DURBAN UNIVERSITY of TECHNOLOGY

DEPARTMENT OF RADIOGRAPHY

FACULTY OF HEALTH SCIENCES

STUDENT ACTIVITY BOOK

SUBJECT : Radiographic Pathology II
Subject Code : RPAT201
SAPSE Code : 090304122
Lecturer : Mrs. R. Sunder

RESOURCES

PRESCRIBED TEXTS:

- REID and ROBERT, **PATHOLOGY ILLUSTRATED**, Churchill Livingstone, Latest Ed.
- ARMSTRONG, ROCKALL and WASTIE, **DIAGNOSTIC IMAGING,** Blackwell Scientific, Latest Ed.
- MARTIN, E.A. (editor), **OXFORD CONCISE MEDICAL DICTIONARY**, Latest Ed.
- TORTORA and DERRICKSON, **PRINCIPLES OF ANATOMY AND PHYSIOLOGY**, Wiley, 11th Ed.

Additional RESOURCES:

- MACE and KOWALCZYK, **RADIOGRAPHIC PATHOLOGY for TECHNOLOGISTS**, Mosby, 4th Edition
- EISENBERG and JOHNSON, **COMPREHENSIVE RADIOGRAPHIC PATHOLOGY**, Mosby.
- GOVAN, MACFARLANE and CALLANDER, **PATHOLOGY ILLUSTRATED**, Churchill Livingstone, 4th Ed.
- KUMAR, COTRAN and ROBBINS, **BASIC PATHOLOGY**, W.B.Saunders, Latest Ed.
- DAVIES, **MEDICAL TERMINOLOGY – A Guide to Current Usage**, Latest Ed.
- GRAINGER and ALLISON, **DIAGNOSTIC RADIOLOGY - A Textbook of Medical Imaging**, Churchill Livingstone, 1986 or latest edition.
- MOORE and AGUR, **ESSENTIAL CLINAL ANATOMY**, Lippincott Williams & Wilkins, Latest Ed.
- KUMAR and CLARK, **CLINICAL MEDICINE**, Bailliere Tindall, Latest Ed.
- CHAPMAN, S & NAKIELNY, R. **A GUIDE TO RADIOLOGICAL PROCEDURES**. Eastbourne W.B. Saunders, latest edition.
- SUTTON, D.A**. TEXTBOOK OF RADIOLOGY AND IMAGING**. VOL. 1 & 2, London : Churchill Livingstone, 1980 or latest.

INTERNET RESOURCES:

- **Organ System Pathology Images - http://library.med.utah.edu/WebPath/ORGAN.html**
- **The Internet Pathology Laboratory for Medical Education** - **http://library.med.utah.edu/WebPath/webpath.html**
- **WebPath Mini-Tutorials -**

http://library.med.utah.edu/WebPath/TUTORIAL/TUTORIAL.html

SYLLABUS THEME 1 - MEDICAL TERMINOLOGY

DEFINE THE FOLLOWING TERMS:

- Medicine
- Disease
- Aetiology
- Symptom
- Asymptomatic
- Auto-antibodies
- Benign neoplasm
- Leukaemia
- Lymphatic spread
- Lymphoma
- Lesion
- Necrosis
- Gangrene
- Immunity
- Inflammation
- Repair
- Infarct/ion
- Oedema (Dropsy)
- Diagnosis
- Prognosis
- Epidemiology
- Autoimmune disorders
- Carcinoma
- Hereditary
- Inflammatory
- Invasion
- Nosocomial
- Pathogenesis
- Syndrome
- Lumen
- Putrefaction
- Autoimmunity
- Infection
- Haemorrhage
- Hyperaemia
- Embolism
- Clinical history
- Clinical examination
- Malignant neoplasm
- Metabolism
- Metastatic spread
- Mortality rate
- Morbidity rate
- Sarcoma
- Seeding
- Degeneration
- Pathological calcification
- Apoptosis
- Anaemia
- Ischaemia
- Thrombosis
- Hypersensitivity/Allergy
- Acute Circulatory Failure (shock)

The following terms are descriptions of diseases. EXPLAIN the meaning of each:

- Congenital
- Acute
- Functional
- Local
- Silent
- Acquired
- Chronic
- Organic
- Systemic

WRITE short notes on the following types of diseases:

- Congenital and Hereditary
- Traumatic
- Infective and Inflammatory
- Endocrine
- Iatrogenic
- Iatrogenic and due to other causes
- Neoplastic/Tumours
- Metabolic
- Chemical poisonings
- Allergic
- Psychiatric

Briefly EXPLAIN how the presence of disease may be revealed.

DISTINGUISH between a disease diagnosis and its prognosis.

CITE characteristics that distinguish benign from malignant Neoplasms.

DESCRIBE the system used to stage malignant tumours.

IDENTIFY the difference in origin for carcinoma and sarcoma.

EXPLAIN the following **prefixes**:
Dys-
Haem-
Hydro-
Pneumo-
Py-

EXPLAIN the following **suffixes**:
-itis
-ectomy
-oma
-scopy
-osis
-ostomy
-otomy

SYLLABUS THEME 2 - CELL AND TISSUE DAMAGE

DEFINE THE FOLLOWING TERMS: (some will be revision from previous worksheet)

- Necrosis
- Autolysis
- Deposition
- Endogenous pigmentation
- Apoptosis
- Radiation damage
- Calcification
- Exogenous pigmentation
- Atrophy
- Ageing
- Degenerations

Cells are active participants in their environment, constantly adjusting structure and function to accommodate changing demands and extracellular stresses – maintains normal homeostasis. As a cell encounters physiologic stresses or pathologic stimuli, it adapts thereby achieving a new steady state and remaining viable. The principle adaptive responses include atrophy, hypertrophy, hyperplasia and metaplasia. When its adaptive capabilities are exceeded, cell injury develops. Cell injury is mostly reversible; however it can suffer irreversible injury and eventual death, if the stress is severe or persistent.

There are 2 patterns of cell death: WRITE short notes on these patterns.

The stresses that can induce cell injury range from gross physical trauma following a MVA to a single gene defect that underlies many metabolic diseases. Most of the causes can be grouped into the following broad categories and include hypoxia, physical agents, chemicals & drugs, microbiologic agents, toxins, immunologic reactions, genetic defects, nutritional imbalances and age.
Kumar, Cotran and Robbins, Basic Pathology, Chapter 1 – Cell Injury, Death and Adaptation.

EXPLAIN these broad categories of causes of cell injury.

ACUTE CELL INJURY:
*There are 2 patterns of acute **reversible cell injury**.* **STATE and DESCRIBE the patterns.**
DESCRIBE the patterns of necrosis, including the different types.
DESCRIBE the patterns of apoptosis. -???

CELLULAR ADAPTATIONS OF GROWTH AND DIFFERENTIATION:
*As mentioned earlier, cells must constantly adapt to changes in the environment, even in normal conditions. **Pathologic adaptations** share the same mechanism, but they allow the cells to modulate their environment and maybe escape.* **EXPLAIN this statement.**

*The important pathologic adaptations in cell growth and differentiation include **atrophy, hypertrophy, hyperplasia and metaplasia.***
WRITE short notes on each of the adaptations.

CELL DAMAGE – RADIATION:
Ionising radiation (both gamma- and x- rays), as you learnt from 1st year, can cause serious cellular and tissue damage. **EXPLAIN this statement.**

CELLULAR AGEING:
True ageing and ageing complicated by disease processes may be difficult to differentiate, but true ageing is normally seen in an "ideal" environment with minimal stress. However, the latter is more identifiable and therapy can be directed more easily. **EXPLAIN how the progressive accumulation of alterations in structure and functions may lead to cell death or diminished capacity of the cell to respond to injury.**

HEREDITY, GENES AND DISEASE:
"Knowledge of the genetic influence on disease is increasing rapidly." (Reid & Robert,)
EXPLAIN the genetic abnormalities and associated disorders related to cells.

DEGENERATION:
Damage insufficient to cause necrosis, but may lead to necrosis or return to normal. Various types include fatty change, cloudy swelling and hyaline, fibrinoid, mucoid, and amyloid degeneration.
WRITE short notes on each type.

CALCIFICATIONS:
"Abnormal deposits of calcium salts occur in 2 circumstances: dystrophic and metastatic"
WRITE short notes on pathologic calcifications.

ENDOGENOUS PIGMENTATION:
Melanin is normal pigment found in skin, choroids of the eye and the adrenal glands. A "suntan" is a temporary pigmentation of the skin due to UV rays.
Briefly DISCUSS the abnormal pigmentation related to certain diseases.

SYLLABUS THEME 3 - INFLAMMATION

DEFINE THE FOLLOWING TERMS: (some will be revision from previous worksheet)

- Acute Inflammation
- Phagocytosis
- Chronic Inflammation
- Cellulitis
- Ulcer
- Chemotaxis
- Suppuration
- Resolution
- Ulceration
- Empyema
- Phagocytosis
- Hyperaemia
- Exudation
- Sinus
- Fistula

Inflammation is a protective response, occurring in vascularised connective tissue, to eliminate both the initial cause of cell injury (microbes/toxins) and the consequences of such injury (necrotic cells and tissues). It is interlinked with the repair processes.
While inflammation helps clear infections and makes healing possible, with repair; both have considerable potential to cause harm, eg.anaphylactic reaction. *(Govan, MacFarlane & Callander,)*

Inflammation is grouped into 2 basic forms: acute and chronic.
DESCRIBE the two (2) forms of inflammation.

LIST and EXPLAIN the 5 classical signs and 3 gross signs of acute inflammation.
EXPLAIN the role of chemical factors in acute inflammation.
DESCRIBE the sequels of acute inflammation.

Adding the suffix "itis" to the name of organ/tissue indicates type of inflammation eg. gastritis. The inflammatory process is influenced by the site, causing agent, severity and duration.
WRITE short notes on the special types of inflammation.

ULCERATION: *is a complication of any disease processes and cab be benign or malignant.*
With the aid of labelled diagrams, EXPLAIN the evolution of an ulcer.

Briefly EXPLAIN the role of the lymphatics and lymph nodes in inflammation.

SYLLABUS THEME 4 – HEALING

DEFINE THE FOLLOWING TERMS: (some will be revision from previous worksheet)

- Repair
- Contraction
- Wound healing
- Regeneration
- Angiogenesis
- Gliosis
- Keloid
- Fibrosis
- Stricture/stenosis
- Scar remodelling

Healing – final response to tissue injury.
Injuries and disease processes which cause death of cells produce a loss of continuity in tissues. When loss of continuity occurs, natural processes are quickly set in motion in an effort to restorse continuity – REPAIR (Davies, 1989)

WOUND HEALING:
This repair occurs 2 ways – healing by 1st intention (primary union) and healing by 2nd intention (secondary union). **EXPLAIN these processes, using detailed drawings.**

REPAIR BY CONNECTIVE TISSUE:
In some tissues the cells lose their power of multiplication, making regeneration impossible. The deficiencies are restored by a 3 component process termed repair by connective tissue. The components are angiogenesis, fibrosis and scar remodelling.
DESCRIBE this process and its consequences.
STATE the local and general factors that influence healing by fibrosis.

REGENERATION:
EXPLAIN this repair that is achieved by multiplication of undamaged specialised cells.

PATHOLOGIC ASPECT OF REPAIR:
A variety of factors, which may be extrinsic or intrinsic, frequently reduce the quality and adequacy of the repair process. They are infection, type of tissue injured, location and aberrations of cell growth. **EXPLAIN each factor.**

Using labelled diagrams, DESCRIBE healing in the different types of tissues.
TABULATE the adverse and favourable factors influencing healing of fractures.

SYLLABUS THEME 5 – INFECTION

DEFINE THE FOLLOWING TERMS: (some will be revision from previous worksheet)

- Micro-organisms
- Sub clinical infection
- Bacteria
- Protozoa
- Ingestion
- Anorexia
- Complement
- Bacteraemia
- Pyogenic bacteria
- Tuberculosis
- Microbes
- Healthy carrier
- Viruses
- Toxins
- Inoculation
- Malaise
- Septicaemia
- Gangrene
- Actinomycosis
- Syphilis
- Retroviruses
- Commensals
- Pathogens
- Fungi
- Inhalation
- Pyrexia
- Phagocytosis
- Pyaemia
- Abscess
- Tetanus
- Leprosy

Most micro-organisms are harmless, but some are pathogenic and establish themselves in the tissues and are able to survive and reproduce themselves. Most common are bacteria and viruses, fungi and other groups less commonly cause disease (Reid & Robert, 2005).

EXPLAIN the 3 routes of entry for infecting organisms.

Once an infection has occurred, it establishes itself in 2 ways, in the host or in the micro-organism. But it has to be noted that the body has defence mechanisms which try to prevent this occurrence. **EXPLAIN/DESCRIBE the factors influencing the course of infection.**

Reid and Roberts lists examples of failure of protective and defence mechanisms. **IDENTIFY them.**

BACTERIA:
DESCRIBE the 3 step process of bacterial infection.

Tissue invasion can lead to 3 consequences – bacteraemia, septicaemia and pyaemia.
EXPLAIN each consequence.
With reference to acute bacterial infection, DESCRIBE the following (use diagrams):

- **Pyaemic abscess**
- **Septic infarction**
- **Pyogenic bacteria**
- **Gangrene – 1^0 and 2^0**
- **Tetanus**

With reference to chronic bacterial infection (granulomas) , EXPLAIN the following:

- **Tuberculosis – 1^0 and re- infection**
- **Actinomycosis**
- **Leprosy**
- **Syphilis**

VIRUSES:
Viruses, the smallest micro-organisms, are only visible using an electron microscope. The virus particle consists of a central core of genetic material (either DNA or RNA) surrounded by a protein coat. It odes not contain the biochemical mechanism for replication, but relies on the resources of the infected cell.
Using a clearly labelled diagram, EXPLAIN how replication is accomplished.

EXPLAIN the term RETROVIRUSES.
EXPLAIN the evolution of a typical acute virus infection.
What is meant by latent virus infection. GIVE some examples.
EXPLAIN oncogenic virus infection

OPPORTUNISTIC INFECTIONs:
Occur in individuals whose resistance to infection is impaired., eg. HIV/AIDS patient.
EXPLAIN opportunistic infections.

GENERAL AFFECTS:
General body reactions in infection include fever, changes in metabolism and changes in the blood. **EXPLAIN these reactions**.

SYLLABUS THEME 6 - IMMUNITY

DEFINE THE FOLLOWING TERMS: (some will be revision from previous worksheet)

- Specific antibodies
- Immunoglobulin
- Complement
- Autoimmunity
- Antigen (Ag)
- Specific immune response
- Tolerance
- Antibody (Ab)
- Cell mediated immunity
- Acquired Immune Deficiency Syndrome (AIDS)

A person who has recovered from an infectious disease, eg. Measles; is most unlikely to suffer from it again – this is immunity (the inability to be infected). But may remain susceptible to other infections (Govan, MacFarlane & Callander, 1995).

REVIEW THE ANATOMY AND PHYSIOLOGY OF THE IMMUNE SYSTEM.

SPECIFIC IMMUNE RESPONSE:
Immunology is the study of the mechanisms involved in the establishment of specific immunity, the immune response and its consequences. **DESCRIBE and EXPLAIN the sequences of events in an infection, including the 1^0 and 2^0 responses.**

EXPLAIN the genetic influence on the immune response.
EXPLAIN cell-mediated immunity.
EXPLAIN T cell functions and mechanisms.
WRITE short notes on immunoglobulins (Ig).

IMMUNE REACTIONS:
The basic reaction is the combination of antigen (Ag) and antibody (Ab) to form an Ag/Ab complex, which is reversible in varying degree.
DESCRIBE the immediate and delayed reactions that can occur.

There are several consequences of the basic Ag/Ab combination which include precipitation, agglutination, anti-toxic effect and enhancement of the natural non-specific mechanisms.
EXPLAIN these consequences.

WRITE short notes on the following:
Mononuclear phagocyte system
Tolerance

IMMUNOPATHOLOGY:
"The complicated and delicately balanced immune mechanisms clearly have been developed to protect against antigens, particularly infections. When these immune reactions are upset, the protective mechanism can itself be a source of disease states" (Govan, MacFarlane & Callander, 1995). The 3 main categories are: hypersensitivity states, immune defiency states and autoimmune diseases.

HYPERSENSITIVITY REACTIONS: (important for Rad Prac II – contrast media and reactions)
These consist of an exaggerated response by an individual to an antigen. There are 4 classifications of immune responses. Types I, II and III are associated with humoral antibodies and Type IV is associated with cell-mediated immunity.
EXPLAIN each type, using drawing where necessary.

IMMUNE DEFIENCY STATES – AIDS:
A worldwide epidemic, due to infection by a lentivirus – human immunodeficiency virus (HIV). This disease is slowly progressive and is usually fatal.
EXPLAIN the stages of the disease following infection.
WRITE short notes on the epidemiology of AIDS.
WRITE short notes on the aetiology of AIDS.
EXPLAIN how transmission of this disease occurs.

AUTOIMMUNE DISEASES:

These diseases deal with or are associated with an immune response against the individual's own cells or cell products, where the body fails to differentiate self from non-self. Usually a late onset occurrence, in an ongoing disease state and is not the primary cause. It involves changes in humoral, cell-mediated immunity and tolerance.

While the aetiology of autoimmune diseases are not established, there are clues to their genesis. **Explain them**.

Certain substances within the tissues of an individual develop antigenic properties and cause formation of auto-antibodies. These may result in various types of Ag/Ab reactions. They are organ specific or non organ specific and result in certain diseases. **TABULATE the antibody, its target organ and the consequent disease.**

GIVE some examples of autoimmune diseases.

SYLLABUS THEME 7 - NEOPLASIA

DEFINE THE FOLLOWING TERMS: (some will be revision from previous worksheet)

- Hypertrophy
- Hyperplasia
- Metaplasia
- Dysplasia
- Tumour
- Oncology
- Benign
- Malignant

Neoplasia means "new growth" – an abnormal mass of tissue whose growth exceeds that of normal tissue and continues in same excessive manner, following the cessation of the stimuli which evoked the change. "Neoplastic cells are said to be transformed, because they continue to replicate oblivious to the regulatory influences that control normal cell growth" (Kumar, Cottran and Robbins, 1997.)

TABULATE the classification of tumours, using tissue of origin, and its category of benign or malignant.

NON-NEOPLASTIC PROLIFERATION:

Reid and Roberts (2005) explain that it is important to understand non-neoplastic proliferation in order to understand neoplasia. **EXPLAIN the term proliferation.**

Physiological enlargement of organs/tissue is common and normal under certain circumstance, eg. Muscle bulk following training, but pathological enlargement is the result of disease processes. **EXPLAIN, using examples, the following terminology:**

Hypertrophy **Hyperplasia**
Metaplasia **Dysplasia**

CLASSIFICATIONS OF NEOPLASMS:

Tumours are classified 2 ways – clinically and histologically.

Clinical classification *is based on its morbid anatomy and behaviour. 2 main groups are benign (simple) and malignant.*

TABULATE the manifestations of these groups according to spread, rate of growth, margins, relationship to surrounding structures, and its effects.

Histologically/cytologically*, these groups of tumours vary also – differentiated (benign) and undifferentiated (malignant).* **IDENTIFY and DESCRIBE these differences, using the following:**

- **Mimic the structure of their parent organ.**
- **Resemble their cells of origin.**
- **Show remarkable uniformity in size, shape and nuclear configuration.**
- **Show evidence of normal function.**
- **Mitosis.**

SIMPLE CONNECTIVE TISSUE TUMOURS:
Composed of differentiated connective tissues of the body – fibrous tissue, cartilage, bone, muscle and fatty tissue. Characteristics are well-rounded, well encapsulated/marginated and only compress surrounding tissue.

DESCRIBE the following tumours, including their characteristics:

- **Tumours of fibrous tissue**
- **Lipoma**
- **Chondroma**
- **Osteoma**
- **Leiomymoma**

SIMPLE EPITHELIAL TUMOURS:
Essentially of 2 types: **Papillomas and Adenomas**. **DESCRIBE these tumours, including their characteristics.**

CARCINOMA IN SITU (INTRAEPITHELIAL):
The intermediate stage of cancer production. Cytological features of malignancy are present, but cells have not invaded surrounding tissues. Common sites: cervix and breast.
USING diagrams, DESCRIBE the stages of this tumour.

MALIGNANT EPITHELIAL TUMOURS:
Generic term – CARCINOMA (Greek – crab) – refers to the irregular jagged shaped, due to local spread. **USING diagrams, DESCRIBE this type of tumour.**

Using drawings, (where necessary), EXPLAIN the different types of carcinomas (Ca.):

- **Squamous cell Ca.**
- **Basal cell Ca.**
- **Ca. of glandular organs.**

All carcinomas spread primarily into adjacent tissues, and after time, metastasise to more distant structures. **Briefly DISCUSS the SPREAD of CARCINOMAs.**

MALIGNANT CONNECTIVE TISSUE TUMOURS:
Generic term – SARCOMA (Greek – flesh) – less common than Ca.. Besides leukaemia, most common malignant tumour in children and young adults. **EXPLAIN its origin**.

Using drawings, (where necessary), EXPLAIN the different types of sarcomas:

- **Fibrosarcoma**
- **Osteogenic sarcoma**
- **Giant cell tumour (osteclastoma)**
- **Chondrosarcoma**
- **Liposarcoma**
- **Myosarcoma**

SPECIAL TUMOURS:
WRITE short notes on the following special tumours:

- **Mixed tumours**
- **Teratoma**
- **Hamartoma**
- **Haemangioma**
- **Lentigo/ benign pigmented naevus**
- **Malignant melanoma**

CARCINOGENESIS:
"The ultimate mechanism which causes cancer – allows cells to proliferate continuously break through normal bounds and invade other tissues remain unknown, but ther are 3 classes of agent – chemical carcinogens, radiant energy and viruses. (Govan …"
Briefly DISCUSS these carcinogen agents.

There are other factors that play a role in carcinogenesis, i.e. heredity, race, age, geography, hormones, chronic irritation and trauma. **EXPLAIN these co-factors.**

MULTI-STEP THEORY OF CARCINOGENESIS:
Malignant change can be seen as taking a series of steps – each step can halt and revert to normal or may progress – stage of initiation, latent stage, stage of promotion, malignant changes. **Explain these four (4) STAGES.**

IMMUNOLOGY AND CANCER:
Both humoral and cell-mediated immunity can be demonstrated in animals with cancer.
WRITE short notes on this phenomenon.

SYLLABUS THEME 8.1 – SKELETAL SYSTEM

DEFINE THE FOLLOWING TERMS: (some will be revision from previous worksheet)

- Ossification
- Non-union
- Consolidation
- Periostitis
- Sequestrum/a
- Ankylosis
- Osteogenesis
- Avascular necrosis
- Dislocations
- Fractures
- Involucrum
- Sclerosis
- Lysis
- Resorption
- Bone formation
- Subluxation
- Aseptic necrosis
- Osteonecrosis
- Trauma
- Ischaemia

Please add new terminologies to list as discovered…

At the end of this learning area, you should be able to:

- *DESCRIBE the anatomic components of the skeletal system on a basic microscopic level + macroscopic level.*
- *IDENTIFY and EXPLAIN the criteria for assessing technical adequacy of skeletal radiographs (this is undertaken in the viewing practicals)*
- *CHARACTERISE a given condition as congenital, inflammatory, arthritic, metabolic, traumatic or neoplastic (CATBITES – what do you think this stands for?)*
- *SPECIFY the pathogenesis, signs & symptoms and prognosis of various skeletal pathologies.*
- *EXPLAIN the role of various imaging modalities in the diagnosis and treatment of skeletal pathologies.*
- *RECOGNISE and EXPLAIN the patterns/steps required to evaluate normal and abnormal bone images (viewing practicals)*

ANATOMY & PHYSIOLOGY OF BONE:

Please REVIEW the anatomy and physiology of the skeletal system. This is very necessary to fully appreciate the pathologies that may present in the skeletal system.

Some guidelines:

- *Ossification*
- *Classification of bones and joints*
- *Anatomy of individual bones*
- *Dynamics of bone activity and homeostasis – osteoclasts and osteoblasts*
- *Role of other systems on bone changes – endocrine, CVS, etc.*

Categories of bone diseases can be:

C – congenital
A – arthritides or joint dx
T – trauma
B – blood related disorders
I – infection/ inflammation
T – tumours
E – endocrine or metabolic related disorders
S – soft tissue disorders
O – Other – idiopathic, chemical poisons, etc.

When working through each of these diseases, ***DESCRIBE/EXPLAIN each, in terms of:***

- ***Aetiology***
- ***Incidence/prevalence***
- ***Clinical presentations***
- ***Pathological manifestations***
- ***Image characteristics appearances***

USE clearly labelled diagrams where necessary.

EVALUATE the role of imaging in the skeletal system, with respect to the following:

- **Plain film/image radiography**
- **Contrast radiography – arthrography**
- **Magnetic Resonance Imaging (MRI)**
- **Computed Tomography (CT)**
- **Nuclear Medicine (NM) Procedures**
- **Ultrasound of the musculoskeletal system**
- **Bone Mineral Densitometry**

The activities of osteoblasts and osteoclasts continue throughout life and all bone tissue is subject to continual process of absorption of old bone and replacement of newly formed bone – exact counterbalance. As old age approaches the formation of new bone decreases. This upset in the normal ossification may lead to 2 conditions: **Osteoporosis and Osteomalacia**

DESCRIBE/EXPLAIN these conditions.

Congenital & Hereditary Diseases of Bones and Joints *– considerable variety.*

Range from small isolated developmental errors, affecting single bone to gross changes which may be widespread throughout skeleton. Structural abnormalities are sometimes present (polydactyl extra digits) with no association to upset in normal processes of ossification. Others are related to abnormalities in osteogenesis – dysplasis, dystrophies, etc.

Common congenital anomalies or disorders	*Less common congenital abnormalities*
• ***Cervical rib*** • ***Spondylolisis*** • ***Spina bifida + meningocoele*** • ***Congenital dislocation of hip*** • ***Achondoplasia*** • ***Osteogenesis imperfecta*** • ***Osteopetrosis*** • ***Hand and Foot malfomations – talipes, flatfoot***	• ***Cranial anomalies- craniostenosis, hyperteleorism, craniosynostoses and*** • ***anencephaly*** • ***Exostoses*** • ***Arachnodactyly*** • ***Polydactyly*** • ***Sacralisation*** • ***Hemivertebrae***

DESCRIBE/EXPLAIN the various congenital disorders, as indicated above.

Infections and Inflammation of Bones and Joints

Infective micro-organisms may invade soft tissues of bone marrow → inflammatory reaction → osteomyelitis. They may also causes inflammation in periosteum → periostitis
Both these are forms of osteitis and may be acute or chronic. When an infective lesion is situated near joint, 2^0 infection → infective arthritis.

Common bone infections:	*Common joint infections:*
• ***Osteomyelitis*** • ***Tuberculosis*** • ***Acute Suppurative Arthritis*** • ***Syphilitic infection***	• ***Rheumatoid arthritis + juvenile RA*** • ***Ankylosing spondylitis*** • ***Osteoarthritis (OA) - Degenerative*** • ***Gouty arthritis***
DESCRIBE/EXPLAIN the various infective disorders, as indicated above.	

Other Metabolic Disorders of Bones and Joints *(see osteoporosis & osetomalacia above)*

Usually due to deficiencies or metabolic imbalance.
vitamin C → scurvy
vitamin D → rickets/osteomalacia
Raised amounts of calcium → hypercalcaemia

Common metabolic disorders:	
• ***Scurvy*** • ***Rickets*** • ***Hyperparathyroidism***	• ***Paget's disease*** *(osteitis deformans)* • ***Acromegaly (see endocrine)***
DESCRIBE/EXPLAIN the various metabolic disorders, as indicated above.	

Tumours of Bones and Joints

Many variety of bone tumours exist and bone contains a number of different types of tissues from which primary tumours may arise and is also a common site for metastases. Plain film radiography is extensively employed together with MRI, CT and isotope scanning. Neolplasms consist of 2 types: benign and malignant. Biopsies become necessary when malignancy is suspected.

Common benign neoplasms:	*Common malignant neoplasms:*
• ***Osteoma*** • ***Osteoid osteoma & osteoblastoma*** • ***Chondroma (ec- or en-chondroma)*** • ***Osteochondroma - exostosis*** • ***Osteoclastoma (Giant cell tumour)*** • ***Haemangioma***	• ***Osteosarcoma*** • ***Sarcomas*** o ***Chondrosarcoma*** o ***Fibrosarcoma*** o ***Parosteal sarcoma*** o ***Angiosarcoma*** o ***Liposarcoma*** • ***Ewing's tumour*** • ***Myelomatosis – multiple myeloma*** • ***Lymphoid tumours*** •
Secondary tumours in bone:	
• ***Metastases from breast, prostate & lung cancer*** • ***Leukaemia*** • ***Hodgkin's dx*** • ***Non-Hodgkin's dx***	
DESCRIBE/EXPLAIN the various neoplasms, as indicated above.	

Cystic lesions in Bone

True simple cysts are not uncommon. They have an ill-defined collagenous capsule and expand and risk of fracture increases – most usual presenting sign.
Other cyst like spaces occur in many bone disorders.

Common cystic lesions:	*cyst-like spaces in other bone dx:*
• ***Localised developmental defects*** o ***Simple cysts*** • ***Trauma*** o ***Post-traumatic cysts*** • ***Endocrine dx*** o ***Hyperparathyroidism***	• ***OA*** • ***GCT*** • ***ABC*** • ***Histiocytosis X*** • ***2^0 deposits***
DESCRIBE/EXPLAIN the various cystic lesions, as indicated above.	

Idiopathic and Miscellaneous Bones Disorders:

Common disorders:	
• ***Hyperparathyroidism*** • ***Hypertrophy of bone*** o ***Acromegaly*** o ***Hypertrophic osteoarthropathy*** • ***Fibrous dyplasia*** • ***Slipped upper femoral epiphysis*** • ***Idiopathic scoliosis***	• ***Paget's diseae*** • ***Juvenile Osteochondritis*** o ***? location → name*** • ***Osteochondritis dessicans*** • ***Avascualr necrosis vs Perthe's Dx*** • ***Subperiosteal haematoma*** • ***Irritable hip***
DESCRIBE/EXPLAIN the various infective disorders, as indicated above.	

Joint and Soft Tissue Disorders:

Common disorders:

• ***Synovitis*** • ***Soft tissue tumours*** • ***Loose bodies in joints***	• ***Bursitis*** • ***Ganglion*** • ***Connective tissue dx*** ○ ***SLE***
DESCRIBE/EXPLAIN the various infective disorders, as indicated above.	

Traumatic disorders of Bones and Joints

These may take the form of bone fractures, dislocations, joint sprains & subperiosteal haematomas.

Common disorders:	

• ***Fractures***
  ○ ***Open vs closed #***
  ○ ***Comminuted #***
  ○ ***Complete, noncomminuted***
  ○ ***Avulsion #***
  ○ ***Incomplete #***
  ○ ***Growth plate # - Salter Harris #***
• ***#s in specific locations***
  ○ *? types*
	• ***Stress & Fatigue #***
	• ***Occult # & bone bruise***
	• ***Dislocations***
	  ○ ***subluxations***
	• ***Sprains***
	• ***Avascular necrosis (see above)***
	• ***Subperiosteal haematoma***
	• ***Internal derangement of knee (IDK)***
	• ***Non accident Injuries – battered child syndrome***

DESCRIBE/EXPLAIN the various traumatic disorders, as indicated above.	

SYLLABUS THEME 8.2 – RESPIRATORY SYSTEM

DEFINE THE FOLLOWING TERMS: (some will be revision from previous worksheet)

- Rhinorrhoea
- Epstaxis
- Haemoptysis
- Cyanosis
- Dyspnoea
- Tachypnoea
- Expectoration
- Lung collapse
- Clubbing
- Asthma
- Pleural affusion
- Atelectasis
- Respiratory failure
- Spontaneous pneumothorax
- Consolidation
- Pulmonary fibrosis
- Opportunistic infections
- Lung abscess

PREFIXES/SUFFIXES: (some will be revision from previous worksheet)

- Rhino-
- Laryngo-
- Tracheo-
- Broncho-
- Pneumono- , pneumato-
- -pnoea

Please add new terminologies to list as discovered…

At the end of this learning area, you should be able to:

- *DESCRIBE the anatomic components of the respiratory system.*
- *DISTINGUISH between the results obtained and uses for the various projections of the chest.*
- *DESCRIBE the various types of tubes, vascular access lines, and catheters used in relation to the respiratory system.*
- *IDENTIFY the pathogenesis of the chest pathologies and the typical treatments for them.*

- *DESCRIBE, in general, the radiographic appearances of each of the given pathologies.*
- *RECOGNISE and EXPLAIN the patterns/steps required to evaluate normal and abnormal chest images (viewing practicals)*

ANATOMY & PHYSIOLOGY OF THE RESPIRATORY SYSTEM:

Please REVIEW the anatomy and physiology of the respiratory system. This is very necessary to fully appreciate the pathologies that may present in this system.

Some guidelines:

- *Composition of the upper respiratory system*
- *Composition of the lower respiratory system*
- *Organs of the system that have other functions – eg. Voice production in larynx*
- *Role of other systems on respiratory changes – CVS, etc.*

EVALUATE the role of imaging in the respiratory system*, with respect to the following:*

- *Plain film/image radiography*
  - *Exposure factor considerations*
  - *Patient positioning and projections*
  - *Evaluation criteria and Patterns for viewing CXRs*
- *Contrast radiography – bronchography*
- *Computed Tomography (CT)*
- *Nuclear Medicine (NM) Procedures*

Chest tubes, vascular access lines and Catheters *– (Mace & Kowalczyk, 2004, Radiographic Pathology for Technologists, pg 67.)*

" a variety of tubes, lines & catheters can be placed in relation to particular parts of the respiratory system, it is important… to be familiar with each of these and exercise caution"…when x-raying patients in critical care radiography.

IDENTIFY and DESCRIBE the keys tubes, lines and catheters and their importance.

Categories of chest diseases:

- ***Respiratory Failure***
- ***Congenital and Hereditary Dx***
- ***Inflammatory Dx***
- ***Neoplastic Dx***
- ***Traumatic Disorders***
- ***Occupational Dx***
- ***Idiopathic Dx***

When working through each of these diseases, ***DESCRIBE/EXPLAIN each, in terms of:***

- ***Aetiology***
- ***Incidence/prevalence***
- ***Clinical presentations***
- ***Pathological manifestations***
- ***Image characteristics appearances***

USE clearly labelled diagrams where necessary.

Respiratory Failure:

"…lack of respiratory function or lack of O_2 and CO_2 exchange, which can occur within the lungs or as a result of impaired breathing." **EXPLAIN this condition and DESCRIBE its radiographic appearances**.

Congenital and Hereditary diseases:

Upper respiratory – **deviation of the nasal septum** *and* **Choanal atresia**
Lungs - **Cystic fibrosis** *and* **Respiratory Distress Syndrome (RDS**) *or Hyaline membrane disease.* **DESCRIBE/EXPLAIN these disorders.**

Pulmonary hamartoma, **agenesis of the lung** - *not common dx* **– briefly EXPLAIN these.**

Inflammatory/Infective diseases:

Various inflammatory or infective conditions affect the upper and lower respiratory system.

Upper respiratory system:	***Lower respiratory system:***
Rhinitis *Pharyngitis and Laryngitis* *Sinusitis* *Influenza* *Enlarged adenoids* *Adenovirus infections* *Tonsillitis* *Retropharyngeal abscess*	*Pneumonias (cont…)* ○ *Pneumocystis carinii* ○ *Legionnaire's disease* ○ *Mycoplasma* ○ *Aspiration* ○ *Viral* *Pulmonary TB* *Chronic Obstructive Pulmonary Dx (COPD)* ○ *Chronic bronchitis* ○ *Emphysema* ○ *Bronchiectasis* *Fungal diseases – histoplamosis* *Lung abscess* *Pleurisy and Pleural effusion*
Lower respiratory system:	
Bronchitis – acute & chronic *Pneumonias* ○ *Streptococcal* ○ *Staphylococcal* ○ *Pneumococcal*	

DESCRIBE/EXPLAIN the various infective disorders.

Neoplastic diseases:

These may occur in any part of respiratory system and include the following:

Upper respiratory system:	***Lower respirator system:***
Papilloma of vocal cords *Nasal polypi* *Malignant carcinoma of sinuses, pharynx or larynx* *Nasopharyngeal lymphosarcoma*	*Mesothelioma of the pleura* *Bronchial Adenoma* *Bronchiogenic Carcinoma* *Pulmonary metastases* *Mediastinal neoplasms* ○ *Benign teratoma* ○ *Malignant teratoma* ○ *Malignant lymphomas (Hodgkin's & non-Hodgkin's)* *Malignant thymoma*
Lower respiratory system:	
Cysts ○ *Congenital cystic dx* ○ *Pneumatocoeles* ○ *Honeycomb dx (cystic lung)* ○ *Fibrosing alveolitis*	

DESCRIBE/EXPLAIN the various infective disorders.

Traumatic Disorders:

The lungs may be damaged by both penetrating & non-penetrating chest injuries. Chest injuries may lead to **lung contusion** *or a* **haematoma.** *Sometimes* ***a laceration of the pleura & lung tissue*** *may lead to a* **pneumo- and/or haemo- thorax**, *usually associated with* ***rib fractures****. Multiple rib fractures may result in deformity –* **"stove-in-chest" or flail chest.**
Development of pneumothorax → leakage of air into soft tissues causing **surgical emphysema.**
DESCRIBE these traumatic disorders (in bold), USING labelled diagrams (where necessary).

Occupational diseases:

A group of pulmonary diseases caused by inhalation of harmful dusts – in the course of sufferer's daily work. Those produced by mineral dusts → pneumoconiosis:
3 important types:

- **Coal workers' pneumoconiosis**
- **Silicosis**
- **Asbestosis**

DESCRIBE and EXPLAIN each type.

Idiopathic and other diseases:

Some respiratory conditions of unknown cause include:

- **Pulmonary sarcoidosis**
- **Pulmonary haemosiderosis**
- **Loeffler's syndrome**

Briefly DESCRIBE these conditions.

Pulmonary embolism *is a very serious consequence of disorders in the cardiovascular system and is dependent on size of detached fragment of thrombus which becomes arrested within the pulmonary circulation → severity extending form a* **pulmonary infarct** *to death.*
Pulmonary oedema *is another consequence of cardiovascular disorders.*
Briefly EXPLAIN/DESCRIBE these conditions.

SYLLABUS THEME 8.3 – GASTROINTESTINAL SYSTEM

DEFINE THE FOLLOWING TERMS: (some will be revision from previous worksheet)

- Digestion
- Peristalsis
- Dysphagia
- Colic
- Gastroscopy
- Anorexia
- Haematemesis
- Melaena
- Steatorrhoea
- Endoscopy
- Jaundice
- Indigestion
- Dyspepsia
- Colonoscopy
- Sigmoidoscopy

PREFIXES/SUFFIXES: (some may be revision from previous worksheet)

- Gloss-
- Gastr-
- Enter-
- Sigmoid-
- Proct-
- -scopy
- Hepat-
- Chole-
- Cholecyst-
- Cholangio-

Please add new terminologies to list as discovered…

At the end of this learning area, you should be able to:

- *DESCRIBE the anatomic components of the abdomen and gastrointestinal system and how they are visualised radiographically.*
- *COMPARE and CONTRAST the various imaging modalities used in evaluating the abdomen and its contents.*
- *IDENTIFY the tubes and catheters related to the gastrointestinal system by type and briefly EXPLAIN their use.*
- *CHARACTERISE a given condition as congenital, inflammatory, neurogenic or neoplastic.*
- *IDENTIFY and EXPLAIN/DESCRIBE the pathogenesis of GI pathologies and the typical treatments for them.*
- *DESCRIBE , in general, the radiographic appearances of each of the given pathologies.*
- *RECOGNISE and EXPLAIN the patterns/steps required to evaluate normal and abnormal chest images (viewing practicals)*

ANATOMY & PHYSIOLOGY OF THE ABDOMEN and GASTROINTESTINAL (GI) SYSTEM:

Please REVIEW the anatomy and physiology of the GI system. This is essential to fully appreciate the pathologies that may present in this system.

Some guidelines:

- *9 abdominal regions and its contents*
- *Quadrants and its contents*
- *Abdominal and pelvic cavities and its contents*
- *GI system – mouth, oro- & laryngo-pharynx, oesophagus, stomach, small intestines (duodenum, jejunum, ileum) and large intestine (caecum, appendix, colon, sigmoid, rectum and anal canal).*
- *Accessory organs – teeth, salivary glands, and hepatobiliary system (liver, gall bladder, bile ducts and pancreas).*
- *Role of other systems on GI system – CVS, etc.*

EVALUATE the role of imaging in the GI system*, with respect to the following:*

- *Plain film/image radiography – ABDOMEN*
- *Contrast radiography – upper GI series, lower GI series, hepatobiliary system*
- *Ultrasound – significant for imaging abdominal contents*
- *Computed Tomography (CT)*
- *Nuclear Medicine (NM) Procedures*
- *Endoscopic procedures*

Tubes and Catheters – *(Mace & Kowalczyk, 2004, Radiographic Pathology for Technologists, pg 107.)*

"as with the chest, a variety of tubes and catheters can be placed within particular portions of the abdomen……some are sterile and require special care to avoid infection"

IDENTIFY and DESCRIBE the keys tubes and catheters and their importance.

Categories of GI system diseases:	***Categories of Hepatobiliary diseases:***
○ *Congenital and Hereditary Dx* ○ *Inflammatory Dx* ○ *Oesophageal Varices* ○ *Degenerative Dx* ○ *Bowel Obstructions* ○ *Neurogenic Dx* ○ *Diverticular Dx* ○ *Neoplastic Dx* ○ *Traumatic Disorders* ○ *Idiopathic Dx*	○ *Inflammatory Dx* ○ *Metabolic Dx* ○ *Neoplastic Dx* ***Salivary glands disorders**:* ○ *Calculi* ○ *Inflammatory Dx* ○ *Neoplastic Dx*

When working through each of these diseases, ***DESCRIBE/EXPLAIN each, in terms of:***

- ***Aetiology***
- ***Incidence/prevalence***
- ***Clinical presentations***
- ***Pathological manifestations***
- ***Image characteristics appearances***

USE clearly labelled diagrams where necessary.

DISEASES OF THE GASTROINTESTINAL SYSTEM

Mouth and tongue disorders:

A wide variety of inflammatory conditions affect the mouth and tongue.
Vial infections – most common Herpes simplex
Fungal infections – Candida albicans (Candidiasis = thrush)
Bacterial infections – syphilis, oral TB, aphthous ulcers
Congenital anomaly – cleft lip/palate
Oral cancers – Squamous cell Ca., Ca. of the tongue, others (Refer Reid & Roberts, pg 292)
DESCRIBE these conditions, using clearly labelled diagrams (if necessary)

Congenital and Hereditary Dx:

Some of these conditions affecting upper and lower GIT include:

• *oesophageal atresia* • *bowel atresia* • *imperforate anus* • *hypertrophic pyloric stenosis*	• *malrotation* • *Hirschsprung's Dx* • *Meckel's Diverticulum*

DESCRIBE/EXPLAIN these disorders.

Inflammatory/Infective Dx:

Inflammatory and infective changes can affect the oesophagus, stomach, small and large bowel, including the appendix. Some of these conditions are:

• *Oesophageal strictures* • *Gastroesophageal Reflux Disease (GERD)* • *peptic ulcers* • *gastroenteritis* • *Crohn's Dx (regional enteritis)*	• *Coeliac disease (malabsorption syndrome)* • *ulcerative colitis* • *intestinal infections* • *Typhoid and Dysentery* • *Ischaemic colitis*

• *Appendicitis*	• *Neonatal necrotising enterocolitis*

DESCRIBE/EXPLAIN each of these disorders, as indicated above.

Oesophageal Varices:

Varicose veins are abnormally lengthened, dilated and superficial veins. Found in oesophagus as a result of portal hypertension → **EXPLAIN this phenomenon.**

DESCRIBE/EXPLAIN this condition.

Degenerative Dx:

In GIT – these changes result in protrusion of a loop of bowel through small opening → hernia. Inguinal hernias , common in men → when bowel loop protrudes through weakness in inguinal ring and may descend to scrotum. Femoral and umbilical herniation are other types. When the herniated loop is pushed back into abdominal cavity → reducible. If "stuck" → incarcerated. I constriction cuts off blood supply → strangulated (serious → necrosis).

Hiatal Hernias → weakness of oesophageal hiatus – allows portion of stomach into thoracic cavity.

DESCRIBE the various types of Hiatus Hernia (HH) and its associated disorders.

Bowel Obstructions:

Both the small & large bowels of the normal patient are nearly always active in peristalsis. Many lesions of various types can interfere with this action and cause obstruction → **mechanical bowel obstruction or paralytic ileus** → *failure of peristalsis.*

Mechanical bowel obstruction can present in various forms – ***simple or strangulated, gallstone ileus, volvulus and intussusception.***

DESCRIBE/EXPLAIN each of these obstructive disorders, as indicated above.

Neurogenic Dx:

Achalasia *is a neuromuscular disorder of the oesophagus.*

DESCRIBE/EXPLAIN this functional disorder.

Diverticular Dx:

"A diverticulum is a pouch or sac of variable size that occurs normally or through a defect in its muscular coat." They are found in the oesophagus and colon.

DESCRIBE/EXPLAIN both abnormalities.

Neoplastic Dx:

Benign and malignant growths can occur anywhere in the GIT. Common occurrences:

Oesophagus: • *Leiomyoma – benign* • *Squamous Ca.* • *Adenocarcinoma (associated with Barrett's oesophagus*	*Stomach:* • *Leiomyoma – benign* • *Adenocarcinoma* • *Polyps – may be benign* • *Leiomyosarcoma* • *Gastric lymphomas*
Small intestine: None commonly found • *Hamartomatous polyps*	*Large intestine:* • *Adenomas*

• *Non-Hodgkin's lymphoma* • *Carcinoids* • *Karposi's sarcoma in AIDS*	• *Colonic polyps* • *Polypoid carcinoma* • *Adenocarcinoma*
Peritoneal involvement → malignant ascites	

DESCRIBE/EXPLAIN the tumourous growths that may be present in the different regions.

Traumatic Disorders:

Bowel may be contused or ruptured by penetrating and non-penetrating type injuries to the abdomen. Perforation may result with sometimes complete division of a segment of the bowel.
DISCUSS this statement.

Peritoneal Cavity:

Some diseases can extend to the peritoneal cavity and include peritonitis, ascites and tumours.
Briefly EXPLAIN/DESCRIBE these conditions.

DISEASES OF THE HEPATOBILIARY SYSTEM

Inflammatory/Infective Dx:

Some inflammatory or infective conditions of the liver include:

• *Viral hepatitis – different types* • *Bacterial infections – abscesses* • *Alcohol liver disease* • *Cirrhosis* • *Spirochaetal infections* • *Amoebic hepatitis*	• *Diseases due to parasitic worms/flukes* • *Infective cholangitis* • *Cholecystitis* • *Cholelithiasis* • *Pancreatitis*

DESCRIBE/EXPLAIN these inflammatory/infective disorders that may be present in the different regions.

Metabolic Dx:

Some metabolic disorders that affect the liver are: **DESCRIBE these effects on the liver.**

• *Haemochromatosis* • *Haemosiderosis*	• *Wilson's Dx* • *α_1 _ Antitrypsin deficiency*

Neoplastic Dx:

Benign and malignant tumours affect the hepatobiliary system. They are:

• *Hepatocellular adenoma* • *Haemangioma – most common* • *Hepatocellular carcinoma (hepatoma/HCC)*	• *Metastases* • *Carcinoma of the GB* • *Carcinoma of the Pancreas*

DESCRIBE/EXPLAIN these tumours.

Other diseases:

Other conditions that affect this system include hepatocellular failure and portal hypertension.
DESCRIBE/EXPLAIN these conditions.

Jaundice *is not a disease itself but rather a sign of disease. EXPLAIN this sign, i.t.o.*

- **Aetiology**
- **Clinical presentations**
- **Pathological manifestations**

USE clearly labelled diagrams where necessary.

DISEASES OF THE SALIVARY GLANDS

Calculi, Inflammatory and Neoplastic Diseases:

The formation of stones (salivary calculi), inflammatory conditions (sialitis) and neoplasm affect the salivary glands.
DESCRIBE/EXPLAIN these conditions.

SYLLABUS THEME 8.4 – GENITO-URINARY SYSTEM

DEFINE THE FOLLOWING TERMS: (some will be revision from previous worksheet)

- Albuminuria
- Anuria
- Incontinence
- Renal colic
- Calculi
- Hydronephrosis
- Haematuria
- Retention
- Oliguria
- Urinary stasis
- Nephropathy
- Cystiti
- Dysuria
- Pyuria
- Polyuria
- Bacteriuria
- Pyelonephritis

PREFIXES/SUFFIXES: (some may be revision from previous worksheet)

- Reno-
- Pyelo-
- Nephro-
- Vesico-
- Cysto-
- Hyper-
- Hypo-

Please add new terminologies to list as discovered…

At the end of this learning area, you should be able to:

- *DESCRIBE the anatomic components of the GU system and their functions.*
- *IDENTIFY the tubes and catheters related to the GU system by type and briefly EXPLAIN their use.*
- *DISCUSS the role of other modalities in imaging the GU system, particularly ultrasound and CT.*
- *DISCUSS common congenital anomalies of this system*
- *CHARACTERISE a given condition as congenital, inflammatory, metabolic or neoplastic.*
- *IDENTIFY and EXPLAIN/DESCRIBE the pathogenesis of GU system and the typical treatments for them.*
- *DESCRIBE , in general, the radiographic appearances of each of the given pathologies.*
- *RECOGNISE and EXPLAIN the patterns/steps required to evaluate normal and abnormal images (viewing practicals)*

ANATOMY & PHYSIOLOGY OF THE GENITO-URINARY SYSTEM:

Please REVIEW the anatomy and physiology of the GU system. This is essential to fully appreciate the pathologies that may present in this system.

Some guidelines:

- *Kidneys, ureters, bladder and urethra (male & female) – position & structure*
- *Renal vasculature*
- *Glomerular structure and function*
- *Role of other systems on GU system – CVS, etc.*

EVALUATE the role of imaging in the GU system*, with respect to the following:*

- *Plain film/image radiography – ABDOMEN*
- *Contrast radiography – IVU/EU, VCU, Retrograde Urography,*
- *Ultrasound – significant for imaging abdominal contents*
- *Computed Tomography (CT)*
- *Renal Angiography*
- *MRI*
- *Interventional Procedures/Techniques*

Tubes and Catheters – *(Mace & Kowalczyk, 2004, Radiographic Pathology for Technologists, pg 176.)*

" when certain types of pathology… inhibit the normal flow of urinary system, several types of tubes may be used to allow drainage"

IDENTIFY and DESCRIBE the keys tubes and catheters and their importance.

Categories of GU system diseases:	
○ *Congenital and Hereditary Dx* ○ *Inflammatory and Infective Dx* ○ *Renal Failure* ○ *Kidney and Hypertension*	○ *Degenerative and Metabolic Dx* ○ *Neoplastic Dx* ○ *Traumatic Disorders* ○ *Idiopathic Dx*
When working through each of these diseases, ***DESCRIBE/EXPLAIN each, in terms of:*** • ***Aetiology*** • ***Incidence/prevalence*** • ***Clinical presentations*** • ***Pathological manifestations*** • ***Image characteristics appearances*** ***USE clearly labelled diagrams where necessary.***	

Congenital and Hereditary Dx:

A large number of developmental abnormalities may occur in the KUB. Many are minor in nature and those more marked are less common. They include the following:

Number and size anomalies • *renal agenesis* • *supernumerary kidney* • *hypoplasia* • *hyperplasia* *Fusion anomalies* • *horseshoe kidney* • *crossed ectopy* *Polycystic kidney Dx* *Medullary Sponge kidney*	*Position anomalies* • *malrotation* • *ectopic kidney* • *nephroptosis* *Renal Pelvis and Ureter anomalies* • *duplex kidney* *Lower tract anomalies* • *ureterocoele* • *diverticula – ureter and bladder* • *urethral valves*

DESCRIBE/EXPLAIN these congenital anomalies.

Inflammatory and Infective Dx:

Pathogens may reach the kidneys via the blood or by ascending the ureter from the lower urinary tract. Urinary tract infections (UTIs) are the most common of all infections. Important consequences include obstruction and/or vesicoureteric reflux.

• *Urinary tract infections* • *Pyelonephritis – acute and chronic* • *Glomerulonephritis – acute and chronic* • *Cystitis*	• *Pyo-nephrosis (hydro-)* • *Renal carbuncle* • *Perinephric abscess* • *Renal TB*

DESCRIBE/EXPLAIN these infective conditions.

Kidney and Hypertension:

2 aspects to this relationship. Many renal diseases (chronic pyelonephritis, glomerulonephritis and renal artery stenosis) causes hypertension (high blood pressure). But hypertension leads to renal damage and a "vicious" circle is set up.

DESCRIBE/EXPLAIN hypertension of renal origin.

Degenerative and Metabolic Dx:

There are several diseases caused by degeneration and metabolic changes, which result in structural and functional alterations in the KUB. They are:

• *Nephrosclerosis* • *Nephrocalcinosis* • *Renal Failure*	• *Calcifications* • *Hydronephrosis*

DESCRIBE/EXPLAIN each of these conditions.

Neoplastic Dx:

Neoplasms may arise out of the solid part of the kidney, renal pelvis, ureter or bladder. They show up as masses which can cause filling defects, and become visible when they stretch or displace the collecting system. Almost all solitary masses are either malignat tumours or simple cyst. Most common masses are:

• *Renal cysts* • *Polycystic kidneys* • *Renal adenocarcinoma (hypernephroma)* • *Fibroma and adenoma*	• *Nephroblastoma (Wilm's tumour)* • *Transitional cell carcinoma* • *Papilloma of the bladder* • *Carcinoma of the bladder*

DESCRIBE/EXPLAIN these neoplastic growths.

Intercurrent Renal Conditions:

Renal complications are common in ***diabetes*** *→ develop proteinuria after many years, with kidney changes evident.*

Renal function during pregnancy can be affected – 4 ways. NAME them.

DESCRIBE/EXPLAIN both these intercurrent conditions.

Traumatic Disorders:

Injuries to the abdomen may result in contusion, rupture or total avulsion of the kidney/s, with haematuria. Pelvic injuries can lead to bladder and/or urethral rupture in males.
DESCRIBE/EXPLAIN these traumatic disorders.

Other Female Disorders:

Bladder/genital prolapse and stress incontinence occur in females.
DESCRIBE/EXPLAIN these disorders.

SYLLABUS THEME 8.5 – REPRODUCTIVE SYSTEM

DEFINE THE FOLLOWING TERMS: (some will be revision from previous worksheet)

- Ovulation
- Coitus
- Conception
- Puberty
- Menopause
- Stress incontinence
- Amenorrhoea
- Dysmenorrhoea
- Menorrhagia
- Polymenorrhoea
- Retroversion
- Hydrocoele
- Varicocoele
- Phimosis
- Priapism
- Undescended testis/es
- Cryptochidism

PREFIXES/SUFFIXES: (some may be revision from previous worksheet)

- Utero-
- Hystero-
- Salpingo
- Vagino-
- -ectomy
- Colpo-
- Mero-
- -scopy

Please add new terminologies to list as discovered…

At the end of this learning area, you should be able to:

- *DESCRIBE the basic anatomic structures associated with the male and female reproductive system.*
- *Briefly DISCUSS the role of general radiography, mammography, sonography, CT and MRI in the diagnosis of the reproductive system, particularly ultrasound.*
- *DIFFERENTIATE among the major congenital anomalies of this system.*
- *DESCRIBE the various neoplastic diseases of both male and female reproductive systems in terms of aetiology, incidence, signs and symptoms, treatment and prognosis.*
- *DIFFERENTIATE among the common disorders during pregnancy and EXPLAIN the role of ultrasound in the management o the gravid female.*
- *DESCRIBE, in general, the radiographic appearances of each of the given pathologies.*
- *RECOGNISE and EXPLAIN the patterns/steps required to evaluate normal and abnormal images (viewing practicals) – US learners will cover this in their Radiographic Practice lectures*

ANATOMY & PHYSIOLOGY OF THE REPRODUCTIVE SYSTEM:

Please REVIEW the anatomy and physiology of the reproductive system. This is necessary to fully appreciate the pathologies that may present in this system.
Some guidelines:

- *Female – ovaries, fallopian tubes, uterus, cervix, vagina, vulva and breasts*
- *Male – testes, epididymis, vasa differentia, seminal vesicles, ejaculatory ducts, prostate gland and penis with urethra*
- *Role of other systems on GU system.*

EVALUATE the role of imaging in the Reproductive System*, with respect to the following:*

- *Plain film/image radiography – ABDOMEN and PELVIS, mammography*
- *Contrast radiography – HSG,*
- *Ultrasound – significant for imaging abdominal and pelvic contents*
- *Computed Tomography (CT)*
- *MRI*

Categories of Reproductive system diseases:	
Female:	***Male:***
○ *Congenital and Hereditary Dx* ○ *Inflammatory and Infective Dx* ○ *Neoplastic Dx* ○ *Uterine masses* ○ *Breast masses* ○ *Disorders during pregnancy*	○ *Congenital disorders* ○ *Inflammatory and Infective Dx* ○ *Neoplastic Dx* ○ *Traumatic Disorders*
When working through each of these diseases, ***DESCRIBE/EXPLAIN each, in terms of:*** • ***Aetiology*** • ***Incidence/prevalence*** • ***Clinical presentations*** • ***Pathological manifestations*** • ***Image characteristics appearances*** ***USE clearly labelled diagrams where necessary.***	

Congenital and Hereditary Dx:

These abnormalities are unique to each gender, but some can occur in both. They include the following:

Female:	***Male:***
• *Ovarian dysgenesis* • *Hypoplasia of the uterus* • *Bicornuate uterus* • *Unicornuate uterus* • *Uterus didelphys* • *Atresia of the vagina*	• *Congenital urethral stenosis* • *Congenital urethral valves* • *Hypo- & epi- spadias*
• *Hermaphrodite* • *Pseudo-hermaphrodite*	

DESCRIBE/EXPLAIN each of these congenital anomalies.

Inflammatory Dx:

Various inflammatory and infective disorders occur in both males and females. They include the following:

Female:	***Male:***
• *Pelvic Inflammatory disease (PID)* • *Endometritis* • *Endometriosis* • *Cervicitis* • *Salpingitis* • *Pelvic and ovarian abscess*	• *Prostatitis* • *Epididymo-orchitis* • *Gonorrhoea* • *TB* • *Syphilis*

• *Vaginitis - thrush*	
Breast:	***Common:***
• *Mastitis*	• *Urethritis*

DESCRIBE/EXPLAIN these congenital anomalies.

Neoplastic Dx:

Various masses that affect both males and females are:

Female:	***Male:***
Ovarian cystic masses • *Follicular cysts* • *Corpus luteum cysts* • *Endometriosis* • *Polycystic ovaries* • *Cystic teratoma* • *Dermoid cysts* *Cystadenomacarcinoma* *Ca. of the cervix/dysplasia*	*Ca. of the penis* *Benign enlargement of prostate - hyperplasia* *Ca. of prostate gland* *Testicular masses* • *Seminoma* • *Teratoma* *Ca. of scrotum*
Leiomyomas (uterine fibroids) *Endometrial polyps* *Adenocarcinoma of endometrium* *Ca. of cervix*	***Breast Masses:*** • *Fibroadenoma* • *Fibrocystic breast* • *Ca. of the breast*

DESCRIBE/EXPLAIN each condition.

Trauma in males:

Traumatic rupture of the urethra *is associated with pelvic injuries.* ***Foreign bodies*** *can also be inserted or dislodged in the urethra.*

DESCRIBE/EXPLAIN these traumatic disorders.

Pregnancy Disorders:

Diagnostic ultrasound is often used as positive proof of a pregnancy, in addition to aiding in diagnosis of ***multiple and ectopic pregnancies****, foetal presentations, foetal viability and maturity, any foetal abnormality. Other abnormal findings include disorders of the placenta, hydatidiform mole, alterations in amniotic fluid.*

DESCRIBE/EXPLAIN these disorders.

Other Disorders:

Alterations in the menstruation results in various disorders:

• *Amenorrhoea* • *Crytoenorrhoea* • *Dysmenorrhoea* • *Menorrhagia*	• *Metrorrhagia* • *Dysfunctional uterine bleeding* • *Polymenorrhea*

Infertility/sterility *→ when pregnancy does not occur after one year during which coitus takes place at regular intervals.*

DESCRIBE/EXPLAIN each of this disorders.

SYLLABUS THEME 8.6 – CARDIOVASCULAR SYSTEM

DEFINE THE FOLLOWING TERMS: (some will be revision from previous worksheet)

- *Dyspnoea*
- *Fatigue*
- *Syncope*
- *chest pain*
- murmur
- cyanosis
- Aneurysms
- Anastomoses
- Transposition of viscera
- Dextrocardia
- Infarct
- Ischaemia
- Coarctation
- Haemorrhage
- Myocarditis
- Pericarditis
- Endocarditis

Please add new terminologies to list as discovered…

At the end of this learning area, you should be able to:

- *DESCRIBE the anatomic components of the cardiovascular system.*
- *EXPLAIN the appearance of the various portions of the heart on conventional CXRs.*
- *DESCRIBE each segment of the cardiac cycle.*
- *DISCUSS the role of other imaging modalities in the diagnosis, treatment and management of cardiovascular disorders.*
- *DIFFERENTIATE the major congenital anomalies of the CVS.*
- *IDENTIFY the pathogenesis of the pathologies and typical treatments of them.*
- *DESCRIBE, in general, the radiographic appearances of each of the given pathologies.*

ANATOMY & PHYSIOLOGY OF THE CARDIOVASCULAR SYSTEM:

Please REVIEW the anatomy and physiology of the CVS. This is necessary to fully appreciate the pathologies that may present in this system.

Some guidelines:

- *Pulmonary circulation – between heart and lungs*
- *Systemic circulation – between heart and rest of body*
- *Peripheral circulation – between heart and limbs*
- *Coronary circulation – of the heart*

EVALUATE the role of imaging in the Cardiovascular System*, with respect to the following:*

- *Plain film/image radiography – CHEST*
- *Contrast radiography – Angiography*
- *Echocardiography – US learners*
- *Nuclear cardiology – SPECT, PET/CT*
- *Computed Tomography (CT)*
- *MRI*

Categories of CVS diseases:

- *Congenital and Hereditary Dx*
- *Valvular and Inflammatory Heart Dx*
- *Coronary Heart Dx*
- *Hypertensive Heart Dx*
- *Shock*
- *Cardiac Arrhythmias*
- *Congestive Cardiac Failure (CCF)*
- *Cor Pulmonale*
- *Cardiac Arrest*
- *Dx of arteries*
- *Dx of veins*
- *Ischaemic Heart Dx*
- *Dx of Pericardium*
- *Dx of lymphatics*
- *Vascular Tumours*
- *Kaposi's Sarcoma*

When working through each of these diseases, ***DESCRIBE/EXPLAIN each, in terms of:***

- ***Aetiology***
- ***Incidence/prevalence***
- ***Clinical presentations***
- ***Pathological manifestations***
- ***Image characteristics appearances***

USE clearly labelled diagrams where necessary.

Congenital and Hereditary Diseases:

Foetal and blood-gas exchange occur within the placenta, certain characteristics (NAME them) present in foetal circulation should normally disappear at birth. When these anatomic structures persist→ variety of congenital anomalies develop in newborn.

Aetiology of congenital heart disease includes inherited genetic disorders, chromosomal aberrations (Down syndrome) and environmental factors (drugs, alcohol, infection, radiation and maternal dx).

DESCRIBE/EXPLAIN each of these congenital disorders:

• *Patent Ductus Arteriosus* • *Coarctation of the aorta* • *Septal defects*	• *Transposition of great vessels* • *Dextrocardia* • *Tetralogy of Fallot*

Valvular Disease and Inflammatory Dx of the Heart:

Abnormalities of the heart valves often cause cardiac symptoms such as dyspnoea, fatigue, syncope, chest pain or murmurs. Most common cause of chronic valve disease if Rheumatic Fever. Another disease of the heart valves is infective endocarditis.

DESCRIBE/EXPLAIN each of these conditions:

• *Mitral valve dx* • *Aortic valve dx*	• *Rheumatic Fever* • *Infective endocarditis*

Coronary Artery Dx:

Results form deposition of atheromas in coronary arteries (arteries supplying blood to heart muscle).

DISCUSS this condition.

Thrombosis and Embolism:

Thrombus – formation of blood constituents within a vessel or the heart. While blood clotting is a normal physiological protective mechanism, the formation of at thrombus a pathological with serious consequences.

DESCRIBE/EXPLAIN these two disorders.
EXPLAIN the common sites and types of thrombi.
DESCRIBE the sequels of thrombosis.

Arterial obstruction is usually due to thrombosis or emboli and may be i) partial or complete or ii) acute or slowly progressive. **EXPLAIN this phenomenon.**
Infarcts are a usually consequence. **EXPLAIN infarcts.**
EXPLAIN the common sites for infarction.

Oedema:

"*there is continous interchange of fluid between blood & tissues.some fluid enters the lymphatics before eventually returning to the blood stream."* **EXPLAIN this.**

An imbalance in this fluid circulation leads to **OEDEMA. DESCRIBE this condition.**

Shock:

"is a condition in which the vital functions of the body are depressed due to severe & acute reduction in cardiac output & effective circulating blood volume."
EXPLAIN the causes and effects of SHOCK.
EXPLAIN the occurrences in the different stages.
EXPLAIN bacterial shock (endotoxic).
EXPLAIN shock on burns and scalds.
EXPLAIN the consequences on shock on individual organs – heart, lungs, kidneys, brain, and liver.

Congestive Cardiac Failure (CCF):

The essential function of heart **(EXPLAIN this)** → *provide the pumping action of blood in closed circuit. CCF occurs when heart is unable to propel blood at a sufficient rate and volume – can occur as a result of primary myocardial failure OR secondary to other cardiac diseases.*
DISCUSS these.
There are 2 stages – acute and chronic and the causes and effects are different. **EXPLAIN this.**
CCF may affect either side of heart but both are commonly affected together.

• *Left ventricular failure*	• *Right ventricular failure*

DESCRIBE/EXPLAIN each of these conditions and the compensatory mechanisms that may occur.

The consequences of CCF – chronic venous congestion → ***pulmonary oedema. Cor pulmonale*** *results from some type of lung disease producing hypertension in the pulmonary artery and right ventricle enlargement.* **DESCRIBE/EXPLAIN each of these conditions.**

Other Diseases of the arteries and its consequences:

Degenerative *: Arterial dx are very common and are important because the their serious consequences, especially on the heart and the brain.* ***Atherosclerosis (atheroma)*** *affects the major vessels of the body.* ***Coronary artery disease (CAD)*** *results form depositions of atheromas in the coronary arteries → **myocardial infarction.** In other vessels it causes vessel stenosis and a resultant **ischaemia.***

Infective: Arteritis *is associated with TB or syphilis.*

Aneursysms: *a local enlargement of an artery, ballooning or outpouching of vessel wall. There are 2 main varieties: fusiform and saccular. Other varieties are dissecting and "berry" aneurysms.*

Miscellaneous: Raynaud's Phenomenon *– affects fingers, toes, ears and nose.*

DESCRIBE/EXPLAIN each of these arterial disorders.

Hypertension:

"High blood pressure (BP) is importantbecause it increases risk of CV disease, especially:

1. **LT ventricular failure**
2. **Ischaemic heart disase**
3. **Stroke**

EXPLAIN this.
EXPLAIN hypertension and the 2 types – viz. essential and secondary hypertension.
Hypertension is further classified as benign or malignant. EXPLAIN this.
COMPARE these 2 types according to age, aetiology, sex, prevalence, course, BP and vascular changes.
DESCRIBE the effects ad main complications IN VARIOUS ORGANS.

Ischaemic heart disease and myocardial infarction:

Cardiac ischaemia is the major cause of death and is almost always due to atheroma of the coronary arteries – narrowing or occlusion. **EXPLAIN this condition.**

Ischaemia leads to myocardial infarctions. EXPLAIN/DESCRIBE this.
EXPLAIN the complications of myocardial infarctions.

Valvular disease & Rheumatic fever:

EXPLAIN rheumatic fever and its cardiac manifestations.
The mitral and aortic valves when subject to much pressure are more susceptible to damage than the tricuspid and pulmonary valves.
EXPLAIN mitral valve disease and aortic valve disease.
Infective endocarditis is a disease of the heart valves. **EXPLAIN this**.
Myocardial infarctions also lead to arrythmias, silent attacks, cardiac failure and sudden death.
EXPLAIN cardiac arrythmias and diseases of the conducting system.

Diseases of the pericardium:

Pericarditis is commonly a complication of heart diseases or adjacent structures…. **EXPLAIN pericarditis.**
EXPLAIN the other diseases/conditions that may lead to pericarditis.
Cardiac rupture can lead to pericardial haemorrhage. **EXPLAIN this.**

Diseases of the veins and its consequences:

These are important, as they are associated with acute, severe and sometimes fatal complications or result in chronic disability. The formation of blood clots within a vein is called ***venous thrombosis****.* ***Phlebitis*** *is an inflammation of the vein. A combination of these disorders is* ***thrombophlebitis****. Lead to* ***embolism*** *→ fatal*

Varicose veins *is a common condition – veins become prominent and tortuous and bulge outwards under the skin.*

DESCRIBE/EXPLAIN each of these diseases of veins.

Diseases of the lymphatics:

Lymphatic vessels participate in disease processes in 2 ways:
They afford a natural route for spread OR they may become obstructed, with serious results.
EXPLAIN BOTH these phenomena.

Vascular tumours:

Benign tumours – angiomas (refer to page 132). Other varieties include:
Pogenic granuloma
Telangiectasis
Lymphangioma
Glomangioma
Angiosarcomas
Kaposi's Sarcoma
Briefly EXPLAIN each of these vascular tumours.

SYLLABUS THEME 8.7 – HAEMAOPOEITIC & LYMPHOID SYSTEM

DEFINE THE FOLLOWING TERMS: (some will be revision from previous worksheet)

- Lymphadenitis
- Lymphomas
- Lymphangiomas
- Lymphadenopathy

PREFIXES/SUFFIXES: (some may be revision from previous worksheet)

-
-
-

Please add new terminologies to list as discovered…

At the end of this learning area, you should be able to:

- *IDENTIFY the major constituents of blood and DESCRIBE the function of each.*
- *SPECIFY the various blood types*
- *EXPLAIN the role of the lymphatic system in terms of immunity*
- *DESCRIBE the pathogenesis, prognosis, and signs & symptoms of the disease processes in this system*

ANATOMY & PHYSIOLOGY OF THE HAEMOPOIETIC SYSTEM:

Please REVIEW the anatomy and physiology of this system. This is necessary to fully appreciate the pathologies that may present in this system.

Some guidelines:

- *Blood*
- *Lymphatic tissue*
- *Bone marrow*
- *Spleen*

***EVALUATE the role of imaging in the Haemopoietic System**, with respect to the following:*

- *Plain film/image radiography – limited role*
- *Nuclear cardiology – SPECT, PET/CT*
- *Computed Tomography (CT)*
- *MRI*

Categories of diseases:	
○ *Anaemias* ○ *Iron deficiency anaemia* ○ *Thalassaemia* ○ *Sickle cell dx* ○ *Platelet disorders* ○ *AIDS* ○ *Neoplastic DX*	○ *Lymphadenopathy* ○ *Splenomegaly* ○ *Thymus gland* ○ *Non-Hodgkin's Lymphomas* ○ *Plasma cell tumours* ○ *Hodgkin's Dx* ○ *Leukaemias* ○ *Multiple myelomas*
When working through each of these diseases, ***DESCRIBE/EXPLAIN each, in terms of:*** • ***Aetiology*** • ***Incidence/prevalence*** • ***Clinical presentations*** • ***Pathological manifestations*** • ***Image characteristics appearances*** ***USE clearly labelled diagrams where necessary.***	

SYLLABUS THEME 8.8 – NERVOUS SYSTEM

DEFINE THE FOLLOWING TERMS: (some will be revision from previous worksheet)

- Neurology
- Cerebral
- Amnesia
- Dysartthria
- Hemiplegia
- Neuralgia
- Photophobia
- Stupor
- Vertigo
- Aphasia
- Ataxia
- Coma
- Dyslexia
- Nystagmus
- paralysis
- quadriplegia
- spasm
- syncope
- Convulsions
- Dementia
- Diplegia
- Hemiplegia
- Palsy
- Paraplegia
- Paresis
- Tinnitus
- Tremor

PREFIXES/SUFFIXES: (some may be revision from previous worksheet)

- Encephalo-
- Neuro-
- Myelo-

Please add new terminologies to list as discovered…

At the end of this learning area, you should be able to:

- *DESCRIBE the anatomic components of the central nervous system.*
- *DISCUSS the role of the various imaging modalities in evaluation of the CNS, particularly MRI and CT.*
- *DISCUSS common congenital anomalies of the CNS.*
- *CHARACTERISE a given condition as inflammatory, degenerative, vascular, or neoplastic.*
- *IDENTIFY the pathogeneisis of the pathologies cited and typical treatments for them.*
- *DISCUSS the imaging modalities most commonly employed for each type of CNS pathology.*
- *DESCRIBE, in general, the radiographic appearances of each of the given pathologies.*

ANATOMY & PHYSIOLOGY OF THE CENTRAL NERVOUS SYSTEM SYSTEM:

Please REVIEW the anatomy and physiology of the CNS. This is necessary to fully appreciate the pathologies that may present in this system.

Some guidelines:

- *Brain*
- *Spinal cord*

EVALUATE the role of imaging in the CNS*, with respect to the following:*

- *Plain film/image radiography*
- *MRI*
- *CT*
- *Ultrasound*
- *Nuclear medicine*
- *Vascular/interventional radiology*

Categories of CNS diseases:	
○ *Congenital and Hereditary Dx* ○ *Degenerative Dx* ○ *Neoplastic Dx*	○ *Inflammatory Dx* ○ *Vascular Dx* ○ *Traumatic disorders*

When working through each of these diseases in these categories, ***DESCRIBE/EXPLAIN each, in terms of:***

- ***Aetiology***
- ***Incidence/prevalence***
- ***Clinical presentations***
- ***Pathological manifestations***
- ***Image characteristics appearances***

USE clearly labelled diagrams where necessary.

Congenital and Hereditary Diseases:

Meningomyelocoeles *and* ***hydrocephalus*** *are fairly common presentations for imaging.* ***DESCRIBE/EXPLAIN each of these congenital disorders.***

Inflammatory Disease:

Inflammatory changes in the structures of CNS are denoted by the following terms:
Brain tissue – encaphilitis
Meninges – meningitis
Spinal cord tissue – myelitis
Nerves – neuritis

EXPLAIN/DESCRIBE the following inflammatory conditions: page 551 →	
○ *Meningitis (bacterial and viral)* ○ *Brain abscess*	○ *Encephalitis* ○ *TB*

Degenerative Disease:

EXPLAIN/DESCRIBE the following degenerative conditions:	
○ *Disc herniation* ○ *Cervical spondylosis* ○ *Ageing & dementia*	○ *Alzheimer's Dx* ○ *Multiple sclerosis (demyelinating dx)* ○ *Parkinson's Dx*

Raised Intracranial pressure (ICP) occurs in 2 main circumstances:

Due to presence of expanding lesion
Due to obstruction of CSF flow.

Cerebral oedema *iniates or aggravates raised ICP.*
EXPLAIN these consequences.

Vascular Disease:

Hypoxia & ischaemia and intracranial haemorrhage are important and common circulatrory disorders that casue brain damge.
Cerebrovascualr accidents (CVAs) or STROKES due to atherosclerotic dx also affect blood supply to the brain.

EXPLAIN/DESCRIBE the following vascular intracranial conditions: page 551 →	
○ *Cerebral infarction /ischaemia* ○ *Transient ischaemic attacks (TIAs)*	○ *Cerebral haemorrhage* ○ *Aneurysms*

HEAD INJURIES:

Also a major contributor to intracranial bleeds. Other presentations include:

- ***Direct blows to the head***
- ***Non-missile injury***
- ***Acceleration/deceleration injuries & rotational injuries***

Delayed complications from these injuries include:

- ***Haemorrhage***
- ***Cerebral oedema***
- ***External leakage of CSF***

EXPLAIN each of these consequences of head injuries.

INTRACRANIAL NEOPLASMS:

Primary tumours of the brain comprise about 10% of deaths from cancer. In most cases the location is more important than malignancy, due to complications produced by mass effect. Primary tumours are classified according to their site.

EXPLAIN/DESCRIBE the following intracranial neoplasms	
○ *Gliomas* ○ *Astrocytoma* ○ *Glioblastoma* ○ *Oligodendroglioma* ○ *Ependymoma* ○ *Tumours of Neuronal type cells* ○ *Medulloblastoma* ○ *Retinoblastoma* ○ *Neuroblastoma* ○ *Ganglioneuroma* ○ *Meningioma* ○ *Craniopharyngiomas*	○ *Pituitary adenomas* ○ *Tumours of the Central Nerve Sheath Cells/Peripheral Nerves* ○ *Neurofibroma* ○ *Schwannoma* ○ *Metastases from other sites*

Miscellaneous Disorders:

EXPLAIN the following conditions:

- *Motor neuron dx*
- *Motor & sensory disorders*
- *Sensory disorders*
- *The neuropathies*

SYLLABUS THEME 8.9 – SPECIAL SENSES

ANATOMY & PHYSIOLOGY OF THESPECIAL SENSES SYSTEM:

Please REVIEW the anatomy and physiology. This is necessary to fully appreciate the pathologies that may present in this system.

Some guidelines:

- *THE EYE*
- *THE EAR*

EXPLAIN the following EYE Disorders:

- *Cataract*
- *Glaucoma*
- *Tumours – melanoma*

EXPLAIN the following EAR Disorders:

- *Acoustic neuroma*
- *Otitis media*
- *Cholesteatoma*
- *Meniere's Dx*

SYLLABUS THEME 8.10 – ENDOCRINE SYSTEM

DEFINE THE FOLLOWING TERMS: (some will be revision from previous worksheet)

- Endocrinology
- Hyperfunction
- Hypofunction

PREFIXES/SUFFIXES: (some may be revision from previous worksheet)

-
-
-

Please add new terminologies to list as discovered…

At the end of this learning area, you should be able to:

- *DESCRIBE the anatomic components of the endocrine system.*
- *DISCUSS the role of imaging modalities in the diagnosis, treatment and management of endocrine related disorders.*
- *IDENTIFY the pathogenesis of the pathologies and typical treatments of them.*
- *DESCRIBE, in general, the radiographic appearances of each of the given pathologies.*

ANATOMY & PHYSIOLOGY OF THE ENDOCRINE SYSTEM:

Please REVIEW the anatomy and physiology of this system. This is necessary to fully appreciate the pathologies that may present in this system.

Some guidelines:

- *Pituitary gland*
- *Thyroid gland*
- *Adrenal glands*
- *Pancreas*
- *Parathyroid gland*
-

EVALUATE the role of imaging in the Endocrine System*, with respect to the following:*

- *Plain film/image radiography*
- *Ultrasound*
- *Nuclear medicine*
- *Computed Tomography (CT)*
- *MRI*

When working through each of these diseases, ***DESCRIBE/EXPLAIN each, in terms of:*** • ***Aetiology*** • ***Incidence/prevalence*** • ***Clinical presentations*** • ***Pathological manifestations*** • ***Image characteristics appearances*** ***USE clearly labelled diagrams where necessary.***	
Disorders of the pituitary gland:	
○ *Gigantism & acromegaly* ○ *Cushing's syndrome*	○ *Hypopituitarism* ○ *Hyperprolactinaemia*
Disorders of the thyroid gland:	

○ *Myxoedema* ○ *Cretinism* ○ *Thyroiditis* ○ *Malignant tumours*	○ *Grave's Dx* ○ *Toxic oedema* ○ *Goitre*
Disorders of the adrenal gland:	
○ *Cushing's syndrome* ○ *Conn's syndrome*	○ *Sex hormone secretion* ○ *Chronic hypofunction* ○ *Phaeochromocytoma*
Disorders of the pancreas:	
○ *Diabetes mellitus* ○ *Type I* ○ *Type II*	○ *Islet cell tumours*
Disorders of the parathyroid glands:	
○ *Hypoparathyroidism*	○ *Hyperparathyroidism*

SYLLABUS THEME 8.11 – SKIN

DEFINE THE FOLLOWING TERMS: (some will be revision from previous worksheet)

- Cutaneous
- Pruritis
- Purpura
- Vesicles (petechiae)
- Eczema
- Dermatology
- Rashes
- Urticaria
- Hyperkeratoses
- Erythema
- Macules
- Papules
- Exfoliation
- Nodules

PREFIXES/SUFFIXES: (some may be revision from previous worksheet)

Please add new terminologies to list as discovered…

ANATOMY & PHYSIOLOGY OF THE SKIN:
Please REVIEW the anatomy and physiology of the Skin. This is necessary to fully appreciate the pathologies that may present in this system.

Categories of Skin Disorders:	
○ *Congenital and Hereditary Dx* ○ *Traumatic Dx* ○ *Infections* ○ *Infestations*	○ *Neoplasms* ○ *Urticaria* ○ *Eczema* ○
When working through each of these diseases, ***DESCRIBE/EXPLAIN each, in terms of:*** • ***Aetiology*** • ***Incidence/prevalence*** • ***Clinical presentations*** • ***Pathological manifestations*** • ***Image characteristics appearances*** ***USE clearly labelled diagrams where necessary.***	

Congenital Disorders:	
○ *Branchial sinus/fistula* ○ *Dermoid cysts*	○ *Urachal fistula* ○
Traumatic Disorders:	
○ *Wounds* ○ *Burns* ○ *Scalds*	○ *Bedsores/pressure sores* ○ *Corns/bunions*
Infections And Infestations:	
○ *Furuncle* ○ *Carbuncle* ○ *Gangrene – gas* ○ *Anthrax* ○ *Herpes Zoster* ○ *Scabies*	○ *Cellulitis* ○ *TB of the skin* ○ *Syphilis* ○ *Leprosy* ○ *Herpes Simplex* ○
Neoplasms:	
○ *Papilloma* ○ *Melanoma* ○ *Lipoma* ○ *Haemangioma* ○ *Lymphangioma* ○	○ *Epithelioma* ○ *Rodent ulcer (basal cell ca.)* ○ *Malignant melanoma* ○ *Metastases* ○ *Kaposi's Sarcoma*
Other:	
○ *Urticaria* ○ *Psoriasis*	○ *Eczema* ○ *Dermatitis* ○