Unit IX

Introduction:

Communicable diseases—also known as infectious or transmissible diseases—are illnesses caused by microorganisms such as bacteria, viruses, fungi, or parasites. These diseases can spread from one person to another, from animals to humans, or through contaminated food, water, or the environment.

Classification of Communicable Diseases

a) Airborne Diseases : Spread through air or droplets.
Examples: Tuberculosis, Influenza, Measles, COVID-19

b) Waterborne Diseases : Spread through contaminated water.
Examples: Cholera, Hepatitis A, Gastroenteritis

c) Foodborne Diseases : From contaminated or improperly handled food.
Examples: Food poisoning, Salmonellosis, Botulism

d) Vector-borne Diseases : Spread through insects like mosquitoes, ticks, fleas.
Examples: Malaria, Dengue, Zika, Plague

e) Direct Contact Diseases : Spread through physical contact or body fluids.
Examples: HIV/AIDS, Herpes, Ebola

f) Fomite-borne Diseases : Spread through contaminated objects or surfaces.
Examples: Common cold

g) Zoonotic Diseases: Spread from animals to humans.
Examples: Rabies, Brucellosis, Bird flu

VECTOR BORNE DISEASES

- Vector borne diseases are the one who are transmitted by the bite of infected arthropod species like mosquitoes, ticks, bugs sandflies, etc. They are cold blooded and climate sensitive. Means weather influences their survived and reproduction rate.
- Vector borne diseases account for more than 17% of all infectious diseases. They can be caused by either parasites, bacteria or Viruses.

MALARIA

- A disease caused by a *Plasmodium* parasite, transmitted by the bite of infected female anopheles mosquitoes. Only **female** mosquitoes spread malaria because they require **blood meals** for egg production. It typically causes **fever, chills, headache**, and can become **life-threatening** if not treated promptly.

Life Cycle of Malaria

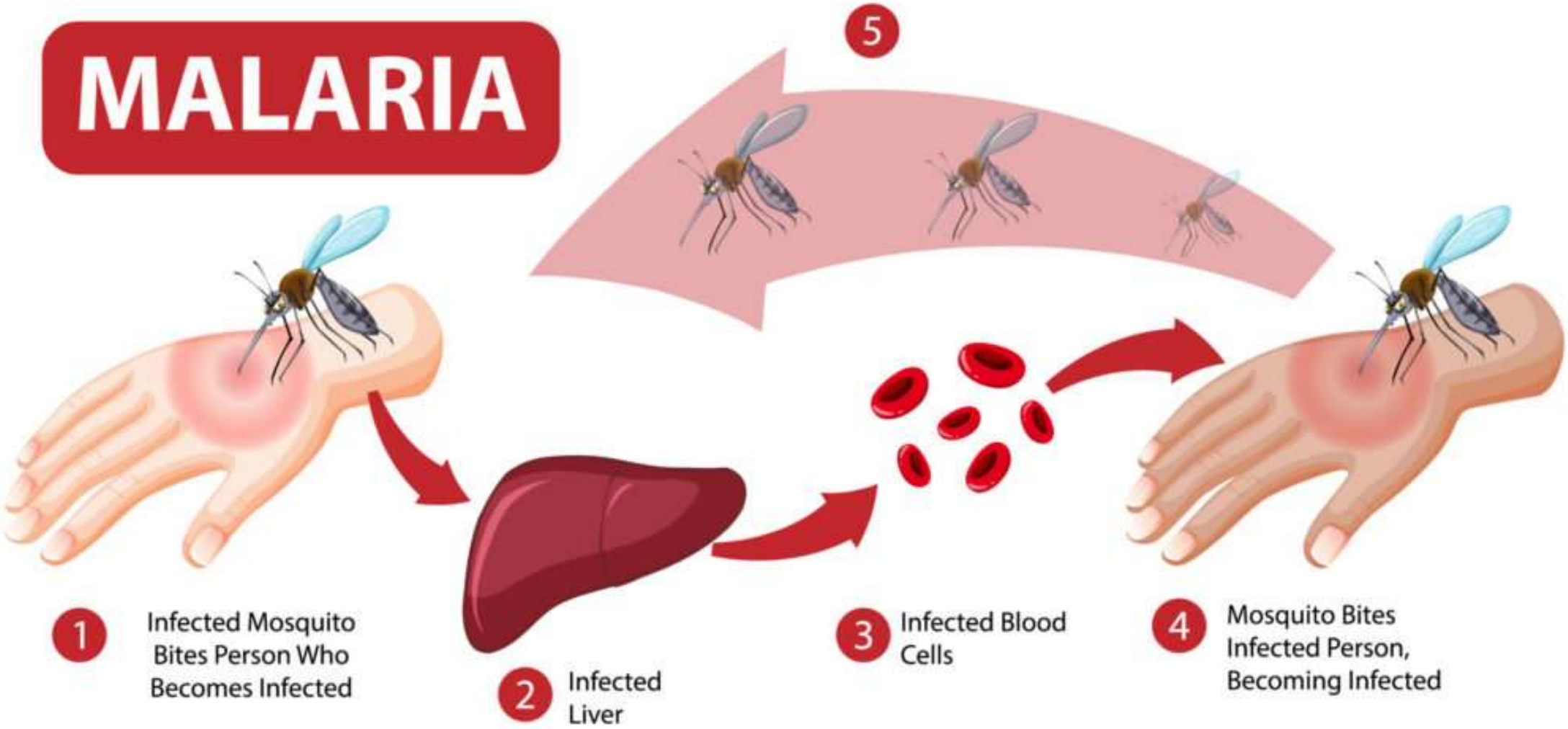
A female Anopheles mosquito carries **Plasmodium parasites** (in the form of sporozoites) in its salivary glands.

•When the mosquito bites a person to feed on blood, it **injects the parasites** into the bloodstream.

•The parasites travel to the **liver**, multiply, then re-enter the blood to infect red blood cells.

•Another mosquito can bite the infected person and pick up the parasites, continuing the **transmission cycle.**

•The bite becomes infectious **only if the mosquito is carrying Plasmodium parasites**


MALARIA
5
1
Infected Mosquito Bites Person Who Becomes Infected
2
Infected Liver
3
Infected Blood Cells
4
Mosquito Bites Infected Person, Becoming Infected

- There are five parasite species that cause malaria in Humans:

1. **Plasmodium falciparum**
   Causes the **most severe and deadly** form of malaria
2. **Plasmodium vivax**
   Widely distributed in **Asia and Latin America**
3. **Plasmodium malariae**
   Causes a **chronic, milder** form of malaria
4. **Plasmodium ovale**
   Rare; found in **West Africa and some islands**
5. **Plasmodium knowlesi**
   Originally a monkey malaria parasite; now a **significant human pathogen**

Screening and Diagnosis of Malaria

- Microscopic/Peripheral Blood Smear (PBS)
- Serological Test
- Dipstick Test/Rapid Diagnostic Test (RDT)

Prevention and Control

- The prevention and control measures aimed at breaking the man–mosquito-man cycle of transmission.
- **There are mainly two methods:**
- Methods of protection against mosquito bites.
- Methods of eradication of mosquitoes, which include antilarval and antiadult measures.

1. Vector Control (Mosquito-focused measures)

a. Insecticide-treated mosquito nets (ITNs/LLINs)

- Sleep under **long-lasting insecticidal nets**
- Reduce nighttime mosquito bites (Anopheles mosquitoes bite at night)

b. Indoor Residual Spraying (IRS)

- Spraying insecticides on walls where mosquitoes rest
- Effective for **3–6 months**, depending on insecticide used

c. Larval Source Management

- Eliminating mosquito breeding areas
  - Drain stagnant water
  - Cover water containers
  - Improve drainage systems
- Use of **larvicides** in water bodies that cannot be drained

2. Personal Protective Measures

- Use **mosquito repellents** (DEET, picaridin, etc.)
- Wear **long sleeves and long pants**, especially in the evening
- Use **window and door screens**
- Use **mosquito coils** or vaporizer insecticides indoors

Treatment of Malaria:

- **Chloroquine (CQ):** 25 mg/kg body weight over 3 days.

- i.e. 10 mg/kg – 1st day
- 10 mg/kg – 2nd day
- 5 mg/kg – 3rd day
  - **Primaquine:** 0.25 mg/kg body weight daily for 14 days. It is contraindicated in infants, pregnant women and individuals with G6Pd deficiency.
  - **Artemisinin-based Combination Therapy**

Artemether–Lumefantrine (AL / Coartem)

Artesunate–Amodiaquine (AS–AQ)

LYMPHATIC FILARIASIS/ ELEPHANTIASIS

Introduction

- Lymphatic filariasis is a **mosquito-borne parasitic infection** caused by thread-like worms called **filariae**, mainly:
- **Wuchereria bancrofti** (most common)
- **Brugia malayi**
- **Brugia timori**
- These worms live in the **lymphatic system**, damaging vessels and causing swelling.

Transmission of Lymphatic Filariasis

- Infected mosquito bites a person.
- It injects **larvae (L3 stage)** into the skin.
- Larvae travel to lymphatic vessels and develop into **adult worms**.
- Adult worms produce **microfilariae**, which circulate in the blood.
- Another mosquito takes them up during a bite → cycle continues.
- **Mosquito vectors include:** Culex, Anopheles, Aedes, Mansonia
- **Bancroftian filariasis:** Culex, Anopheles, Aedes
- **Brugian filariasis:** Mansonia, Anopheles
- **Incubation period:** 8–16 months.

Sign and symptoms

❑**Early Phase (often silent for years)**

- Most infected people have **no symptoms** initially.
- Hidden lymphatic damage may already occur.

❑**Acute Symptoms**

- Fever
- Painful swelling of lymph nodes (lymphadenitis)
- Inflammation of limbs or genital area

❑**Chronic Symptoms**

- These develop after long-standing untreated infection:
- **Elephantiasis**: massive swelling and thickened skin of **legs, arms, breasts, or genitals**
- **Lymphedema**
- **Hydrocele** (swelling of scrotum in men)
- Recurrent secondary bacterial infections

Screening and Diagnosis

- **Microscopy:** Detecting microfilariae in a blood smear (typically at night). The standard method for diagnosing active infection is the identification of microfilariae (mf) in a blood smear by microscopic examination. Usually blood smear obtained at night (10 pm-2 am). Thick smear should be made using 20 cu mm of capillary blood.
- **Antigen tests:** Rapid tests for *W. bancrofti*.
- **Ultrasound:** “Filarial dance sign” showing moving worms.
- **Serology / PCR:** Detect parasite DNA.

Treatment

❖**Medications (Mass Drug Administration – MDA) :**The WHO recommends combinations such as:

- **DEC (Diethylcarbamazine) + Albendazole**
- **Ivermectin + Albendazole**
- **Triple therapy (IDA): Ivermectin + DEC + Albendazole** (where safe)

❖These drugs : Kill microfilariae , Partially affect adult worms ,Reduce transmission

❖**Managing Chronic Disease**

- Even after worms die, lymphatic damage may persist.
- **Hygiene and skin care** to prevent secondary infection
- **Exercise + limb elevation** to improve lymph flow
- **Compression or bandaging**
- **Surgery** for severe hydrocele or deformities

Prevention

- Avoid mosquito bites: nets, repellents, clothing, eliminating standing water.
- Large-scale **community drug programs** in endemic areas.
- Early treatment to prevent progression.

Visceral Leishmaniasis/Kala-azar

There are mainly three types of leishmaniasis. These are as follow:

Type

•Visceral leishmaniasis (Kala-Azar)

•Cutaneous leishmaniasis (Oriental Sore)

•Mucocutaneous leishmaniasis

Epidemiology

Causative Agent

- Leishmania donovani (in India)
- Leishmania tropica
- Leishmania braziiensis
- Leishmaniasis is caused by a protozoa parasite from over 20 leishmania species.

Mode of Transmission

- Vector Bite of female phlebotomine Sandflies
- Very small, silent biter, breeds in cracks, mud walls, organic waste.
- Contamination of bite wound
- Contact
- Blood transfusion

•When an infected sandfly bites → injects **promastigotes**.
•Parasite enters macrophages → becomes **amastigotes** → spreads to:
-Spleen
-Liver
-Bone marrow
-Lymph nodes

Clinical Features

- **S – Splenomegaly** (massive, characteristic)
- **F – Fever**: prolonged, irregular (2 weeks or more)
- **H – Hepatomegaly**
- **H – Hyperpigmentation** (“kala-azar” = black discoloration)
- **A – Anemia & pancytopenia**
- **M – Malnutrition, weight loss, weakness**

Screening and diagnosis

- The diagnosis of VL is complex because its clinical features resembles with other diseases like malaria, typhoid and TB

1.Parasitological tests

- **Bone marrow / splenic aspirate** → shows **amastigotes** (LD bodies).
- Splenic aspirate most sensitive (but risky).

2. Rapid tests

- **rk39 antigen test** (most commonly used)
- Highly sensitive in Indian subcontinent.

Prevention and Control Measures

•Most effective method to prevent infection is to protect from sand fly bites.
•Avoid outdoor activities from dusk to down.
•Covered cloths to protect uncovered skin, e.g., Long sleeved shirts, long pants and socks and tuck your shirt into your pants.
•Apply insect repellent to exposed in skin
•The most effective repellents are those that contain the Chemical DEET (N,N-Diethyl-meta-toluamide).
•Stay Indoor

Treatments

- Treatment through liposomal amphotericin B (LAmB) is the drug of choice for immunocompetent patients. There are other treatment options available such as paromomycin, miltefosin and multidrug therapy treatment.

Prevention & Control

- Early detection & complete treatment
- **Vector control**: Indoor residual spraying
- Insecticide-treated nets
- Improving housing & sanitation
- Health education

National Kala-azar Elimination Programme (NKEP)

- The **National Kala-azar Elimination Programme (NKEP)** is India’s program to **eliminate Kala-azar (Visceral Leishmaniasis)** as a public health problem.

Goal

- To **eliminate Kala-azar** from India by reducing cases to:

  <1 case per 10,000 population at the sub-district (block) level

- India aims to **sustain elimination** by continuous surveillance and vector control.

Strategies of the Program

1. Early Diagnosis: Quick and easy tests:

- **rk39 rapid diagnostic test** (RDT) → used at primary health centres
- Confirmatory tests when required

Goal: diagnose cases **as early as possible**

2. Complete Treatment : Free treatment provided by the government.
Most common regimen:

- **Single-dose Liposomal Amphotericin B (L-AmB)** (Highly effective and reduces duration of illness)
- Also available: Miltefosine, Amphotericin B (multiple doses)
- Goal: **cure the patient and stop transmission**.

3. Vector Control

- Targeting the sandfly Phlebotomus argentipes.

Main activities:

- **Indoor Residual Spraying (IRS)** twice per year in endemic villages
- Use of safe insecticides
- Environmental management:
  - Reduce cracks in walls
  - Improve housing
  - Remove organic waste around homes
- Goal: reduce sandfly population.

4. Surveillance

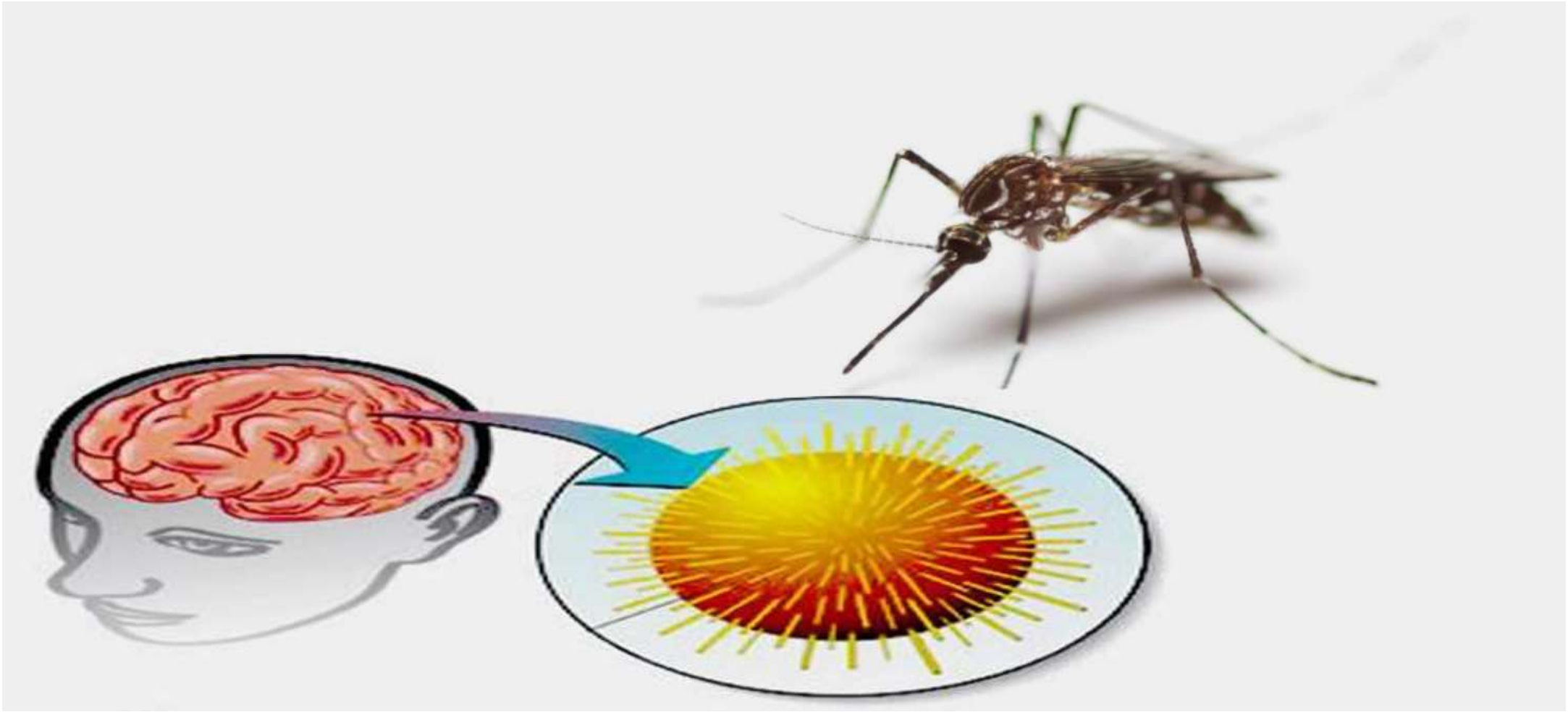
- House-to-house **active case detection**
- Monitoring PKDL(Post-Kala-azar Dermal Leishmaniasis)cases (skin form that can transmit disease)
- Reporting via IDSP & block-level monitoring
- Mapping hotspots
- Goal: **prevent outbreaks** and maintain elimination.

5.Community Awareness

IEC/BCC activities:

- Educate people about symptoms
- Encourage early reporting
- Promote acceptance of spraying teams
- Promote prevention methods

JAPANESE ENCEPHALITIS



JAPANESE ENCEPHALITIS

- Japanese Encephalitis is a virus spread by the bite of infected mosquitoes. It is more common in rural and agricultural areas. JEV (Japanese encephalitis virus) is the main cause of viral encephalitis in many countries of Asia with an estimated 68000 clinical cases every year. It’s a **viral brain infection** transmitted by infected mosquitoes. It belongs to the same genus as dengue, yellow fever and West Nile viruses.

Epidemiology

- **Causative Agent :culicine** mosquitoes mainly **Vishnui** group of **Culex**
- Group B arbovirus (Flavivirus).
- **Host Factors**
- There are many extra human hosts like animals and birds, e.g.,
- **Pigs:** Pigs themselves do not manifest overt symptoms but circulate the virus.
- **Cattle and buffaloes:** Infected but not the natural host of infection.
- **Horses:** Shows signs of encephalitis due to JE virus.
- **Birds** like pond herons, poultry and ducks.
- In man infection is in all ages. Specially in children aged 1–14 years.

Screening and Diagnosing

- By ELISA—Testing of CSF sample is preferred to reduce false-positivity rates from previous infection.

Clinical Signs and Symptoms

- Rapid onset of high fever, headache, neck stiffness, disorientation, coma, seizures, spastic paralysis and ultimately death. The case fatality rate can be as high as 30% among those with disease symptoms

Treatment and Follow-Up

- There is no specific antiviral treatment for Japanese Encephalitis. Supportive care is the mainstay of treatment to manage symptoms and provide comfort. Follow-up appointments are scheduled to monitor the patient’s progress and assess any complications that may arise during the recovery phase.
- Vaccination

Dengue Fever

DENGUE

- Dengue is a **viral infection** transmitted by **Aedes mosquitoes**, mainly Aedes aegypti and Aedes albopictus.

  These mosquitoes usually bite **during the day**, especially early morning and late afternoon.

Epidemiology

- **Vector for Dengue:** *Aedes aegypti*
- **Reservoir:** Man, mosquito
- **Incubation period:** 3-10 days
- The severe form of dengue fever is called dengue hemorrhagic fever, can cause serious bleeding, sudden drop in blood pressure and death.

Signs and Symptoms

- Symptoms usually appear **4–10 days after the bite** and last **2–7 days**.

<u>Common Symptoms</u>

- Sudden **high fever** (40°C / 104°F)
- **Sever headache**
- **Pain behind the eyes**
- **Muscle, joint, and bone pain** (“break-bone fever”)
- **Nausea / vomiting**
- **Skin rash**
- **Fatigue**

Warning Signs (Required urgent medical care)

- Persistent vomiting
- Bleeding gums or nose
- Blood in vomit or stool
- Severe abdominal pain
- Difficulty breathing
- Feeling very weak or restless

Transmission

- The mosquito becomes infected when it bites a dengue-infected person.
- After about a week, the mosquito can infect other people.
- Dengue **does NOT spread directly from person to person**.

Treatment

- There is **no specific antiviral medicine** for dengue.

  Treatment focuses on **relief and preventing complications**.
- **Plenty of fluids** (ORS, water, soups).
- **Paracetamol/Acetaminophen** for fever and pain.
- **Avoid Ibuprofen, aspirin, or NSAIDs** (may increase bleeding risk)

PREVENTION

1.Stop Mosquito Breeding

- Keep surroundings **clean and dry**.
- Empty/cover containers that collect water: buckets, plant pots, old tires.
- Replace water in flower vases every 1–2 days.
- Clean and cover water storage tanks.

2.Avoid Mosquito Bites

- Use **mosquito repellent** (DEET, picaridin, IR3535).
- Wear **long sleeves and pants**.
- Use **window screens** or **mosquito nets**.
- Aedes mosquitoes bite **daytime**, so protection is needed even in the morning.

CHIKUNGUNYA

Introduction:

Chikungunya is a viral infection transmitted by **Aedes mosquitoes**, primarily **Aedes aegypti** and **Aedes albopictus**. While Chikungunya is usually not fatal, it can cause debilitating joint pain that lasts for weeks or even months.

Epidemiology

- It is an infection caused by chikungunya virus (CHIKU) virus spreads between people by two types of mosquito:
- *Aedes albopictus*
- *Aedes aegypti*
- Virus also circulates within number of animals including birds and rodents.
- It is Common in American, Asia, Africa, Europe and Islands, India and Pacific
- Sea.
- **Incubation period:** 4-7 Days

- **Clinical Manifestations**
  - High fever, headache, fatigue, rash, nausea, red eyes, cervical lymph adenopathy, vomiting, malabsorption.
  - People at risk for more severe diseases include newborns infected around the time of birth, older adults (>65 years).
  - Pain and joint swelling most patients feel better within a week but some have joints pain for months or year.
  - No death has been attributed due to chikungunya fever.

Treatment

- No specific anti viral therapy for CHIK-V. There is always symptomatic treatment. It includes nonsteroidal Anti-inflammatory drugs (NSAIDS) to relieve pain and fever.
- Rest
- Paracetamol
- Increased fluid intake
- Corticosteroids and physical therapy
- Physiotherapy for supportive care as chikungunya -virus (CHIK-V) respond to mild exercise, stretches, passive and active exercises will reduce contractures and deformities.

THANK YOU