PITHAPUR RAJAH'S GOVERMENT DEGREE COLLEGE

DEPARTMENT OF MICROBIOLOGY

LECTURER IN MICROBIOLOGY

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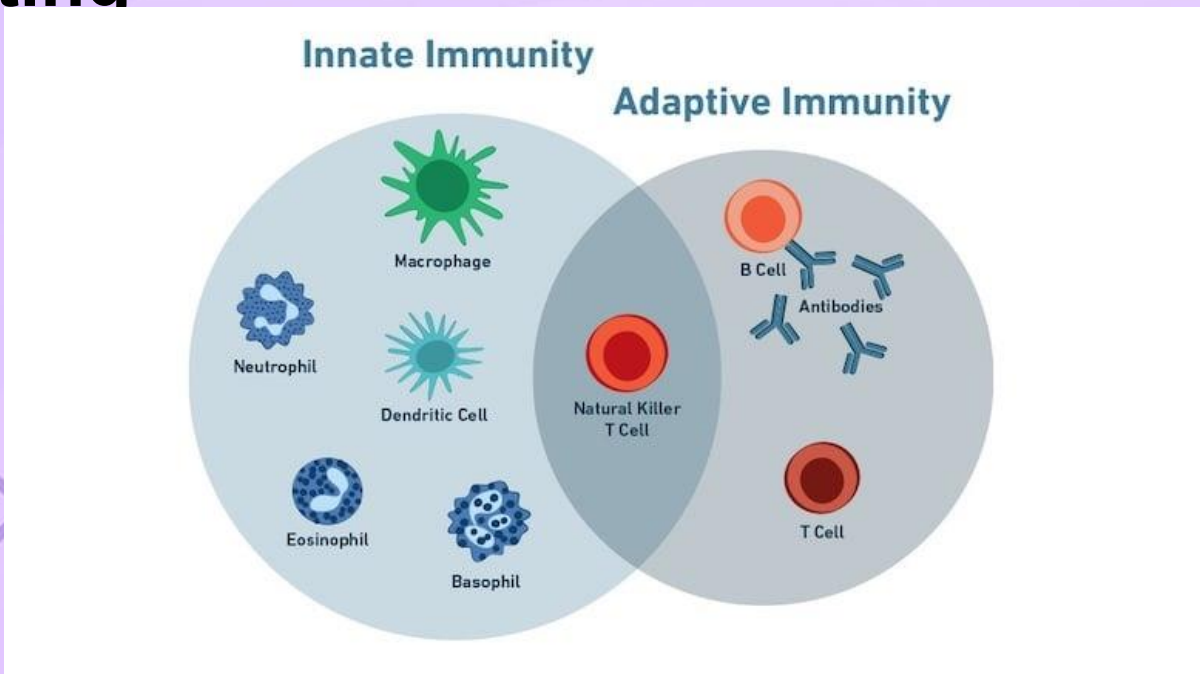
TITLE :
IMMUNOLOGY AND MEDICAL MICROBIOLOGY

Unit 1: Immune System

Innate and Adaptive Immunity

1. Innate immunity – Non-specific, present from birth
2. Adaptive immunity – Specific, develops after exposure
3. Innate includes barriers, phagocytes, inflammation
4. Adaptive includes B & T cells, antibodies, memory
5. Innate is fast; adaptive is long-lasting

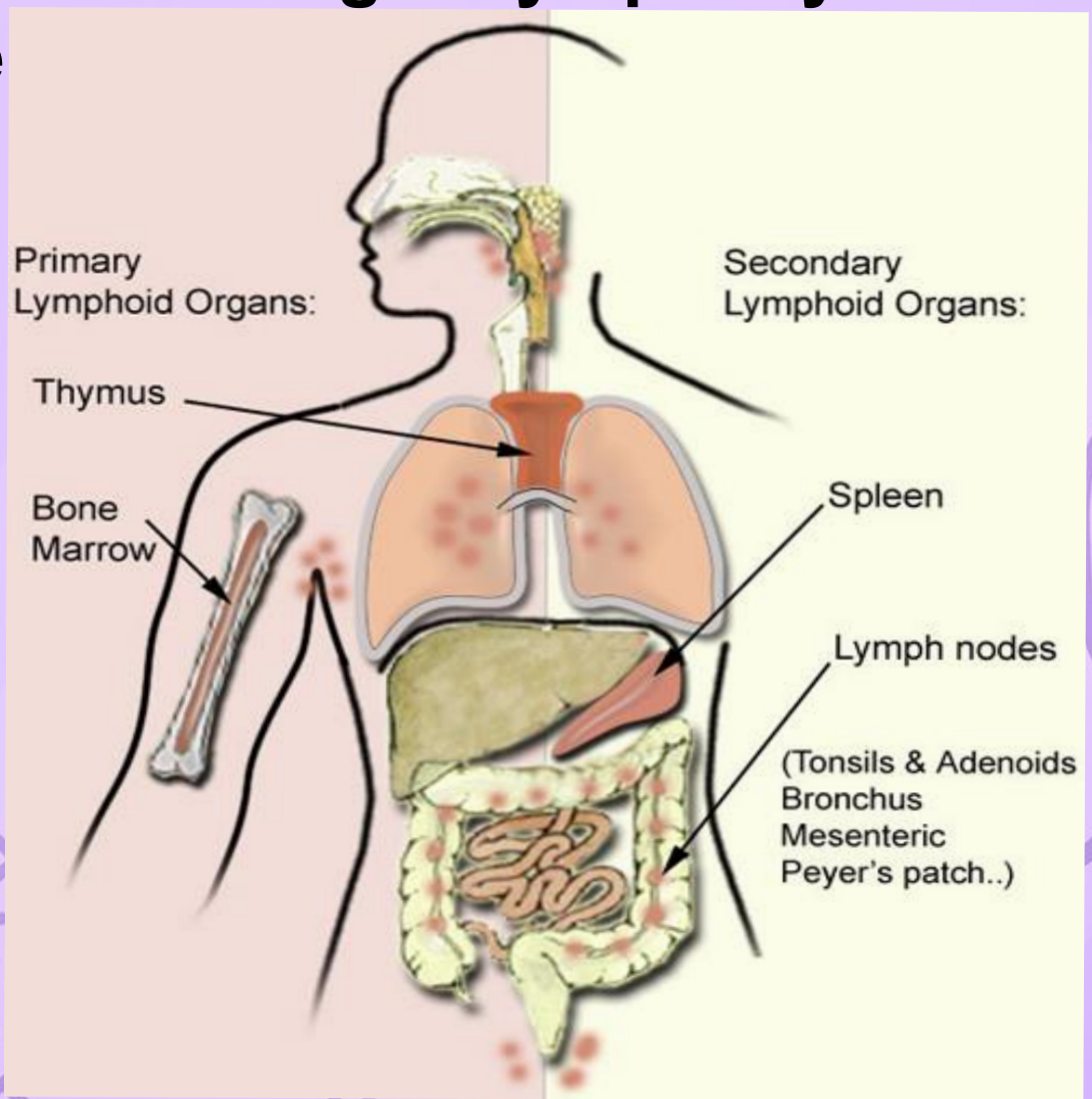


Primary Lymphoid Organs

1. Bone marrow – B cell development
2. Thymus – T cell maturation
3. Bursa of Fabricius – In birds only
4. Role: Production and maturation of immune cells
5. Crucial for adaptive immunity development

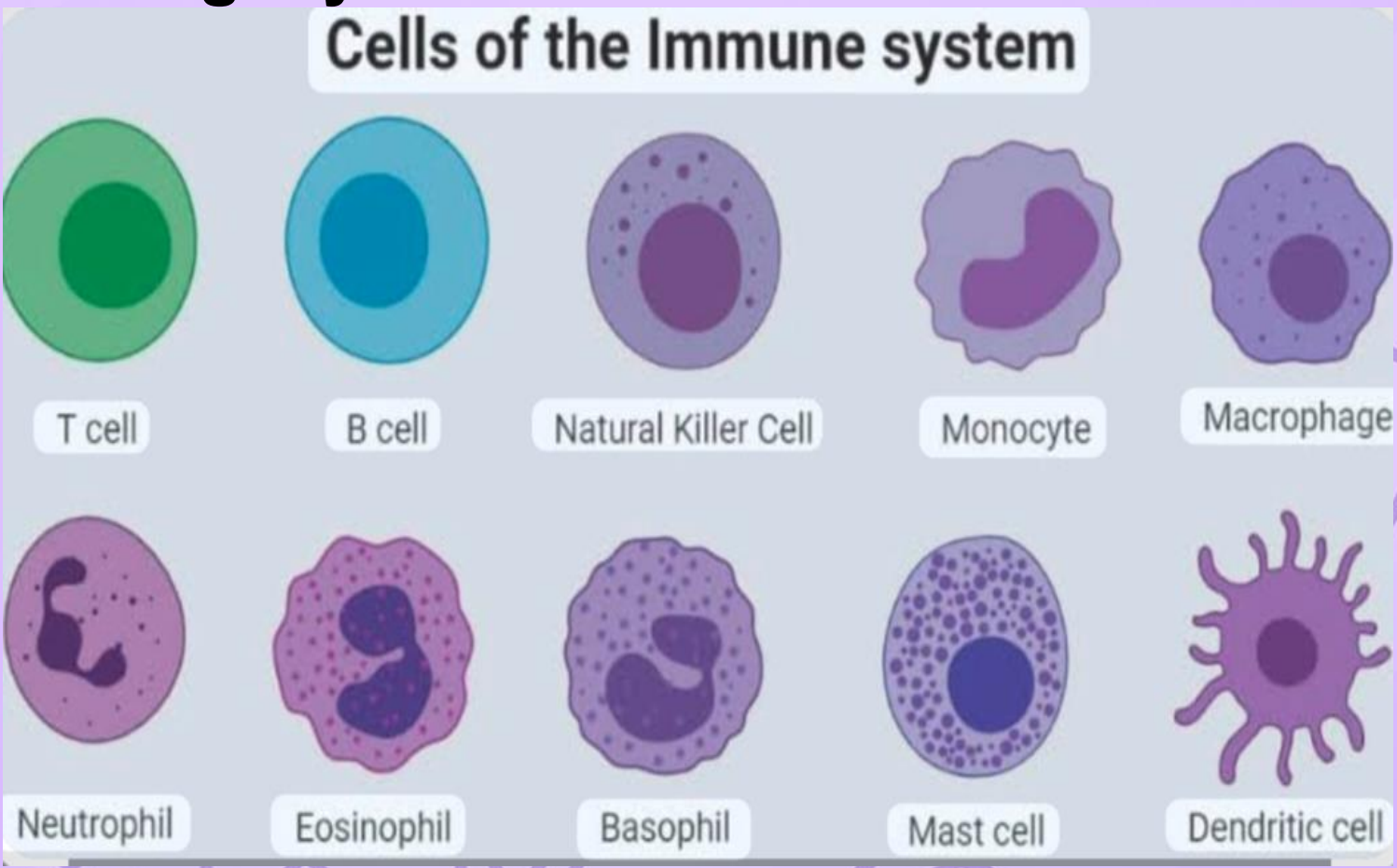
Secondary Lymphoid Organs

1. Spleen – Filters blood
2. Lymph nodes – Trap antigens from lymph
3. MALT/GALT – Mucosal immune defense
4. Role in initiating immune responses
5. Site of antigen-lymphocyte inte



Cells of Immune System

1. B lymphocytes – Antibody production
2. T lymphocytes – Helper & cytotoxic roles
3. Null cells – NK cells, cytotoxic to tumors
4. Monocytes/macrophages – Phagocytosis



Components of Innate Immunity

1. Physical barriers – Skin, mucosa
2. Chemical barriers – Enzymes, pH
3. Cellular – Phagocytes, NK cells
4. Inflammatory response
5. Complement system (briefly) – Enhances phagocytosis

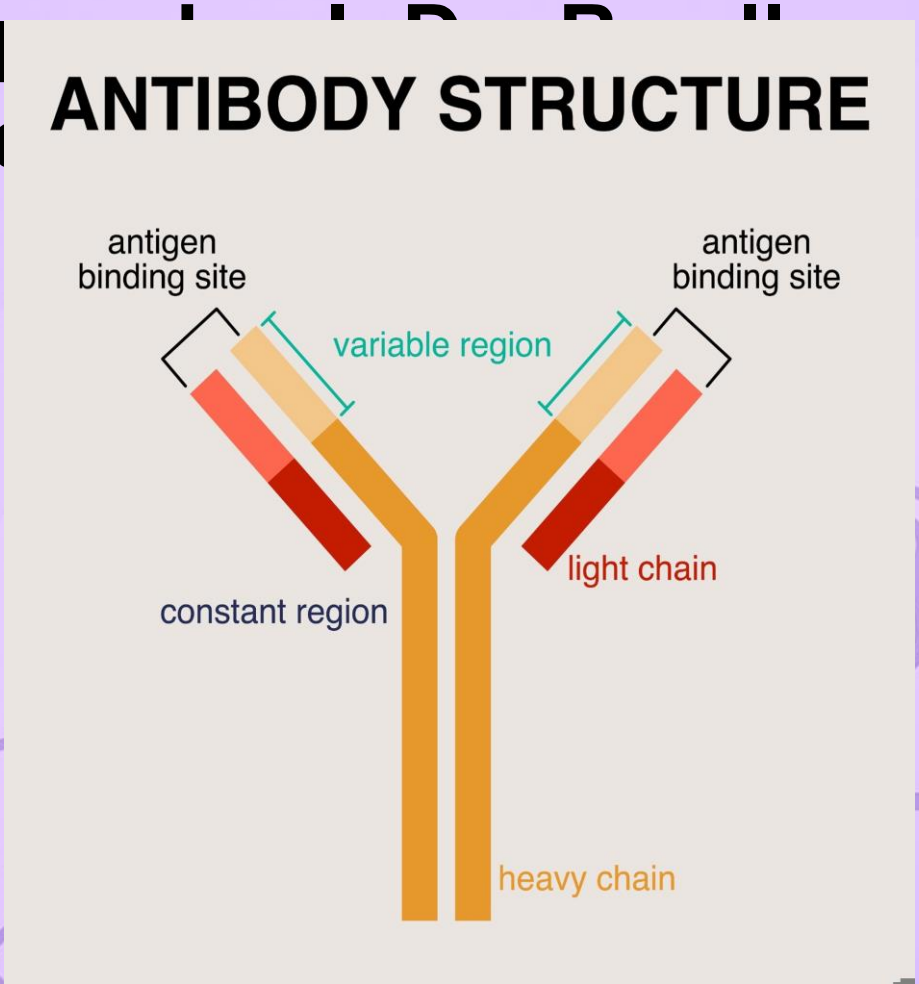
Unit 2: Immune Response

Antigen Characteristics

1. Foreignness – Non-self molecules
2. Size – Larger molecules are more antigenic
3. Heterogeneity – Complex structures more effective
4. Solubility – Affects immune response
5. Haptens – Small molecules, immunogenic with carrier

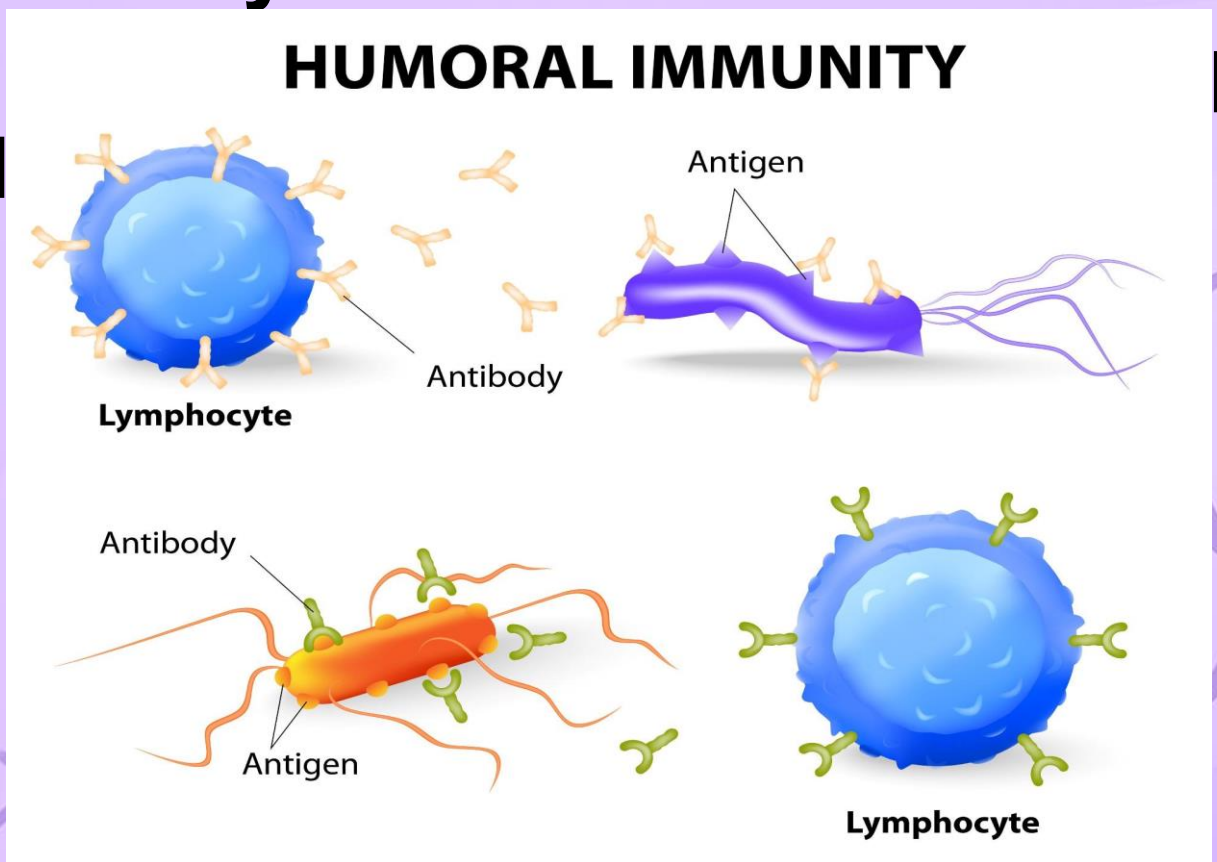
Antibody Structure & Types

1. Y-shaped proteins made of 4 chains
2. Variable region binds antigen
3. IgG – Most abundant
4. IgA – Mucosal immunity
5. IgE – Allergy, IgM – First



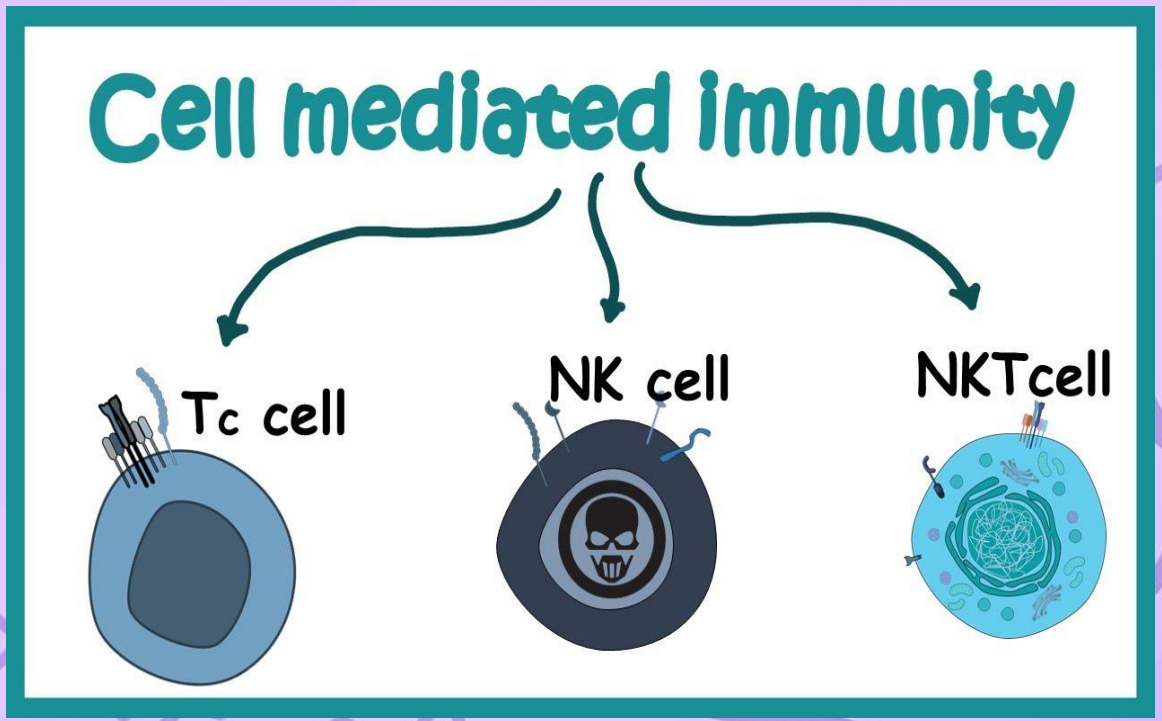
Humoral Immune Response

1. Primary response – Slow, first exposure
2. Secondary response – Fast, memory cells
3. Plasma cells – Produce antibodies
4. Memory B cells – Long-term immunity
5. plex (M



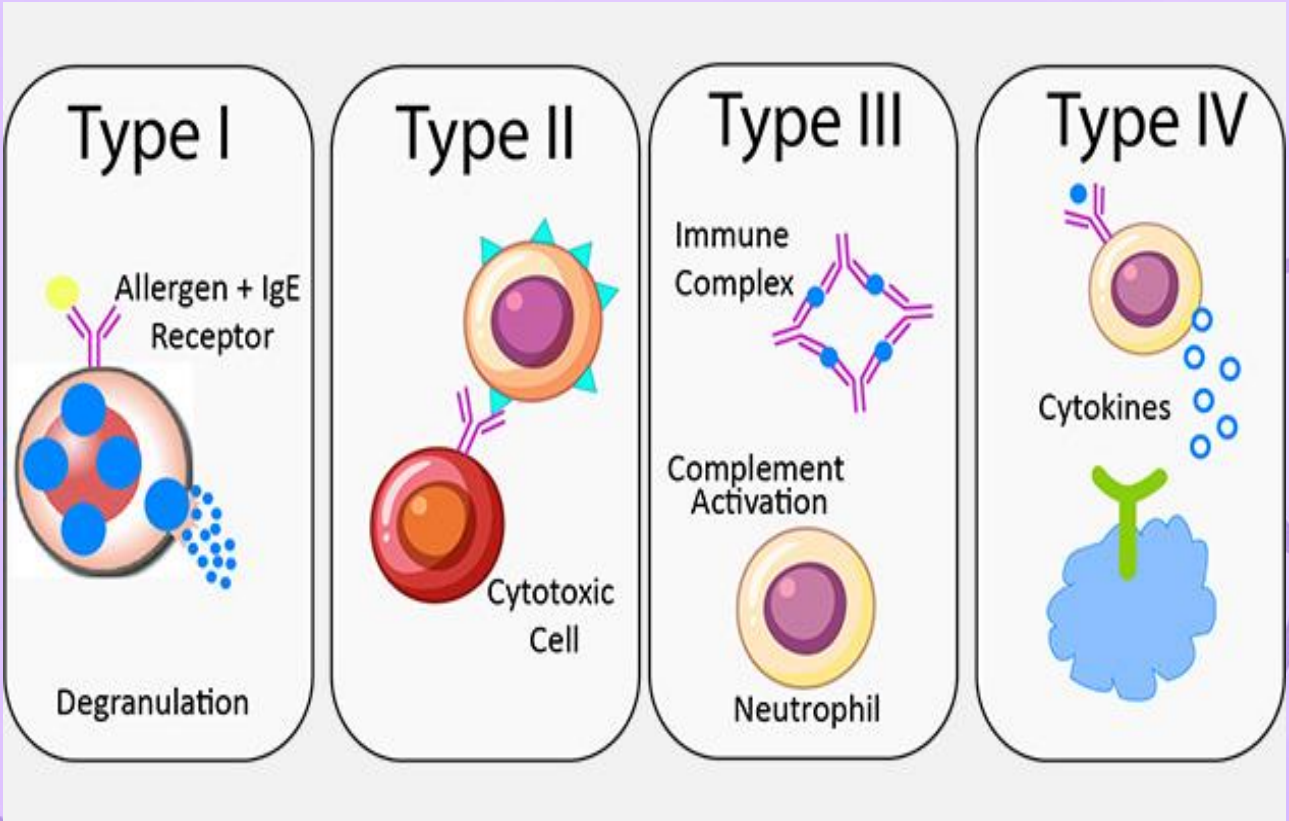
Cell Mediated Immunity & Immune Complex

1. T cells kill infected cells
2. Helper T cells activate B/T cells
3. Agglutination – Clumping of antigens
4. Precipitation – Soluble antigens
5. Neutralization, Complement fixation, Phagocytosis



Hypersensitivity

1. Type I – Allergy (IgE)
2. Type II – Cytotoxic (e.g., transfusion reaction)
3. Type III – Immune complex (e.g., lupus)
4. Type IV – Delayed-type (e.g., TB test)
5. Causes overreaction of immune system



Unit 3: Microbes in Health and Disease

Normal Flora of Human Body

1. Present on skin, gut, mouth, etc.
2. Prevents pathogen colonization
3. Produces vitamins (e.g., K)
4. Aids digestion
5. Maintains immunity balance

Key Definitions

1. Infection – Entry and multiplication of microbes
2. Invasion – Spread in host
3. Pathogen – Disease-causing organism
4. Virulence – Degree of pathogenicity
5. Opportunistic & Nosocomial infections

Bacterial & Fungal Diseases

1. Tuberculosis – Mycobacterium tuberculosis
2. Typhoid – Salmonella typhi
3. Botulism – Clostridium botulinum
4. Candidiasis – Candida albicans
5. Brief: symptoms, transmission, prevention

Viral Diseases

1. Hepatitis A – Feco-oral, liver infection
2. AIDS – HIV virus, affects immune system
3. Modes of transmission
4. Diagnosis (ELISA, PCR)
5. Prevention and control basics

Unit 4: Principles of Diagnosis

Sample Collection & Transport

1. Aseptic techniques
2. Proper labeling
3. Use of transport media
4. Time-sensitive transport
5. Prevent contamination

Identification by Culture

1. Use of selective media
2. Solid vs. liquid media
3. Colony morphology observation
4. Gram staining
5. Pure culture isolation

Biochemical & Physiological Tests

1. Catalase, Oxidase tests
2. Sugar fermentation
3. Indole, MR, VP tests
4. Urease, Citrate tests
5. Identification based on metabolic traits

Molecular and Serological Tests

1. PCR – DNA amplification
2. DNA probes – Target-specific hybridization
3. ELISA – Antigen-antibody detection
4. Immunofluorescence – Fluorescent labeling
5. Agglutination & Complement fixation

Unit 5: Prevention and Treatment

Vaccines

1. Active immunity – Natural or recombinant
2. Passive immunity – Ready-made antibodies
3. Examples – MMR, Hepatitis vaccine
4. Herd immunity
5. Importance in disease prevention

Antibacterial Agents

1. Penicillin – Inhibits cell wall synthesis
2. Streptomycin – Inhibits protein synthesis
3. Broad vs. narrow-spectrum
4. Side effects
5. Resistance issues

Antifungal Agents

1. Amphotericin – Binds fungal membranes
2. Griseofulvin – Disrupts mitosis
3. Used for systemic and superficial infections
4. Admin routes: oral, topical
5. Fungal resistance concerns

Antiviral Agents & Interferons

1. Amantadine – For influenza A
2. Acyclovir – For herpes viruses
3. Interferons – Host proteins, antiviral activity
4. Boost immune response
5. Used in cancer/immunotherapy

Antibiotic Resistance & Susceptibility Testing

1. Misuse leads to resistance
2. MDR, XDR pathogens
3. Disc diffusion test (Kirby-Bauer)
4. MIC – Minimum inhibitory concentration
5. Need for rational antibiotic use

THANK YOU