



# Pathology Introduction

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# Pathophysiology Basics

## Pathology

- Study of disease
- Described in terms of the structural or anatomical changes

## Pathophysiology

- Study of the physiology of disease
- Described in terms of the functional changes of the disease

# Etiology

Study of the causative agent(s) of disease

In medicine, we record the etiology as **E.A.** in the the patient's chart -  
etiological agent



# Major Classifications of Etiology

- Endogenous etiology
- Exogenous etiology
- Acquired etiology
- Degenerative disorders
- Abnormal immunity
- Neoplasms
- Psychosomatic disorders
- Psychiatric causes
- Iatrogenic

# Endogenous Etiology

- From “inside of”
- Genetically linked and predetermined
- Genes are responsible for defects
- **Autosomal dominant disorders**
  - 50% chance if 1 parent has the gene
  - Achondroplasia – a form of dwarfism
  - Huntington’s disease – leads to psychiatric conditions and dementia
  - BRACA 1 & BRACA 2 – leads to breast and ovarian cancer increases
  - Cystic kidney disease and polycystic kidney disease
  - Osteopetrosis – “stone bone”
  - Polycystic liver disease

A background image showing several cells with fluorescent staining. The cells are irregular in shape and have a bright green outline. The interior of the cells is stained with a mix of purple and blue, with some yellow and red spots. The overall appearance is that of a microscopic view of biological tissue.

- **Autosomal recessive disorders**

- Gene must be may not have the disease but carry the gene
  - 25% chance of transmission to offspring
- Phenylketonuria (PKU)
- Sickle cell disease
- Cystic Fibrosis

- **Sex linked diseases**

- Comes from the X chromosome – mother
- Duchenne muscular dystrophy
- Hemophilia
- Color blindness

- **Genetic predispositions**

- The abnormal gene is 100% responsible for the disease
- Lifestyle does NOT play a factor in pathogenesis
- In most disease processes, there is some genetic predisposition
- BRACA 1 & BRACA 2 genes are good examples

## • **Chromosomal disorders**

- Can be caused by environmental factors in the first trimester
- Teratogen - anything that can cause a defect of the developing fetus.
  - Fetal alcohol syndrome
  - Ionizing radiation, medications or other factors
- Can also be a true chromosomal abnormality
  - trisomy 21- Down's Syndrome
  - trisomy 18 – Edward's Syndrome – small organs, size & heart
  - Spina bifida, cleft palate, etc.



# Exogenous Etiology

- Any environmental factor that occurs after conception and before birth
- Defect happened during development *in utero*  
→ genes are intact
- Often referred to as environmental factors
- Examples: Fetal Alcohol Syndrome, Spina Bifida, Cleft Palate, etc.
  - Infections – viruses, bacteria, parasites, protozoa
  - Chemical toxins – can affect the body locally or systemically
  - Physical agents – trauma, electrical, radiation
  - Nutritional factors – folic acid for brain development

# Acquired Etiology

- Defect resulted from post-birth exposure
- Can also be from the reasons above
  - Infections, chemical toxins, physical agents, nutritional factors

# Degenerative Disorders

- Osteoarthritis
- Degenerative disc disease
- Macular degeneration
- Parkinson's disease
- Alzheimer's disease
- ALS
- Osteoporosis

# Abnormal Immunity

- Immunocompromised patients
- Autoimmune diseases

**Immunocompromised  
Vs.  
Immunocompetent**

# Neoplasms - Cancer

- Neo = new plasm = tissue growth
- Benign vs. malignant



# Psychosomatic Factors

- The mind affecting the body and the other way around
- Consider psychoneuroimmunology



# Psychiatric Disorders

- Neurosis disorders are mental disorders caused by an outside environment factor
  - Example is a person who has had a loss and now has symptoms as in grief, etc.
- Psychotic disorders start in the mind and not in the environment
  - May have hallucinations, delusions, etc.
  - Schizophrenia, bipolar disorder, paranoid psychosis

# Iatrogenic Causes

- “Iatro” in Latin means Doctor
- Diseases caused by treatment
- Examples – medication side effects, sequela of treatments and surgery, post surgical damage, etc.



# Pathophysiology Basics

- How do medical professionals respond to patients with disease?
- Establish a **Medical History**
  - “Timeline” of nature and severity of signs/symptoms
  - The medical history will contain many parts

# Pathophysiology Basics

**Signs-** Observable manifestations of disease (e.g. rash, fever, etc.)

**Symptoms-** Only felt by the patient (e.g. aches, nausea, pain, etc.)

**Syndrome-** The characteristic signs and symptoms of a given disease

- Perform a **Physical Examination**
- Compile the **Findings-** Collection of results from physical exams, lab tests, imaging, etc.

# Pathophysiology Basics

- **Pathogenesis**

- The pattern of development of a disease in a patient
- Is the normal course of the disease?
- Each disease has its own syndrome, which is a specific set of subjective complaints and objective findings
  - This is referred to as the differential diagnosis

- **Sequela**

- Any physical condition resulting from a disease
- Examples?

- Diseases can differ in terms of time course and severity:
  - **Acute**- Rapid onset, and shorter duration
  - **Chronic**- Onset may vary, but duration is usually much longer
- Diseases can differ in terms of location:
  - **Local**- Confined to one region of the body
  - **Systemic**- More widely distributed

# Pathophysiology Basics

- **Diagnosis**- The conclusion reached from analyzing medical history and findings
- **Therapy**
  - Treatment of the disease based on the diagnosis
  - May attempt to cure disease or just alleviate signs and symptoms
- **Prognosis**
  - Assessment of patient's response to therapy
  - Will typically be established in a similar manner as the diagnosis

# Clinical Case History Review

Lets consider a 85 year old female with right side congestive heart failure (CHF)

**What is the pathology of this disease?**

**What is the pathophysiology of this disease?**

**What is the etiology?**

**What are the signs and symptoms?**

**What is the prognosis?**

**Is there any sequela?**

