COURSE:
GENERAL VETERINARY PATHOLOGY

SYLLABUS - THEORY

- Introduction and scope of Veterinary Pathology
- Brief outline of major intrinsic and extrinsic causes of disease.
- Aplasia, hypoplasia, atrophy, hypertrophy, hyperplasia, metaplasia and dysplasia.
- Causes and mechanism of reversible and irreversible cell injury, necrosis and its types, apoptosis, differences between post-mortem autolysis and necrosis. Gangrene
- Acute cellular swelling and its variants. Glycogen overload and fatty change. Heat shock proteins and lysosomal storage diseases.
- Inflammation: definitions, classification, various cell types and their functions, mediators, cardinal signs and systemic effects.
- Pathology of hyperaemia, congestion, hemorrhage, edema, thrombosis, embolism, infarction and shock.

SYLLABUS – THEORY conti……

- Major exogenous and endogenous pigments. Metastatic and dystrophic calcification.
- Jaundice in animals. Photosensitization
- Cell cycle and cyclins, soluble and insoluble mediators (including growth factors).
- Wound healing by primary and secondary intention.
- Pathology of autoimmune diseases and amyloidosis.
- Definitions, general characteristics and classification of neoplasms. Differences between benign and malignant tumours, etiology and spread of neoplasms, immunity and neoplasia, effects and diagnosis of neoplasia, stages and grades of neoplasms.

SYLLABUS - PRACTICAL

- Study of gross pathological specimens and recognition of pathological lesions.
- Post-mortem (P.M.) techniques. Collection of morbid materials for pathological diagnosis.
- Techniques for preservation and dispatch of materials.
- Section cutting, staining and identification of microscopic lesions.
- Examination of slides depicting changes in cells and tissues.
- Study of histopathological slides showing hemorrhage, congestion, oedema, infarction, hyperplasia, metaplasis, hypertrophy, necrosis, cloudy swelling, amyloid degeneration, fatty changes, calcification . infiltration etc.
- Examination and interpretation of oncological tissue slides

INTRODUCTION

- **Pathology - Greek word**
  - **Pathos = suffering or disease**
  - **Logos = study**
  - **Study of disease**

- **Definition:**

  "Structural and functional changes in cells, tissues, and organs that underlie disease"

Basic Terminology

- **Health :** Normal condition of the body and mind
- **Homeostasis :** Mechanism by which the body is kept in equilibrium .
- **Disease:** Any deviation from normal or interruption of normal structure or function of any body part, organ, or system
- **Aetiology (Etiology):** The science dealing with causes of disease

- **Incubation period:** Time that lapses between the action of a cause and manifestation of disease.

- **Pathogenesis:** Progressive development of a disease process or mechanism by which the causes produce diseases.

- **Clinical signs:** Outward manifestations of the patient's suffering from disease while alive

- **Symptom :** is a clinical sign (eg. lameness, rolling due to colic)manifested by the individual as the result of tissue changes

- **Syndrome:** A group of signs / symptoms that collectively indicate or characterize a disease

- **Lesions :** Macroscopical (visible to naked eye) or microscopical changes in tissue structure.

- **Pathognomonic lesion(s):** Pathognomonic lesion(s) is/are characteristic for a particular disease OR Alteration that indicates without doubt the cause of a particular disease.

- **Course of the disease:** Course of the disease is the duration of time through which the series of changes characteristic of disease pass through to their ultimate end.

Pathognomonic

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

'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 while some lesions can be highly suggestive of a particular etiologic agent, be wary when using the term 'pathognomonic'

Diagnosis:

- Art or act of identifying a disease from its signs, symptoms, and also through various laboratory tests

Example

- Buffaloes showing difficult breathing, hunched posture, and depression **(clinical signs).**
- Physical examination of some of the infected animals reveals elevated temperatures, pulse rates, and respiration rates **(clinical signs).**
- Auscultation of the thorax reveals absence of air movement in the cranial region of the thorax along with some crackles and wheezes in other lung fields.
- A **clinical diagnosis** of bronchopneumonia is made.

- Some of the animals die, and a **necropsy (postmortem examination)** is done.
- The cranioventral lobes of the lungs are dark red and firm, with fibrin covering the surface **(gross lesions)**.
- A **gross morphologic diagnosis** of severe acute fibrinopurulent cranioventral bronchopneumonia is made.
- Formalin fixed samples are taken for microscopic examination (histopathology), neutrophilic inflammation of airways and alveoli with fibrin are noted **(microscopic lesions)**, and a histologic morphologic diagnosis of severe acute fibrinopurulent bronchopneumonia is made.

- Some of the animals die, and a **necropsy (postmortem examination)** is done.
- The cranioventral lobes of the lungs are dark red and firm, with fibrin covering the surface **(gross lesions)**.
- A **gross morphologic diagnosis** of severe acute fibrinopurulent cranioventral bronchopneumonia is made.
- Formalin fixed samples are taken for microscopic examination (histopathology), neutrophilic inflammation of airways and alveoli with fibrin are noted **(microscopic lesions)**, and a histologic morphologic diagnosis of severe acute fibrinopurulent bronchopneumonia is made.

- Fresh samples of lung are taken for bacterial and viral examination, and *Mannheimia haemolytica* and a bovine herpes virus **(etiologic agents or causes)** are identified.
- An **etiologic diagnosis** of Mannheimia bronchopneumonia and a disease diagnosis of “shipping fever pneumonia” are made.

- **Morphological diagnosis:** **D**iagnosis based on the alterations observed in a tissue or organ. e.g. Pneumonia

- **Aetiological diagnosis :** Where specific cause of the disease can be identified

- **Specific or definitive diagnosis :** Where the pathognomonic lesions are characteristic of the disease can be observed. e.g. Corrugated appearance of intestine in Johne's disease in cattle,

- **Differential diagnosis:** Differential diagnosis is aimed at diagnosing a disease by differentiating from different diseases based on clinical and pathological findings. This is the first step in diagnosis..

- **Prognosis:** Prognosis is pronouncing probable /expected outcome of the disease.

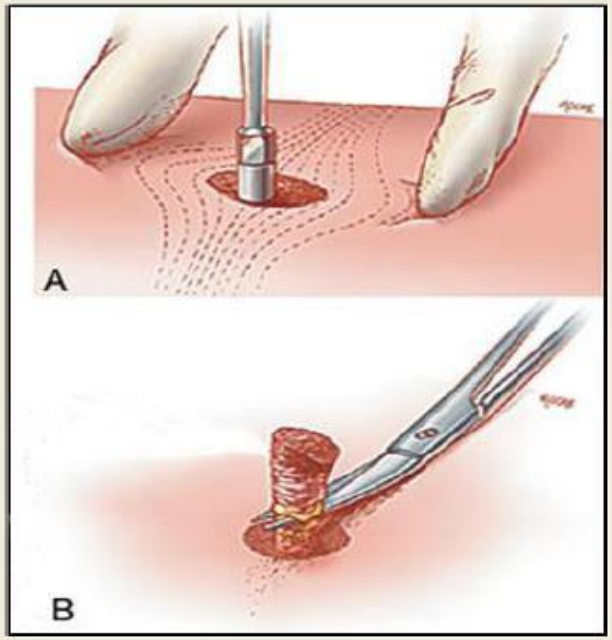
- **Sequelae:** Final end result of the disease

- **Morbidity:** Morbidity is the percentage of affected animals that get exposed

- **Mortality rate:** Mortality rate of a disease is the percentage of deaths among animals affected by that disease.

Biopsy

= the removal and 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.

BRANCHES OF PATHOLOGY

- **General pathology :** The study of basic responses of cells and tissues to insults and injuries, irrespective of the organs, systems, or species of animal involved.

- **Systemic pathology** : The study of diseases peculiar to certain systems or organs

- **Special pathology:** The study of diseases caused by specific microbial pathogens

- **Comparative pathology**: The study of diseases of animals and comparing them to those occurring in man.

- **Clinical pathology:** Clinical pathology concerned with the diagnosis of disease based on the laboratory analysis of bodily fluids such as blood and urine, as well as tissues, using the tools of chemistry, clinical microbiology, hematology and molecular pathology.
- (G. clinics, klinike = bed)

- **Nutritional pathology** is the study of disease processes resulting from deficiency or excess of essential foods

- **Experimental pathology** means the study of disease artificially produced in animals

- **Chemical pathology** deals with alterations in biochemical processes in diseases

- **Toxicopathology** means the study of diseases caused by toxic substances

- **Oncology** (Gk. Onco-Tumour) is study of tumours.

HISTORY OF VETERINARY PATHOLOGY

Renatus Vegetius:

- first to write a textbook on veterinary medicine
- Father of Veterinary Medicine

Antonio Benivieni (1440-1502)

- Remarkable pioneer in reporting postmortem examinations. A gifted pathologist
- 'Father of Pathological Anatomy',

John Hunter : First Experimental Pathologist

Julius Cohnheim: Originator of Modern Experimental Pathology