdom of the Land*

## Off-Site Pathology Services

- Training
  - Veterinary Techs
  - Vets
  - Histo Tech
- Data
- Samples
- Chain of custody

[www.mahidol.ac.th](http://www.mahidol.ac.th)



Mahidol University  
*Wisdom of the Land*

## Questions



[www.mahidol.ac.th](http://www.mahidol.ac.th)