UNIT-IV

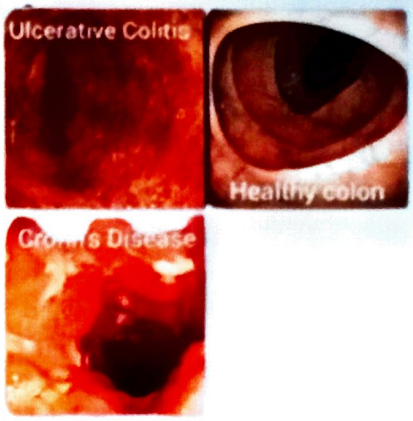
INFLAMATORY BOWEL DISEASES

Points to be covered in this topic

- ❑ INFLAMMATORY BOWEL DISEASE
- ❑ JAUNDICE
- ❑ HEPATITIS (A, B, C, D, E, F)
- ❑ ALCOHOLIC LIVER DISEASE

❑ INFLAMATORY BOWEL DISEASES

❖ Introduction



- Inflammatory bowel disease (IBD) is a term encompassing a number of chronic inflammatory disorders leading to damage of the gastrointestinal tract.

- Inflammatory bowel disease (IBD) can be divided into two chronic inflammatory disorders of the gastro-intestinal tract, namely **Crohn's disease (CD)** and **ulcerative colitis (UC).** Crohn's disease affects any part of the **gastro-intestinal tract** whereas ulcerative colitis affects the **colon and rectum only.**

❖ Epidemiology

- IBD is a condition of developed countries and **outside of Europe**, the **United Kingdom and North America**, is seen in Australia, **South-Africa, and Israel** at an appreciable frequency.
- IBD is more common in **urban areas** and in high socioeconomic settings. It is more common in Caucasians, and especially **those of Jewish extraction.**
- It occurs less frequently in other race groups.

❖ Causes

The exact etiology of IBD remains unknown. However, multiple factors are implicated which can be considered-

INFECTIOUS AGENTS	
• Viruses (e.g., measles)	• Mycobacteria
• L-Forms of bacteria	• Chlamydia
GENETICS	
• Metabolic defects	• Connective tissue disorders

ENVIRONMENTAL FACTORS	
• Diet	• Smoking (Crohn's disease)
IMMUNE DEFECTS	
• Altered host susceptibility	• Immune-mediated mucosal damage
PSYCHOLOGIC FACTORS	
• Stress, Emotional or physical trauma	• Occupation

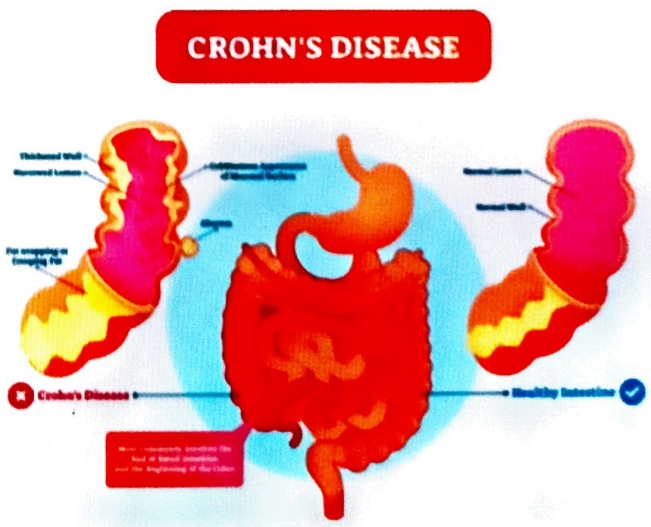
❖ Pathogenesis

Ulcerative Colitis

- Ulcerative colitis is confined to the **colon** and **rectum** and affects primarily the **mucosa** and the **submucosa.**
- The primary lesion occurs in the **crypts of the mucosa** (crypts of Lieberkühn) in the form of a **crypt abscess.**
- Local complications (involving the colon) occur in the majority of **ulcerative colitis patients**. Relatively minor complications include hemorrhoids, anal fissures, or perirectal abscesses.
- A major complication is **toxic megacolon**, The patient with toxic megacolon usually has a **high fever, tachycardia, distended abdomen, elevated white blood cell count, and a dilated colon.**
- Ulcerative colitis have **hepatobiliary** complications including fatty liver, pericholangitis, chronic active hepatitis, cirrhosis, sclerosing cholangitis, cholangiocarcinoma, and gallstones.

Crohn's Disease

- Crohn's disease is a transmural inflammatory process. The **terminal ileum** is the most common site of the disorder but it may occur in any part of the GI tract.



- Complications of Crohn's disease may involve the **intestinal tract or organs unrelated to it.**
- **Small-bowel stricture** and subsequent obstruction is a complication that may require surgery. **Fistula formation** is common and occurs much more frequently than with ulcerative colitis.
- **Arthritis, iritis, skin lesions, and liver disease** often accompany Crohn's disease.
- **Nutritional deficiencies** are common with Crohn's disease.

❖ Signs and symptoms

1. Ulcerative Colitis

✓ Rectal bleeding	✓ Urgency
✓ Diarrhea	✓ Tenesmus
✓ Abdominal cramps	✓ Fever
✓ Loss of weight	✓ Erosions/ulcerations

2. Crohn's Disease

✓ Malaise and fever	✓ Arthritis
✓ Abdominal pain	✓ Weight loss
✓ Frequent bowel movements	
✓ Fistula	

❖ Complications

- Colon cancer. Having ulcerative colitis or Crohn's disease that affects most of your colon can increase your risk of colon cancer.
- Skin, eye and joint inflammation.
- Medication side effects.
- Primary sclerosing cholangitis.
- Blood clots.
- Severe dehydration.

❑ JAUNDICE

❖ Introduction

- Jaundice, also known **as icterus.** Jaundice is **yellowish discoloration of the skin, sclera and mucous membranes** due to **hyperbilirubinemia** and **deposition of bile pigments.**
- Bilirubin is a yellow pigment that is created by the **breakdown of dead red blood cells in the liver.**
- It is usually detectable clinically, when the plasma bilirubin exceeds **50µmol/L(3mg/dL).**

❖ Epidemiology

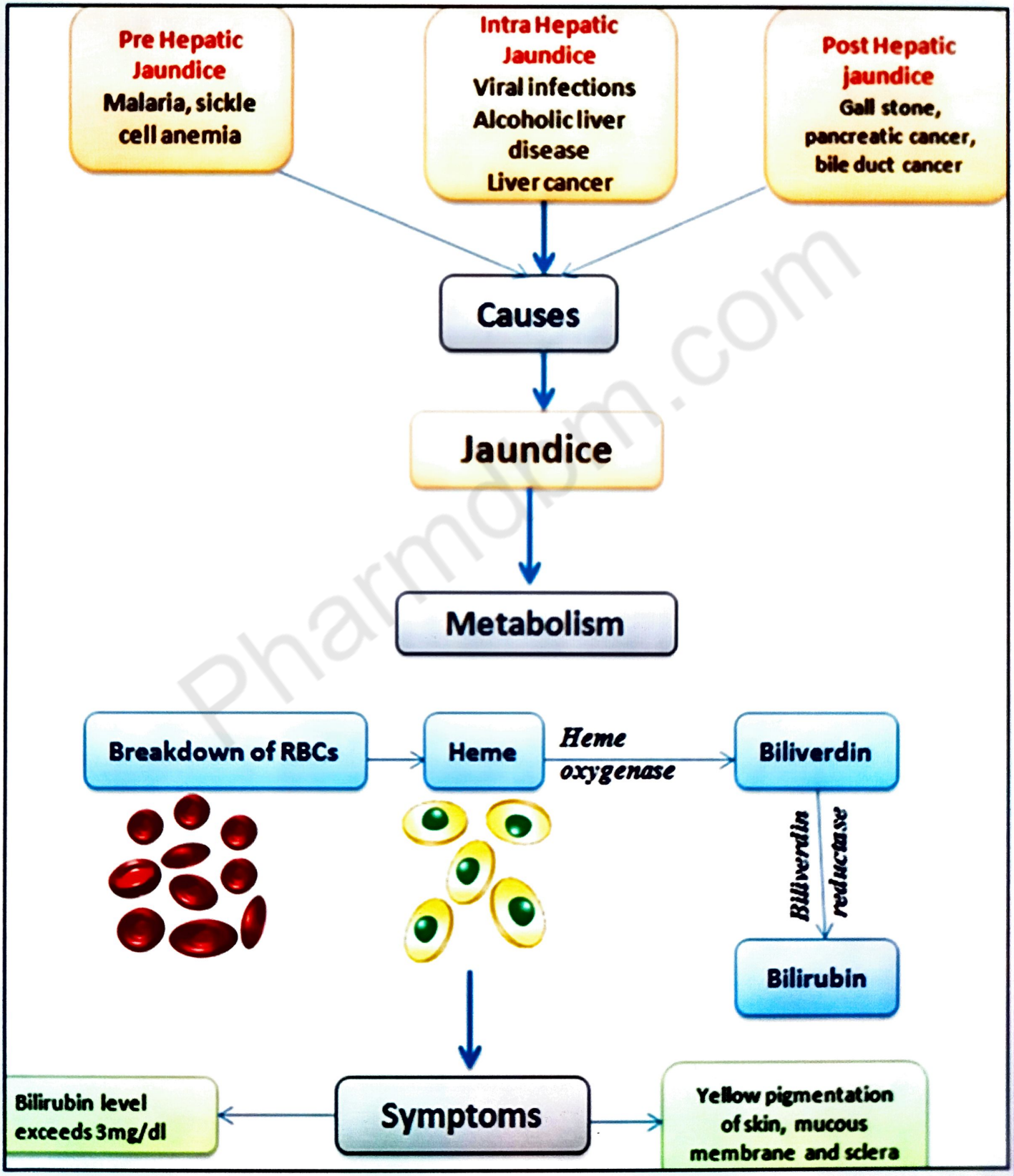
- The prevalence of Jaundice varies with age and sex; **newborns and older adults are most often affected.**
- Approximately 20 percent of newborns develop Jaundice in **the first week of life**, primarily because of **immaturity of the hepatic conjugation process.**
- Congenital abnormalities, **hemolytic or bilirubin uptake disorders**, and conjugation defects are also responsible for Jaundice in infancy or childhood.
- **Viral Hepatitis A** is the most frequent cause of Jaundice among school-age children. Common duct stones, Alcoholic Liver Disease and Neoplastic

❖ Causes

- Pancreases or gall bladder carcinoma
- Hepatitis – infection in the liver
- Alcoholic liver disease & Liver cirrhosis
- Gall stones in the gall bladder
- Pancreatitis- inflammation in pancreases
- Congenital disease – disease since birth

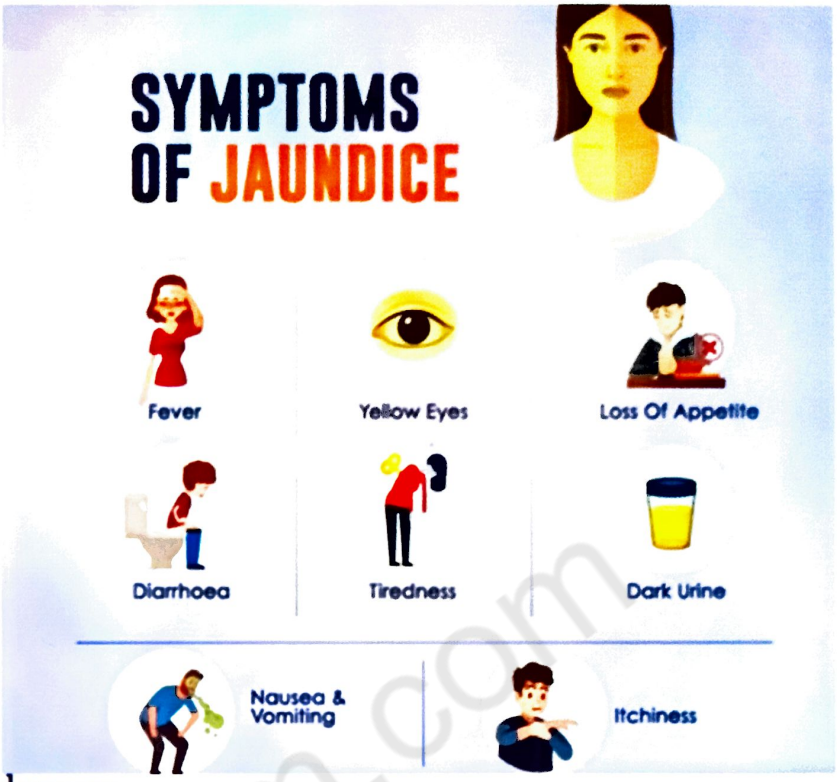
❖ Pathogenesis

- Due to any chemical toxin & blood transfusion.
- Increase the destruction of RBCs.
- Increase the amount of unconjugated bilirubin in blood & hepatocellular & obstructive causes jaundice.



❖ Signs and symptoms

- Yellow discoloration of the skin, Mucous membranes
- The whites of the eyes
- Light-colored stools
- Dark-colored urine
- Itching of the skin
- Nausea and vomiting
- Abdominal pain
- Fever
- Weakness
- Loss of appetite
- Headache
- Confusion
- Swelling of the legs and abdomen



❖ Complications

- Renal failure (Hepatorenal syndrome)
- Biliary infection (Cholangitis)
- Deranged Coagulation
- Relative immunosuppression & delayed wound healing
- Pancreatitis

❑ HEPATTIS (A,B,C,D,E,F)

❖ Introduction

- Hepatitis is an **inflammation of the liver.** Alcohol consumption, several health conditions, and some medications can all cause this condition.
- These include **autoimmune hepatitis** and hepatitis that occurs as a secondary result of medications, drugs, toxins, and alcohol. Autoimmune hepatitis is a disease that occurs **when your body makes antibodies against your liver tissue.**
- The five main viral classifications of hepatitis are hepatitis A, B, C, D, and E. A different virus is responsible for each type of viral hepatitis.

TYPES OF HEPATITIS	COMMON ROUTE OF TRANSMISSION
Hepatitis A	Exposure to HAV in food or water
Hepatitis B	Contact with HBV in body fluids, such as blood, vaginal secretions, or semen
Hepatitis C	Contact with HCV in body fluids, such as blood, vaginal secretions, or semen
Hepatitis D	Contact with blood containing HDV
Hepatitis E	Exposure to HEV in food or water

❖ Epidemiology

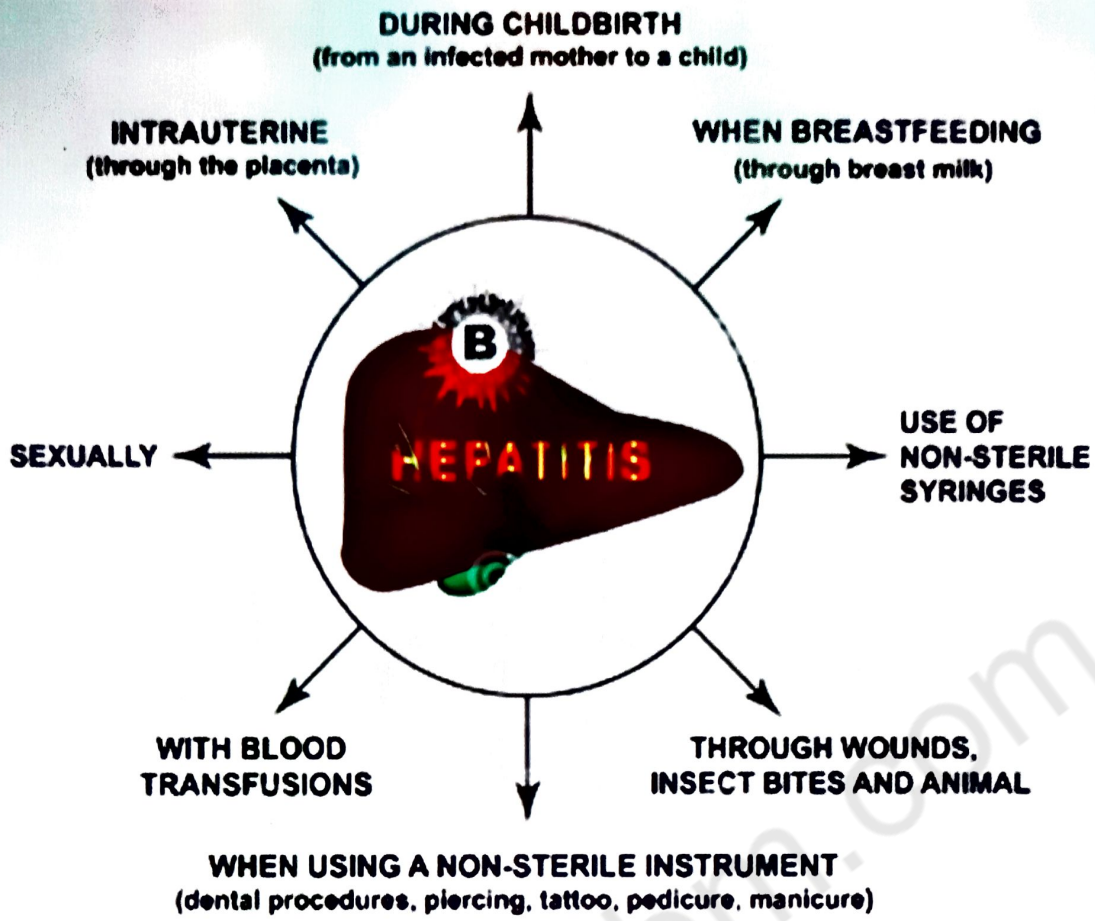
- Approximately 40-60% of cases of acute hepatitis are caused by HAV
- It is endemic throughout the world and hyperendemic in the developing countries.
- Epidemics are common and they are common source epidemics.

❖ Causes

1. Hepatitis A

- Close contact with a person who has hepatitis A
- Injecting drugs with contaminated needles
- Drinking contaminated water, including ice cube

2. Hepatitis B



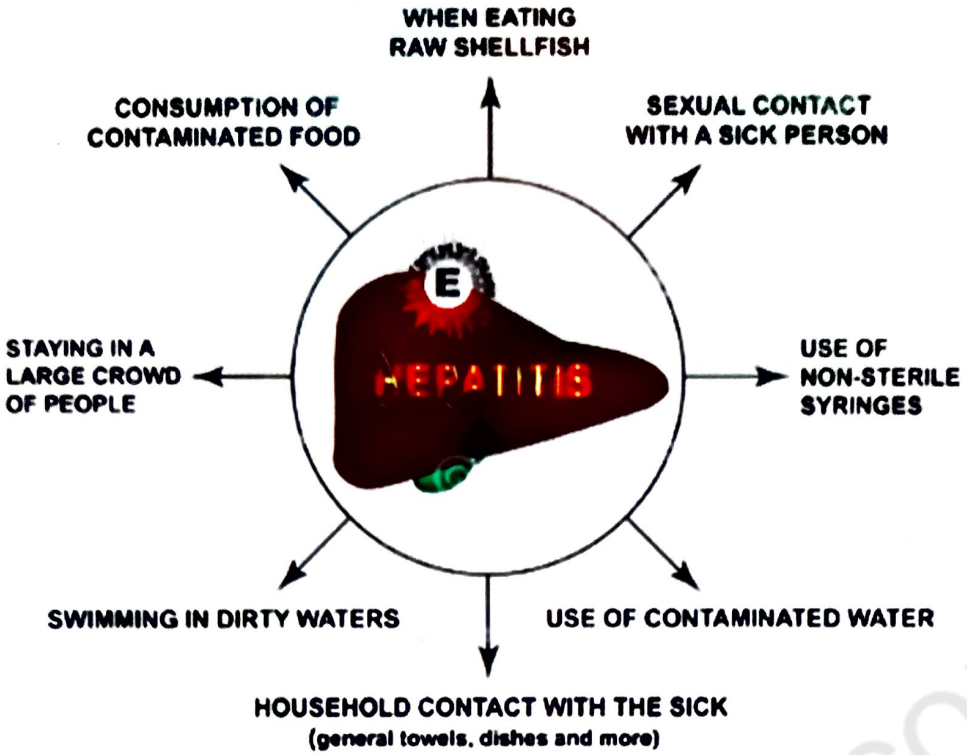
3. Hepatitis C

- In case of insufficient sterilization of instruments (in tattoos, manicure, cosmetology, in dental clinics)
- With **donor blood transfusion**
- During operations
- Use of non-sterile needles for injection
- During sexual contact
- During pregnancy (from mother to fetus)
- During childbirth (from mother to child)
- Complications of an infectious or bacterial disease (for example, a complication of **syphilis or leptospirosis**)

4. Hepatitis D

- During childbirth (from an infected mother to a child)
- With blood transfusions
- Use of **non sterile syringes**
- Through wounds insect bites and animal
- When using a non sterile instrument
- During **sexual contact** & During operations

5. Hepatitis E

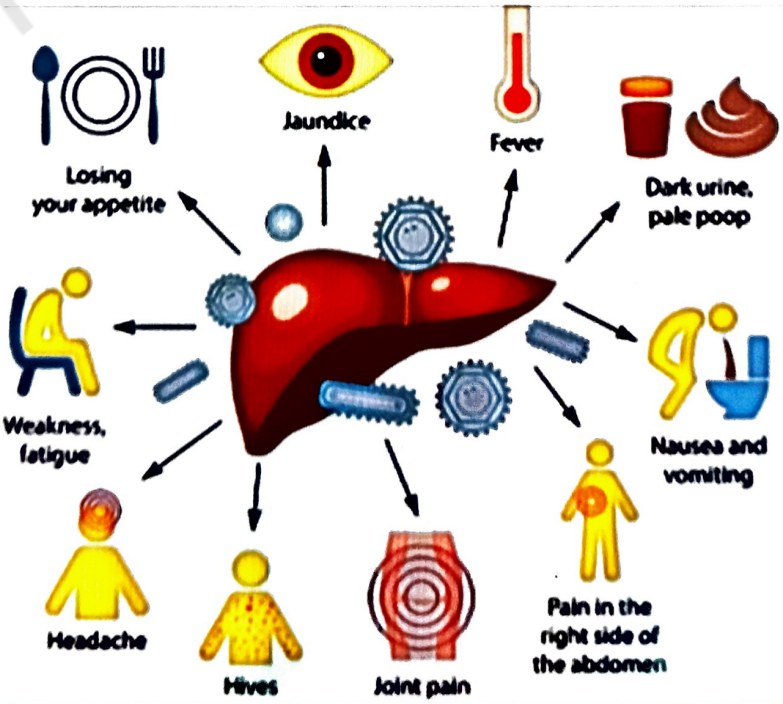


❖ Signs and symptoms

1. Hepatitis A

- Fatigue and generally unwell
- Mild fever sensations
- Dark urine
- Skin and eyes turning yellow (a condition called jaundice)
- Severe itching

2. Hepatitis B



3. Hepatitis C

- Jaundice
- Fever
- **Dark urine pale pop**
- Nausea and vomiting
- Digestive disorders or diarrhea
- **Ascites**
- Vascular asterisks
- Pain in the right side of the abdomen
- Joint pain
- **Headache**
- Hives
- Weakness fatigue
- **Sleep disruption**
- Losing your appetite

4. Hepatitis D

- Increased bilirubin in the blood
- Jaundice
- Cirrhosis
- **Simultaneous explanation of the spleen and liver**
- Physical weakness
- Violation of protein translation in the liver
- **Fever**
- intoxication

5. Hepatitis E

- Nausea vomiting
- Pain in the right hypochondrium
- Reduced appetite
- Dark urine, bleached feces
- Raise body temperature to 38 degree Celsius
- Severe weakness, measles
- Intoxication
- Yellowing of the skin and eyes

❖ Pathogenesis

- Bilirubin, **a yellow pigment**, is one of several products of hemoglobin breakdown. Hemoglobin synthesis and breakdown are continuous processes, small amounts of bilirubin are released into the general circulation continuously.
- The hepatocyte, though, is the prime bilirubin processor, and so hepatocyte impairment results in **disordered bilirubin metabolism**.
- **Bilirubin is fat soluble**, not water soluble. A hepatocyte enzyme, glucuronyl transferase, modifies bilirubin as it arrives at the liver, and **converts it to** a **water soluble compound**.
- This process is called bilirubin conjugation The conjugated bilirubin is then **excreted into the bile** and is **released into the gut**.
- The unconjugated bilirubin, which is fat soluble, accumulates in fatty tissues, most notably the **skin**, where the presence of this yellow pigment produces jaundice.

- If excretion of water soluble, conjugated bilirubin is impaired, jaundice may also occur.
- Mostly bilirubin is **produced by RBC breakdown** in the spleen.
- Jaundice indicates one of **four problems:**

1. Increased RBC breakdown.
2. Failure of **hepatocyte conjugation**
3. Failure of hepatocyte excretion of conjugated bilirubin into the **bile canaliculi**
4. **Extrahepatic obstruction** in liver disease, problems 2 and 3 usually occur together.

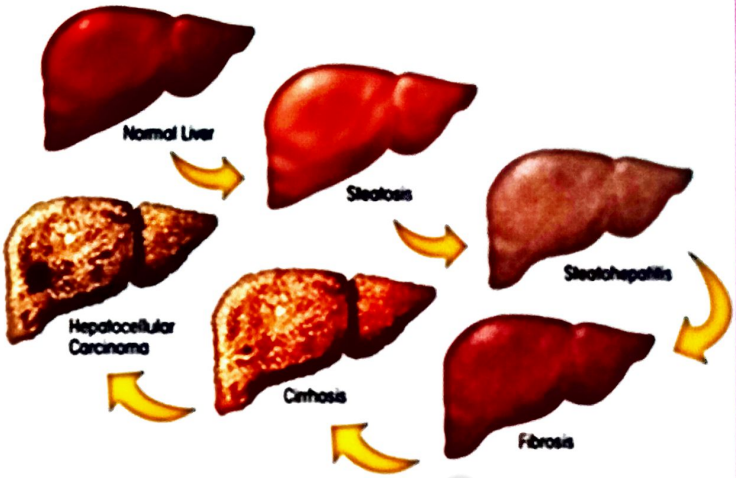
❖ Complications

- Jaundice
- Pruritus
- Renal damage/failure
- Hypo/Hyperthyroidism
- Varices of Esophagus, Stomach, Rectum
- Muscle Wasting

❑ ALCOHOLIC LIVER DISEASE

❖ Introduction

- Alcohol-related liver disease (ARLD) is caused by damage to the liver from years of **excessive drinking.** Years of alcohol abuse can cause the liver to become **inflamed** and **swollen**. This damage can also cause scarring known as cirrhosis. **Cirrhosis** is the final stage of liver disease.



❖ Epidemiology

- Alcoholic liver disease occur when patient **drink >21U/w** in female & **24U/w in male.**
- Most patient with liver disease have **drunk heavily > 5 years.**
- Average alcohol consumption to develop cirrhosis **160g/d for an average 8ys.**

❖ Causes

Main causative factor is heavy alcohol consumption:

- ✓ **Men:> 40 g/day**
- ✓ **Women: 20 g/day**

Risk factors for the development of alcoholic liver disease include:

- ✓ **Women with increased susceptibility**
- ✓ **Hepatitis C virus (HCV) infection**
- ✓ **Obesity and non-alcoholic fatty liver disease**
- ✓ **High-fat diet Smoking & Diabetes**

❖ Pathogenesis

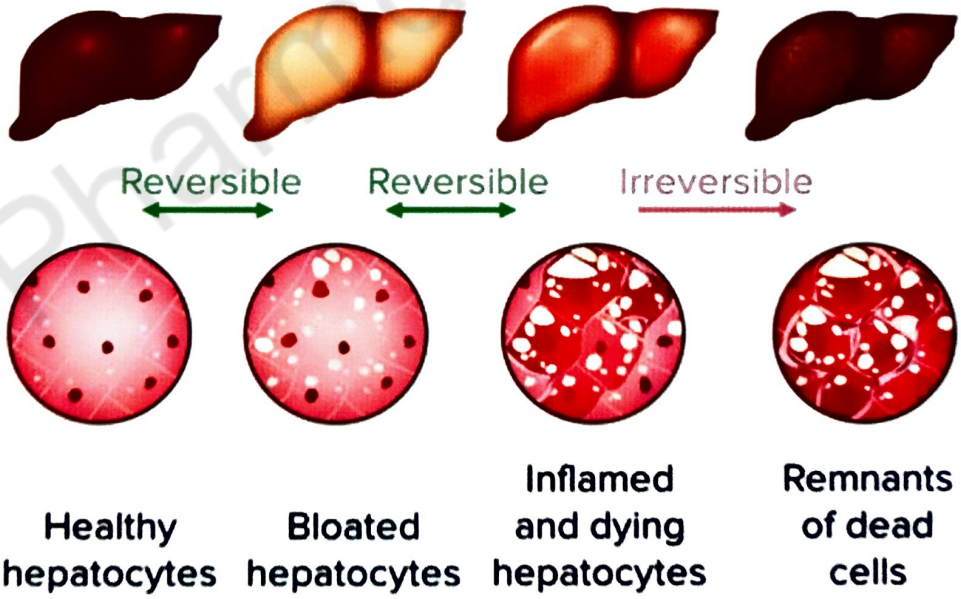
A. Ethanol Metabolism

There are multiple pathways, but the major one is the acetaldehyde pathway:

- ✓ **Acetaldehyde and reduced nicotinamide adenine dinucleotide (NAD+) are generated.**
- ✓ **Acetaldehyde is metabolized to acetate by acetaldehyde dehydrogenase.**
- ✓ **Acetaldehyde dehydrogenase has multiple isoforms with different levels of activity.**
- ✓ **Accumulation of acetaldehyde is one factor responsible for liver injury.**

Progression of liver damage in alcoholic liver disease (left to right):

1. Healthy hepatocytes (no liver damage)
2. Bloated hepatocytes with steatosis (distended by fat droplets), no inflammation: steatosis (liver damage still reversible)
3. Inflamed and dying hepatocytes, possible fibrosis: hepatitis (liver damage still reversible)
4. Dead cells: cirrhosis (irreversible liver damage)



With excessive alcohol consumption, microsomal cytochrome P450 plays a role in metabolism:

- ✓ **Reactive oxygen species are formed in this pathway**
- ✓ **Contribute to oxidative damage in alcoholic liver disease**

❖ Signs and symptoms

- May have vague abdominal discomfort
- Low-grade fever
- Loss of appetite, nausea
- Jaundice
- Hepatomegaly
- Lethargy
- Alopecia
- Confusion
- Fatigue
- malaise
- Weight loss
- Upper GI bleeding
- Reduced libido

❖ Complications

- Portal hypertension.
- Ascites.
- Portosystemic shunt and variceal bleeding.
- Splenomegaly.
- Jaundice and cholestasis
- Hepatorenal syndrome.
- Hepatic encephalopathy
- Hepatocellular carcinoma.

UNIT-IV

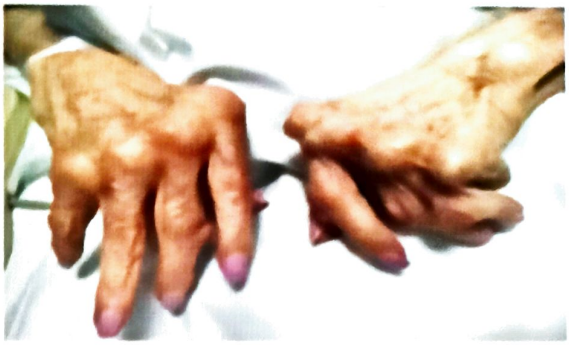
DISEASE OF JONTS & BONES

Points to be covered in this topic

- ❑ RHEUMATOID ARTHRITIS
- ❑ OSTEOPOROSIS
- ❑ GOUT

❑ RHEUMATOID ARTHRITIS

❖ Introduction



- Rheumatoid arthritis (RA) is a **systemic inflammatory disease** which affects not only the joints but a wide range of **extra-articular organs.**
- The disease, if not treated early, will lead to **progressive joint deformity** and increased **morbidity** and **mortality**.

❖ Causes

The cause of rheumatoid arthritis (RA) is unknown, but several risk factors play a role.

✓ **Genetic predisposition:**

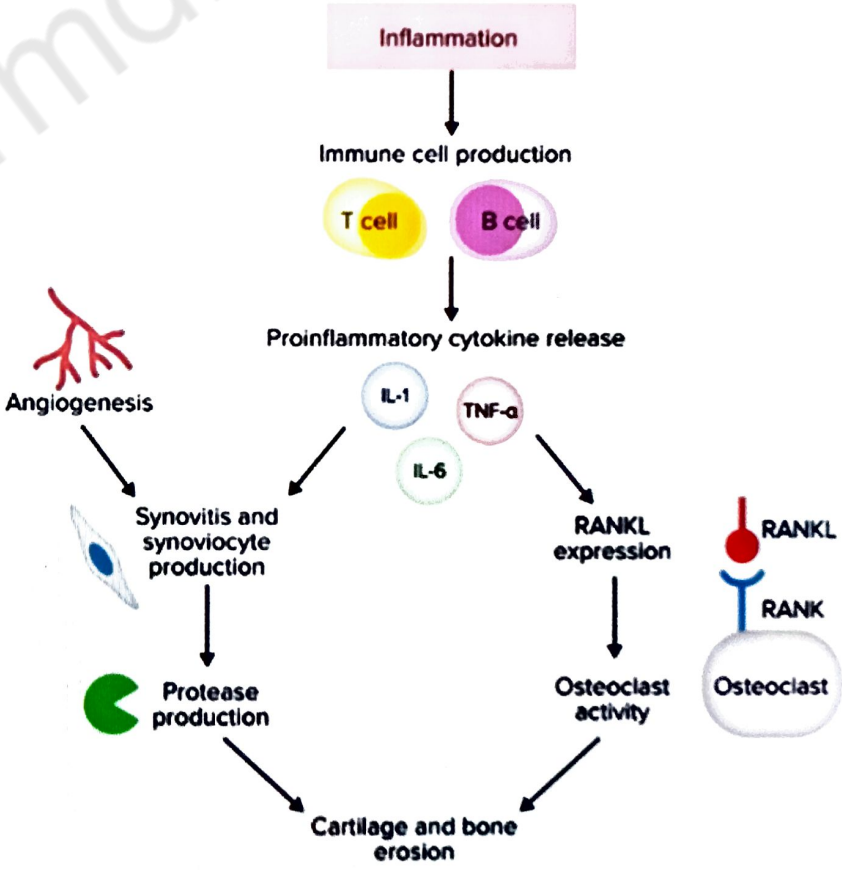
- 2-3 times more likely in those with a 1st-degree relative with RA
- Associated with:
  - HLA-DR1
  - HLA-DR4

✓ **Environmental factors**

- **Lifestyle:**
  - **Cigarette smoking & Obesity**
- **Hormonal**
- **Infectious:**
  - Epstein-Barr virus (EBV)
  - Parvovirus B19
  - Hepatitis B and C
  - Rubella
  - **Mycoplasma**
  - Recurrent dental infections

❖ Pathogenesis

- An **external trigger sets off** the autoimmune response and **↑ expression of enzymes** that convert **arginine to citrulline → creation of antigens**
- β-cells produce antibodies to **citrullinated proteins → bind to fibrinogen and collagen → complement activation**
- Synovium is infiltrated by immune cells (e.g., macrophages mast cells, B cells, CD4 T cells) → cytokine and chemokine production → synovial membrane **thickening and villus formation**
- **Hyperplastic synovial tissue (pannus) releases:**
  - ✓ Collagenase
  - ✓ Stromelysin
  - ✓ Interleukins
  - ✓ (IL)
  - ✓ Tumor
  - ✓ Necrosis
  - ✓ Factor (TNF)-alpha
- **Leads to:**
  - ✓ Continued synovial inflammation
  - ✓ Cartilage
  - ✓ Destruction
  - ✓ Osteoclasts-mediated bone
  - ✓ Destruction



❖ Signs and symptoms

- Fatigue
- **Weakness**
- **Low-grade fever**
- Loss of appetite
- Symmetrical affects joints on **the both sides of the body**
- Rheumatoid nodules
- **Deformity of joints** over time
- Joint pain
- Joint swelling
- Early morning stiffness

❖ Complications

- Serious infectious events
- Osteoporotic fractures
- UGI Bleed
- Extraarticular manifestations
- Total joint replacements
- **Non-Hodgkins lymphoma**
- Myocardial infarction, CVA
- Premature death

❑ OSTEOPOROSIS

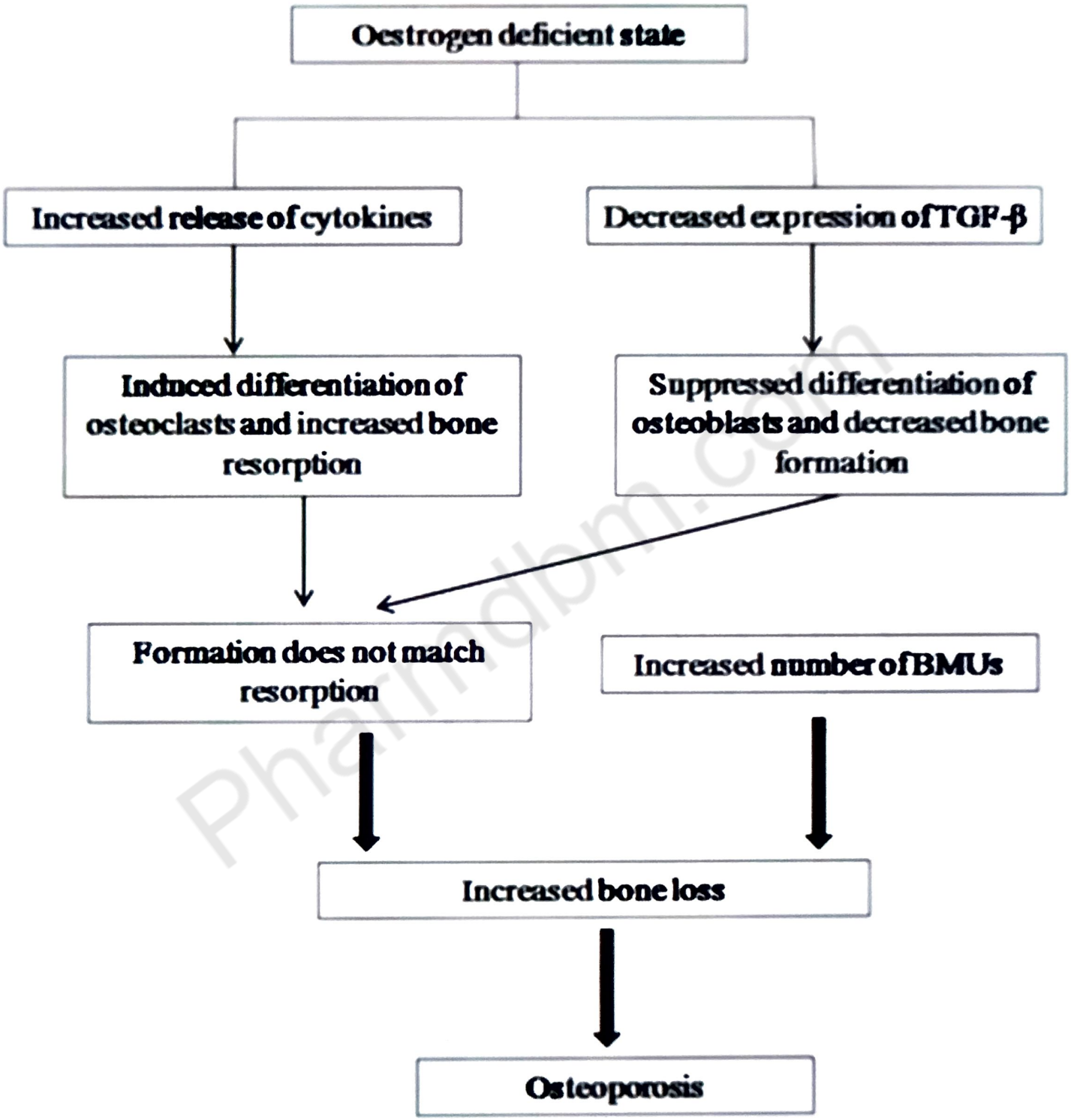
❖ Introduction

- "Osteoporosis (OP) is a **systemic** skeletal disease characterized by **low bone mass and micro-architectural deterioration of bone tissue**, with a consequent increase in bone fragility and susceptibility to fracture risk."
- Osteoporosis causes **bones to become weak and brittle** — so brittle that a **fall or even mild stresses** such as **bending over or coughing** can **cause a fracture.**
- Osteoporosis-related fractures most commonly occur in **the hip, wrist or spine.**

❖ Causes

- It is caused due to **menopausal in females**, arthritis, genetic factors, deficiency of calcium, certain medicaments, etc.
- Women are at a greater risk than men, especially women who are **thin or have a small frame,** as are those of advanced age.
- Women who are white or Asian, especially those with a family member with osteoporosis, have a greater risk of developing OP than other women.
- Women who are **postmenopausal,** including those who have had early or surgically induced **menopause, or abnormal or absence** of menstrual periods, are at greater risk.
- **Cigarette smoking,** eating disorders such as anorexia nervosa or bulimia, **low amounts of calcium in the diet, heavy alcohol consumption,** inactive lifestyle, and use of certain medications, such as corticosteroids and anticonvulsants, are also risk factors.
- **Rheumatoid arthritis** itself is a risk factor for OP.
- Having a parent who has/had osteoporosis is a risk factor for the offspring.

❖ Pathogenesis



❖ Signs and symptoms

- Back pain
- Loss of height
- Increased kyphosis
- Immobility
- Increased number of bed days
- Loss of self-esteem
- Distorted body image
- Depression
- Intense pain.
- Redness.
- Stiffness.
- Swelling.
- Tenderness, even to light touch, such as from a bedsheet.
- Warmth, or a feeling like the joint is "on fire."

❖ Complications

- It can be **disabling and limit your physical activity**. A loss of activity can make you **gain weight and increase stress** on your bones, in particular your knees and hips. Gaining weight can also **increase your risk** of other problems, such as heart disease and diabetes.
- Elderly patients can **further develop pneumonia and blood clots** in the **leg veins** that can travel to the lungs due to prolonged bed rest after a hip fracture.

❑ GOUT

❖ Introduction

- Gout is a **metabolic disorder of purine metabolism**, characterized by intermittent attacks of **acute pain, swelling and inflammation.**
- It always preceded by **hyperuricemia (6.0mg/dl)**
  - ✓ Hyperuricemia due to excessive amount of uric acid production or decreased excretion.
  - ✓ Hyperuricemia - primary or secondary.
  - ✓ Primary hyperuricemia classified as "Overproducers" or "under execrators"

❖ Causes

- **Primary Hyperuricemia and Gout (with No Associated Condition)**
  - ✓ Uric acid under secretion(80%– 90%)
  - ✓ Idiopathic
  - ✓ Urate overproduction (10%– 20%)
  - ✓ HGPRT deficiency
  - ✓ PRPP synthetase over activity (Phosphoribosyl pyrophosphate)
- **Secondary hyperuricemia and gout (with identifiable associated condition)**
  - ✓ Develop during courses of other diseases (lymphoma, leukemia, chemotherapy
  - ✓ Some drug therapy (furosemide, thiazide diuretics, ethacrynic acid)
  - ✓ Some disorders Diabetic ketoacidosis, lead poison, Lymphoproliferative diseases, Hemolytic anemias, psoriasis
  - ✓ Dual mechanism Obesity, Hypoxemia and hypo perfusion
- **Hereditory :** family members have hyperuricemia without gout.
- **Race :** Whites> Blacks
- **Sex :** Males >Females • Age :2nd to 4th decade common at 40 years.

Predisposing factors:

- ✓ Alcohol abuse
- ✓ High consumption of Red meat &Beans
- ✓ Obesity
- ✓ Diabetes
- ✓ Hypertension
- ✓ Hyperlipidemia
- ✓ Chronic inflammatory diseases
- ✓ Long term use of diuretics or aspirin
- ✓ Hyper parathyroidism
- ✓ Myeloproliferative disorders

❖ Pathogenesis

↑ ↑ Uricacid

↓

Blood

↓

React with sodium

Sodium crystals (tophi)

Deposited in soft tissues and joints

↓

Inflammation(ry) — Indomethacin

Colchicine

↓

Infiltration of granulocytes that phagocytise the urate crystals

↓

Generate free radicals

Free radical damage the tissue

Colchicine

↓

Release of proteolytic enzyme glycoprotein

↓

Release of lactic acid — Colchicine

↓

More ppt of urate crystals

Release of lysosomal enzymes

↓

Destruction of joints

❖ Signs and symptoms

- Characterized by a sudden onset of redness, swelling, heat and extreme pain.
- Affects peripheral joints :
  - ✓ Metatarsophalangeal
  - ✓ Elbow
  - ✓ Thumbs
  - ✓ Knees
  - ✓ Fingers
  - ✓ Ankles
- Acute pain during night

❖ Complications

- Tophi are **clumps of urate crystals** that harden under your skin.
- **Joint damage and deformity**. When you have chronic gout, you have **swelling in your joints regularly**.
- **Kidney stones.**
- Kidney disease and kidney failure.
- **Psychological and emotional** problems.
- Tophi can develop in several areas, such as your **fingers, hands, feet, elbows or Achilles tendons** along the backs of your ankles. Tophi usually aren't painful, but they can become swollen and tender during gout attacks.
- Kidney stones. **Urate crystals may collect in the urinary tracts** of people with gout, causing kidney stones. Medications can help reduce the risk of kidney stones.

UNIT-IV

PRINCIPLES OF CANCER

Points to be covered in this topic

- ❑ CLASSIFICATION
- ❑ ETIOLOGY
- ❑ PATHOGENESIS OF CANCER

❑ CANCER

❖ Introduction

- Cancer is a disease in which cell distribute **without control** and **capable to invade other tissue.**
- Most cancer is called for the organ or type of cell in which they start. e.g. lung cancer. Cancer is caused due to **malignant tumor.**

❖ Causes

- The main cause of cancer is **mutations,** or **changes to the DNA** in your cells. Genetic mutations **can be inherited**. They can also occur after birth as a result of environmental forces.
- These external causes, called carcinogens, can include:
  1. Physical carcinogens like **radiation and ultraviolet (UV) light**
  2. Chemical carcinogens like **cigarette smoke**, asbestos, alcohol, air pollution, and contaminated food and drinking water
  3. Biological carcinogens like viruses, bacteria, and parasites
- According to the WHO, about 33 percent of cancer deaths may be caused by tobacco, alcohol, high body mass index (BMI), low fruit and vegetable consumption, and not getting enough physical activity.
- Viruses (**papilioma, Epstein-barr, hapatitis-B, retrovirus**)
- Radiation exposure
- Environmental/industrial carcinogens
  - ✓ Aromatic amines
  - ✓ Bis chloromethyl ethers
  - ✓ Beta nepthialene and benzedene
  - ✓ Nickel
  - ✓ Vinyl chloride
  - ✓ Diet and nutrition
  - ✓ Isopropyl alcohol

❖ Classification

1. Carcinomas

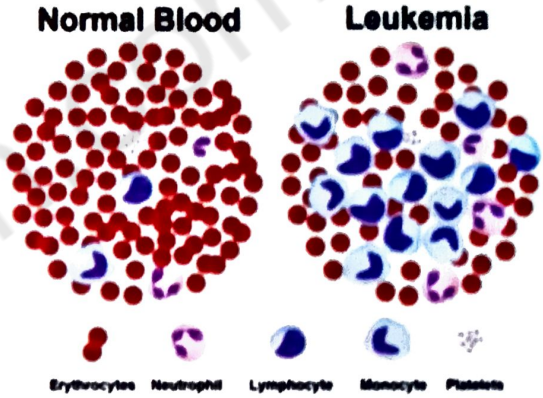
- A carcinoma forms in the **skin or tissue** cells that **line the body's internal organs,** such as the **kidneys and liver**.
- A sarcoma grows in the body's **connective tissue cells**, which include **fat, blood vessels, nerves, bones, muscles, deep skin tissues and cartilage.**

2. Sarcomas

- A **type of cancer** that **begins in bone or in the soft tissues** of the body, **including** cartilage, fat, muscle, blood vessels, fibrous tissue, or other connective or supportive tissue.

3. Lymphomas

- Lymphoma is a broad term for cancer that **begins in cells of the lymph system**.
- The two main types are **Hodgkin lymphoma** and **non-Hodgkin lymphoma (NHL).**



4. Leukemias

- Leukemia is cancer of the body's **blood-forming tissues,** **including the bone marrow and the lymphatic system**.

❖ Pathogenesis

The subject of etiology and pathogenesis of cancer is discussed under the following 4 broad headings

1. **Molecular pathogenesis of cancer (genes and cancer)**
2. **Chemical carcinogens and chemical carcinogenesis**
3. **Physical carcinogens and radiation carcinogenesis**
4. **Biologic carcinogens and viral oncogenesis**

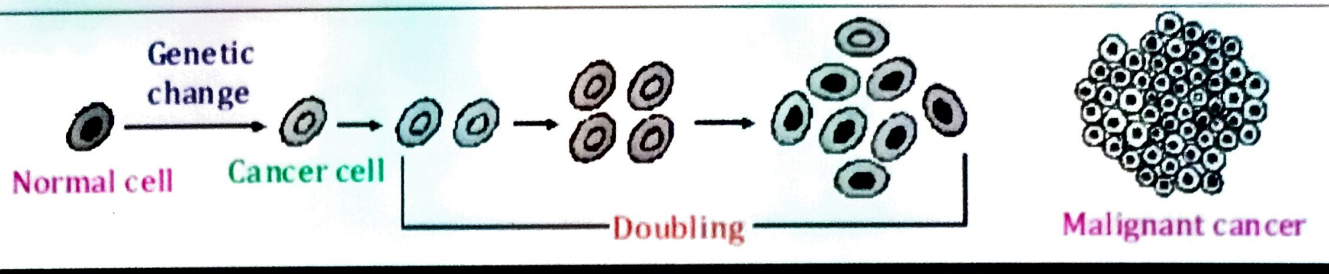


Fig: PROCESS OF CANCER CELL DEVELOPMENT

1. Molecular pathogenesis of cancer (Genetic mechanisms of cancer)

In normal cell growth, there are 4 regulatory genes:

i) **Proto-oncogenes (growth promoting)**

ii) **Anti-oncogenes (growth suppressor)**

iii) **Apoptosis regulatory genes**

iv) **DNA repair genes**

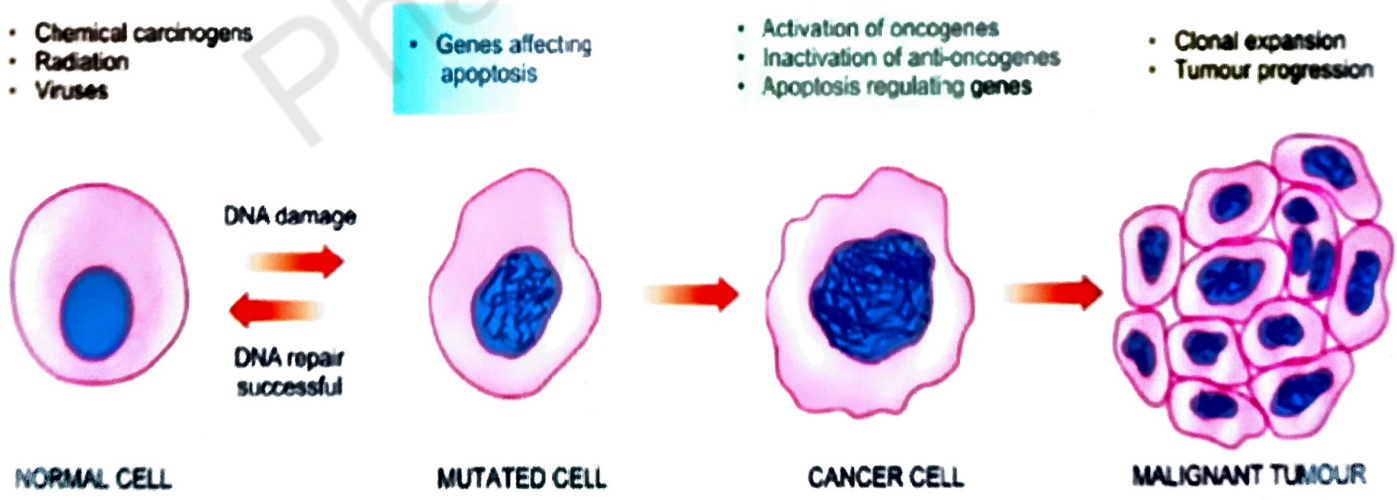
Thus, corresponding abnormalities in these 4 cell regulatory genes are as under:

i) **Activation of growth-promoting oncogenes**

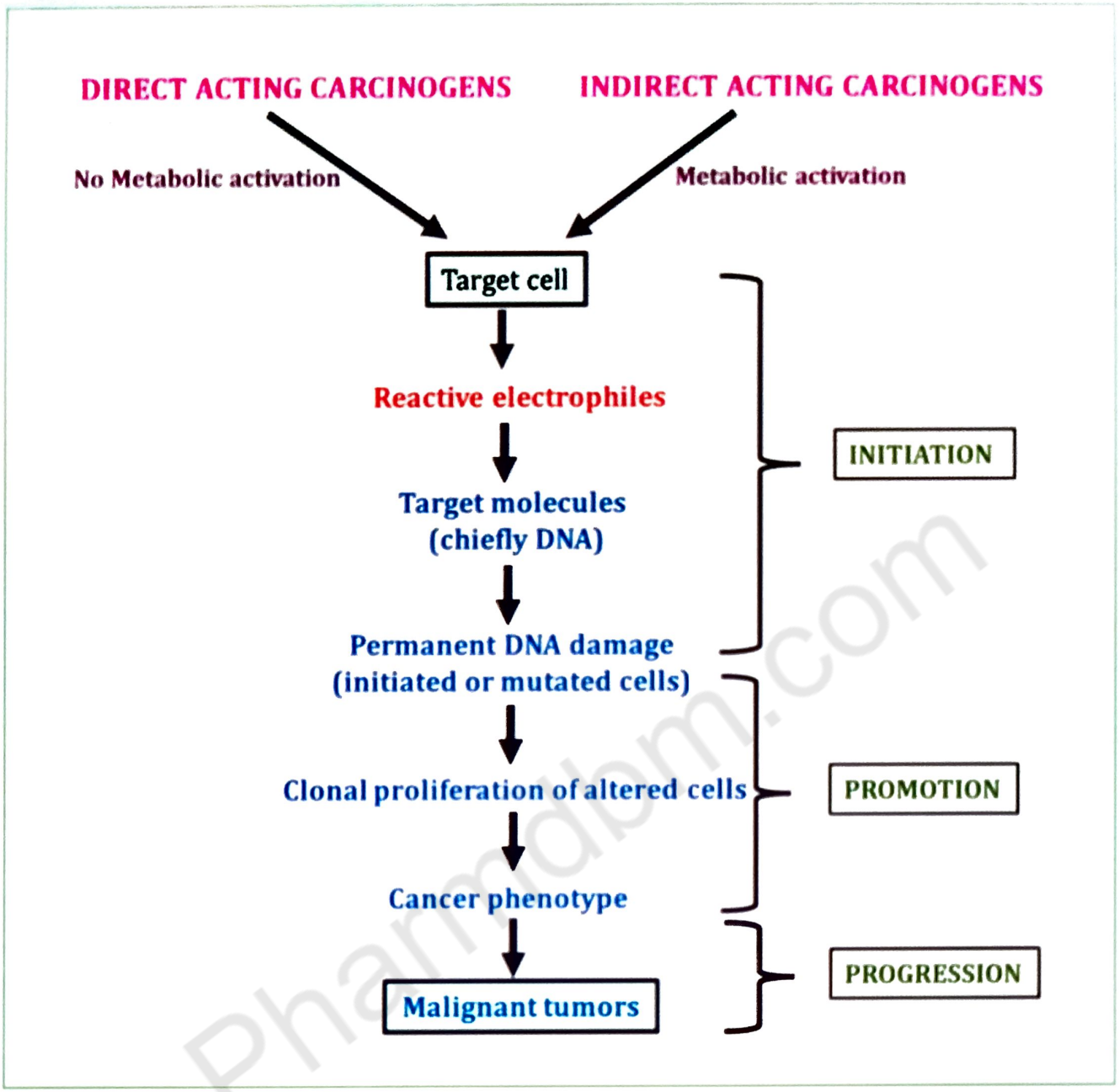
ii) **Inactivation of cancer-suppressor genes**

iii) **Abnormal apoptosis regulatory genes**

iv) **Failure of DNA repair genes**



2. CHEMICAL CARCINOGENESIS



3. PHYSICAL CARCINOGENESIS

Physical agents in carcinogenesis are divided into 2 groups:

1. Radiation, both **ultraviolet light and ionising radiation**, is the most important physical agent.
2. Non-radiation **physical agents** are the various forms of **injury and are less important.**

❖ Mechanism

✓ Radiation damages the DNA of the cell by one of the 2 possible mechanisms:

a) It may **directly alter the cellular DNA.**

b) It may **dislodge ions from water and other molecules** of the **cell and result in formation of highly reactive free radicals** that may **bring about the damage.**

Damage to the DNA resulting in mutagenesis is the most important action of ionising radiation. It may cause chromosomal breakage, translocation, or point mutation.

✓ **Non-radiation Physical Carcinogenesis**

Mechanical injury to the tissues such as from **stones in the gallbladder**, **stones in the urinary tract,** and **healed scars following burns or trauma**, has been suggested as the cause of increased risk of carcinoma in these tissues but the evidence is not convincing.

4. BIOLOGICAL CARCINOGENESIS

- The **epidemiological studies on different types of cancers indicate the involvement of transmissible biologic agents** in their development, chiefly viruses.
- Other biologic agents implicated in carcinogenesis are as follows:
  - ✓ **Parasites**
  - ✓ **Fungus**
  - ✓ **Bacteria**

❖ Signs and symptoms

Some **general signs and symptoms** associated with, but not specific to, cancer, include:

- Fatigue
- **Lump or area of thickening** that can be felt under the skin
- **Weight changes**, including unintended loss or gain
- Skin changes, such as **yellowing, darkening or redness of the** skin, sores that won't heal, or changes to existing moles
- Changes in **bowel or bladder habits**
- Persistent cough or trouble breathing

- Persistent, unexplained **muscle or joint pain**
- Persistent, unexplained fevers or night sweats
- Unexplained bleeding or bruising

❖ Complications

- **Pain.** Pain can be caused by cancer or by cancer treatment, though **not all cancer is painful.**
- **Fatigue.** Fatigue associated with **chemotherapy or radiation therapy** treatments is common, **but it's usually temporary.**
- **Difficulty breathing.** Cancer or cancer treatment may **cause a feeling of being short of breath.**
- **Diarrhea or constipation.** Cancer and cancer treatment can affect your **bowels and cause diarrhea** or constipation.
- **Weight loss.** Cancer steals food from normal cells and deprives them of nutrients. This is often not affected by how many calories or what kind of food is eaten; it's difficult to treat.
- **Chemical changes in your body.** Cancer can **upset the normal chemical balance** in your body and increase your risk of serious complications. Signs and symptoms of chemical imbalances might include **excessive thirst, frequent urination, constipation and confusion.**