Chapter = 13

Immunity

THE IMMUNE SYSTEM:

"The ability of a living organism to resist the infection by parasitic micro- organisms their toxin, foreign cells or abnormal cells of the body is called immunity, and the system which shows response to the infection is known as immune system".

IMMUNOLOGY:

The study of functioning and disorder of immune system is termed as immunology.

TYPES OF IMMUNE SYSTEM:

The immune system can be divided in to following two functional division.

i. INNAT IMMUNE SYSTEM:

ii. ADAPTIVE IMMUNE SYSTEM:

INNAT IMMUNE SYSTEM: (NON SPECIFIC IMMUNE SYSTEM):

It is natural immune system and non specific i.e. this is immunity prevents the infection of all organisms.

In innate immune system there are two system of defence.

a) Physical body organs (First Line of Defence).

b) Internal body system (Second Line of defence).

a) FIRST LINE OF DEFENCE:

- It is non specific in nature & prevent the entry of all kinds of pathogen in body.
- The physical barriers includes, skin, mucous membrane and ciliated epithelium.
- The bio chemical barriers includes, saliva, tears. Mucous, gastric juice etc.

SKIN (As Physical Barriers):

STRUCTURE:

It is the largest organ of the body. The skin is consist of three main layers.

i. Epidermis ii. Dermis iii. Hypodermis.

EPIDERMIS:

- It is the outer most layer of skin & its Lack blood supply.
- It is made up of closely packed dead with Keratin.
- Keratin makes skin mechanically tough and resistance to degradation.
- Fatty acid on skin create a dry, salty and acidic environment which inhibits the growth of micro-organism.
- Dead cells of epidermis shed with microbes and new skin cell are continuously replaced these deads cells.
- In epidermis another cells immune cells such as Langhern Cells T Cell are present which eliminate microbes.

DERMIS:

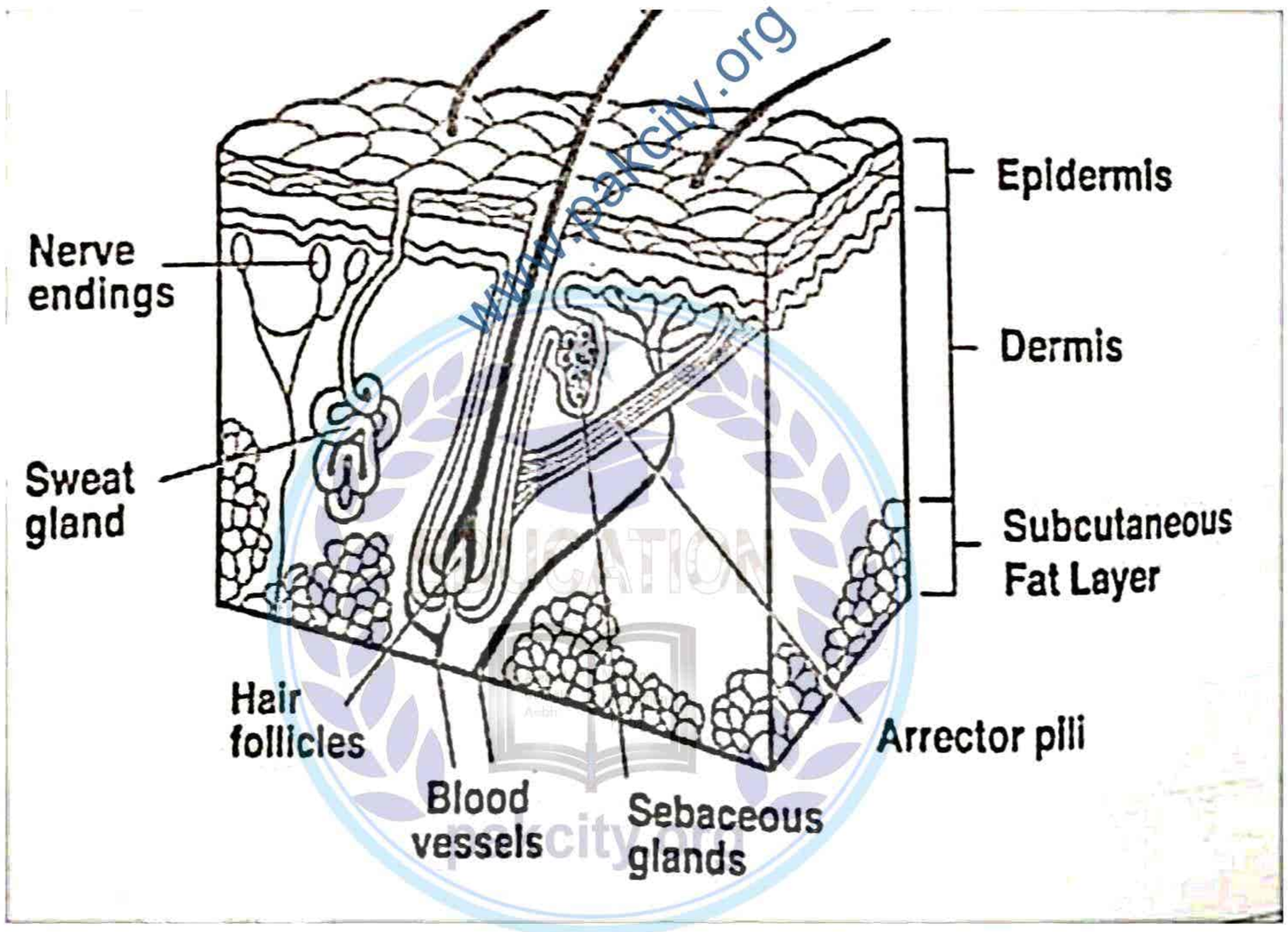
• Underneeth the epidermis the layer of living cells, blood cells & nerve cells are present called Dermis.
• It has Sweat glands (sweat seereting) and sebaceous gland (sebum seereting).
• Sebum act as chemical barrier to penetrate micro-organism.
• Sweat gland secrete variety of polypeptides to inhibits the growth of micro-organism.

HYPODERMIS:

• Hypodermis lies below the dermis.
• It contain fat stoxing adipose & connective tissue.
• It connect the muscle and bones and serve as insulating layer.

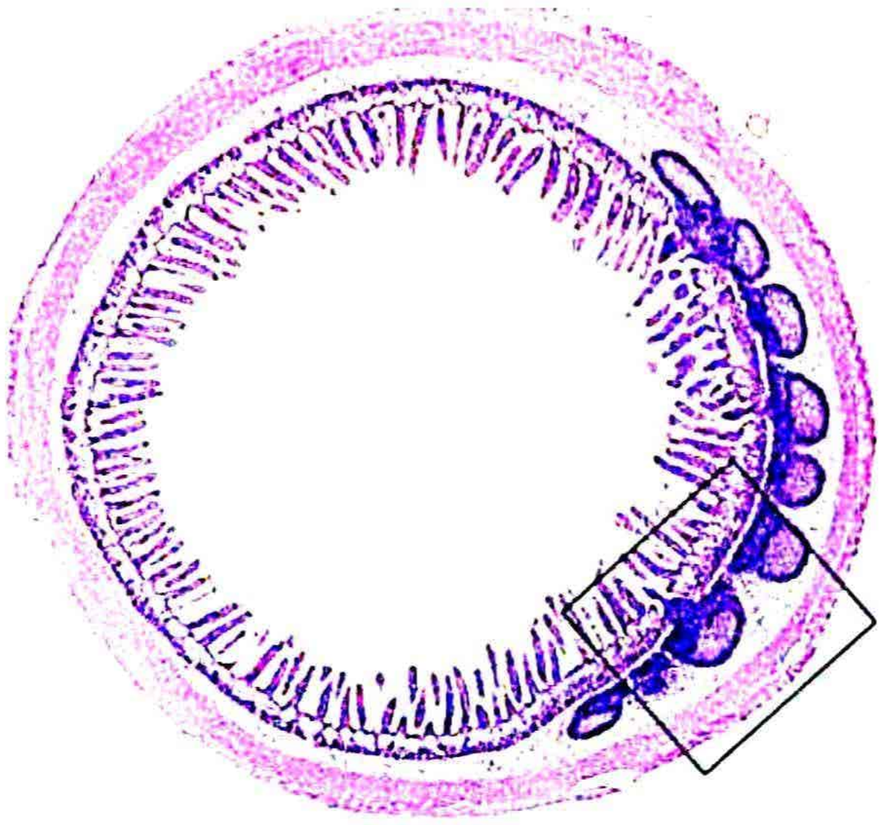
FUNCTION OF SKIN:

• It provide protection from mechanical impact and pressure & temperature, micro- organism etc.
• It also regulate body temperature through sweat & hairs.
•It act as reservoir for the synthesis of Vit D.
• It contain network of nerve cells, which serve as receptors of heat, cold, touch & pain.



DIGESTIVE TRACT:

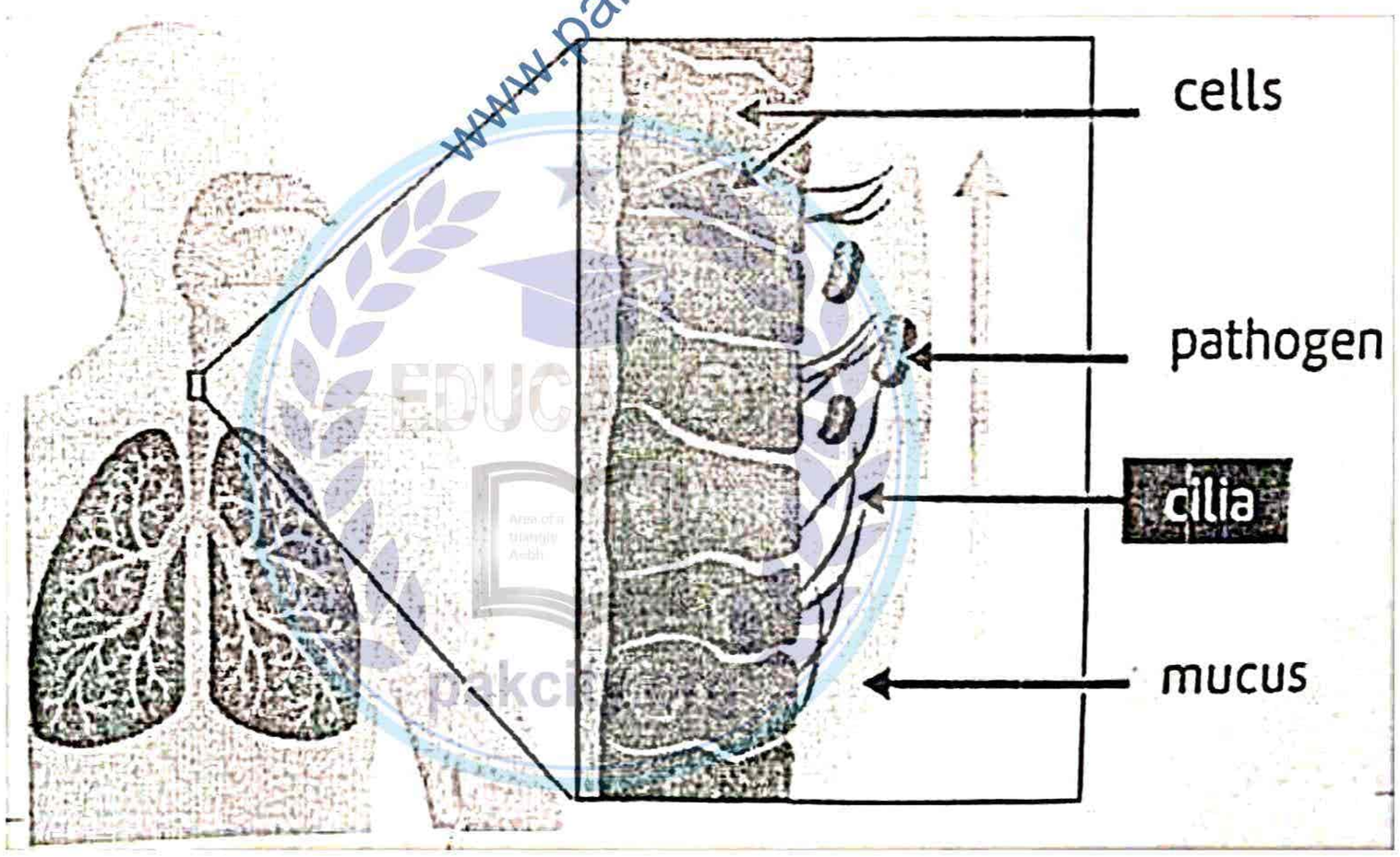
• The internal lining of mouth, nose, digestive tract, respiratory tract, lings and urinary tract contain mucous membrane or mucous.
• Mucosa contain antimicrobial peptide, which provide biochemical & as well as physical barrier.
• Digestive tract also have Lymphoid tissues in three sectors i.e. Tonsils, Payer's Patches & Appendix.
• The Lymphoid tissues contain microphages & Lymphocytes for the protection against pathogenic micro-organism. • Lymphocytes also present in the epithelial cells of mucose and protect against pathogen.



PAYERS PATCHES

AIR PASSAGE WAY:

- The Mucous membrane consist of ciliated columner epithelial cells.
- The Mucosa present inside the respiratory tract traps microorganism and its ciliated surface flush off the containinated mucosa out side.
- The hair present in our noser trap the dust,
- Mucosa membrane contain mucous glands, which stick dust, germ & Pused through synchronized system.



SECOND LINE DEFENCE:

These defences are nonspecific b/c they attack variety of microbes.

- Three non specific defences are work in this system.

i. KILLER CELLS OF BLOOD:

It include phagocytic cells, & Natural killer cells.

ii. Inflamatory Response.

iii. Fever.

KILLER CELLS OF BLOOD:

i. PHAGOCYTOSIS:

"The process of eating, digesting and destroying other cells is called Phagcytosis".

Some specific WBcs take in digest i.e. neutrophils, macrophages & dendriotic cells.

NEUTROPHILS:

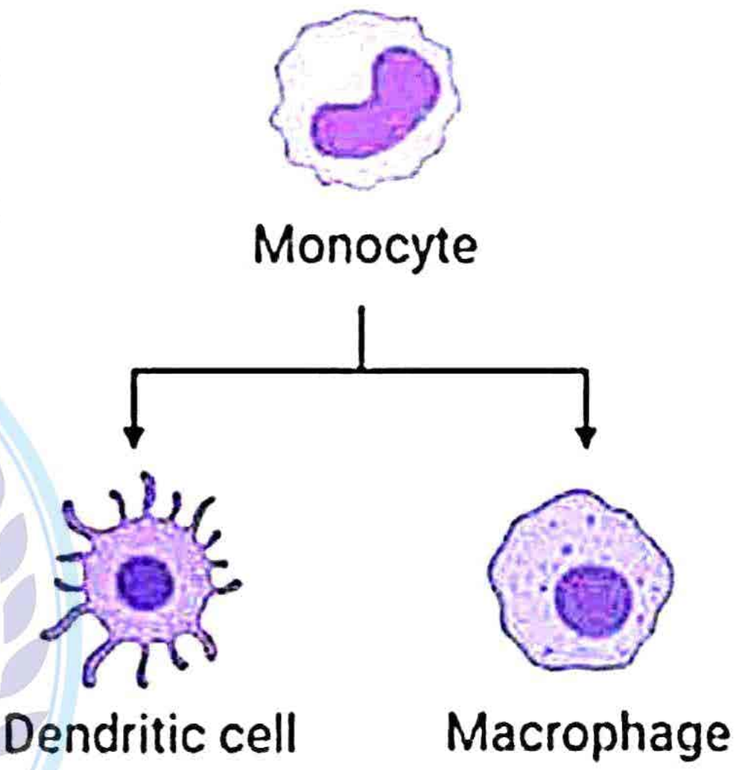
- These are most abundant WBCs & specialized to phagocytize bacteria.
- They are non spherical, multi lobed & shor lived.
- When they are matured they are transferred from blood to tissues.
- The have specific receptors to recognize various bacterial molecules such as peptidoglycans, flagellin, Lipopolysaccharide, Lipopeptides etc.
- When they recognize foreign particles they destroy them through hydrolytic energy.

MONOCYTES:

- They are bean shaped nucleated with non granulated cytoplasmic cell.
- They are 2 to 8% of WBC's & oxiginate from stem cells.
- Average life of these cells is about 2 to 5 days in blood circulation.
- From blood they migrate from tissue & become macrophages dendritic cells & live for year & help in innate immunity.

MACROPHAGE:

- They are largest, agranulocytes, leucocytes.
- They have large, irregular, horse-shoe shaped nucleus.
- From blood they are transferred into lymphoid and non-lymphoid tissues & grow in size into macrophages dendrites cells.
- They phagocytize remove, pathogenic organism & also represent their antigen to T- Cells, So also known as Antigen presenting cells (APCs).
- They release Cytokines to activate other immune cells & also secret nitric oxide which kill phagocytized pathogenic organism.
- They have ability to adopt tissue condition so also named as Alveolae Macrophages (in lungs), Kupffer cells (in liver), Microglia (in CNS) etc.



DENDRITIC CELLS:

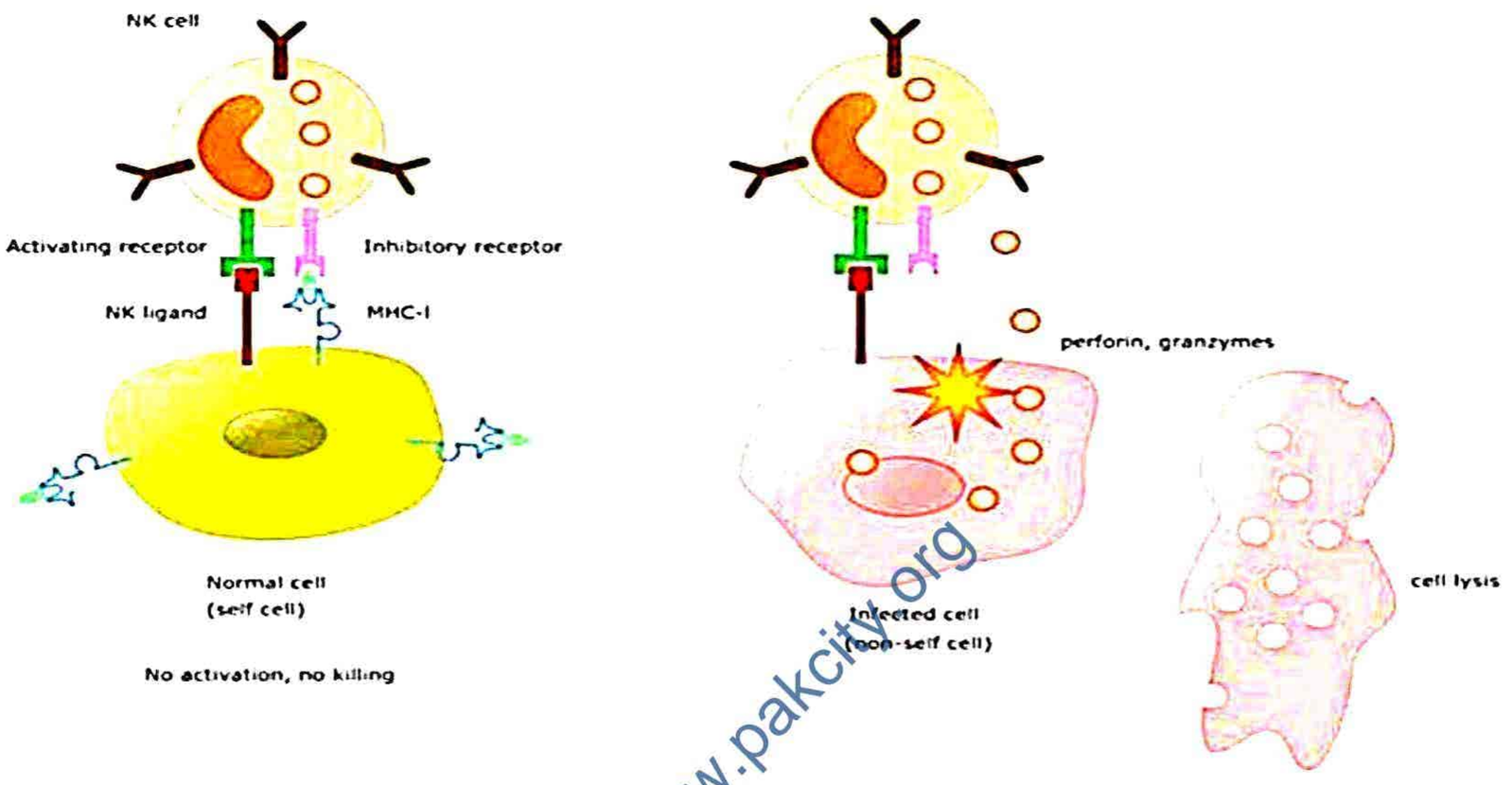
- They are long cytoplasmic projections cells and involved in antigens presenting phagocytized pathogen throng T-Cells.
- Upon inflammation, they migrate to the activation of T-cell & phagocytization they die.

CYTOXICITY:

- During this, damage or death occure of target cell, In this process two cells are involved, Natural Killer (NK) cell & Cytotoxic (Tc) cell.
- These (NK) and (Tc) cells are oxiginate from bone marrow.

NATURAL KILLER CELLS (NK CELLS):

• They are the types of lymphocytes & involved in detecting & eliminating virally infacted cells and and cancer cells.
• They serve as policemen & do check conjugated molecules on cell surface called Major.



HISTOCOMPETIBILITY COMPLEX-I (MCH-I):

• If target cell do not have this identity NK cells activate and destroy the target cells.
• During Lysis of target cell they release cytotoxic granules having Perforin protein & granzyme.
• Granzyme form pores in the plasma cells of the target cells & causes Lysis.

CYTOXIC T CELLS (Tc Cells):

• They belong to group of lymphocytes & recognized vinally infected cells as well as tumor cells.
• They produced in bone marrow, mature in thymus & then released into the blood.
• They develop two type of receptors i.e. CDs receptors with T-cell receptor (TCR).
• These CDs & T-Cell recepto (TCR) bind with (MHC-I) complex on nucleated cell except macrophages.
• Macrophages have their own another MHC-II complex.
• T-Cell recognize vinally infected cells through antigen MHC-I complex.
• They also release some protein like (TNF- a) and (TFN-y), which act on macrophag or dendrict to increase their immune response.
• They are also cause lysis of other infected cells so also called "serial killer".

PROTECTIVE PROTEINS:

• They are the complementary protein & help in the protection against pathogen.
• They damage plasma membrane & activate immune system such as mast cells, neutrophils & macrophages etc.

INFLAMMATORY RESPONSE:

- It is non specific immune response due to infection.
- It is of two types, acite and chronic.
- Acite type is short term inflammation and characterized by redness, hotness, pain, swelling.
- Chronic type is prolong & due to diseases Like cardiovascular Disorder, allergy etc.

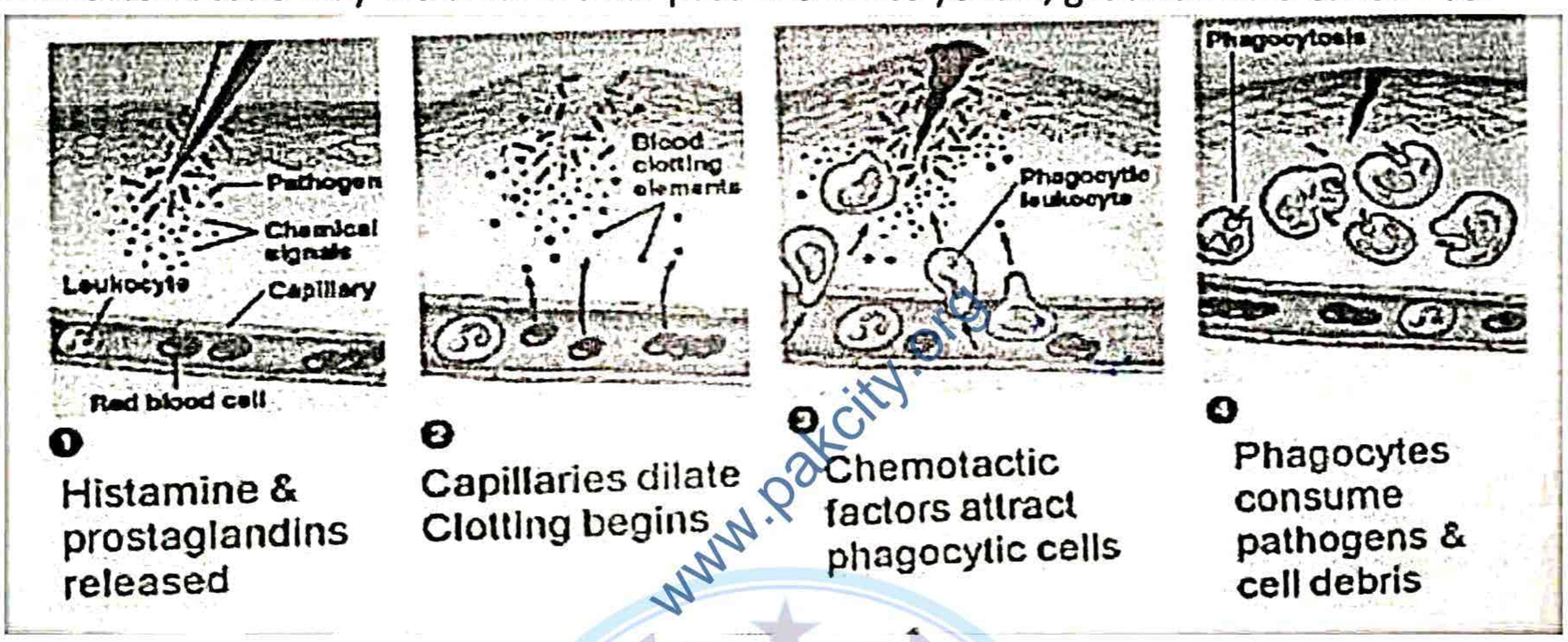
PROCESS:

- When any tissue is damaged, harmful bacteria are introduced in tissues.
- Now tissues release complex protein like.

HISTAMIN & PROSTAGLANDIN:

- These protein attract neutrophils & macrophages to the site of infection, to eliminate the harmful bacteria.

- Now infected tissue may die & form thick past-like white yellow, greenish fluid called Pus.



TEMPERORY RESPONSE:

FEVER (Pyrexia):

It is non specific immune response in which body temprises it is also called "Pyrexia".

INDICATION:

Pyrexia is a sign of infection, heat stroke, brain tumors, toxins affect etc.

REASON OF FEVER:

- Substance pyrogen induce fever by endogenous or exogenous source.
- The endogenous pyrogen release in body blood by activating macrophages cells.
- The endogenous pyrogen involves interleukin-1 (IL-1), & interleukin-6 (IL-6) & Interferons (INF-α).
- Through blood, these pyrogens transport to brain part hypothalamous.
- Hypothalamous produce prostaglandin.
- Due to prostaglandin thermogenesis is increased & heat loss is decreased, This causes fever in body.
- Exogenous Pyrogen coming from external source such as bacteria, toxin.
- Such toxin again recongnised by brain as pyrogen & cause fever.

BENEFITES OF FEVER:

- Due to fever many bacteria and fungi cannot grow & multiply properly, so the immune system can stop them easily to eliminate them.

HARMFUL EFFECTS OF FEVER:

Fever has following harmful effects.

i. Energy is lost as heat.

ii. Causes, fatigue, dehydration, body ach & seizures.

iii. Above 105°F temperature damage enzyme & protein.

iv. Donative body cell & death of person.

THIRD LINE DEFENCE: (THE SPECIFIC DEFENCE);

- It is specific defence supported by non-specific defensive system.
- It is strong resistance and also called Acquired or Adaptive Immune system.

RECOGNITION OF THIRD LINE AS NON SELF:

- When any foreign molecules enter in body, body recognized it as Antigen.
- For any Antigen B-Lymphocytes produce protein called Antibody.
- Antibody combine with Antigen to destroy pathogenic organism, but also memorizes it.
- If same pathogen again enter body identify it and produce Antibodies shortly.

CHARACTER OF MHCI CLASS I:

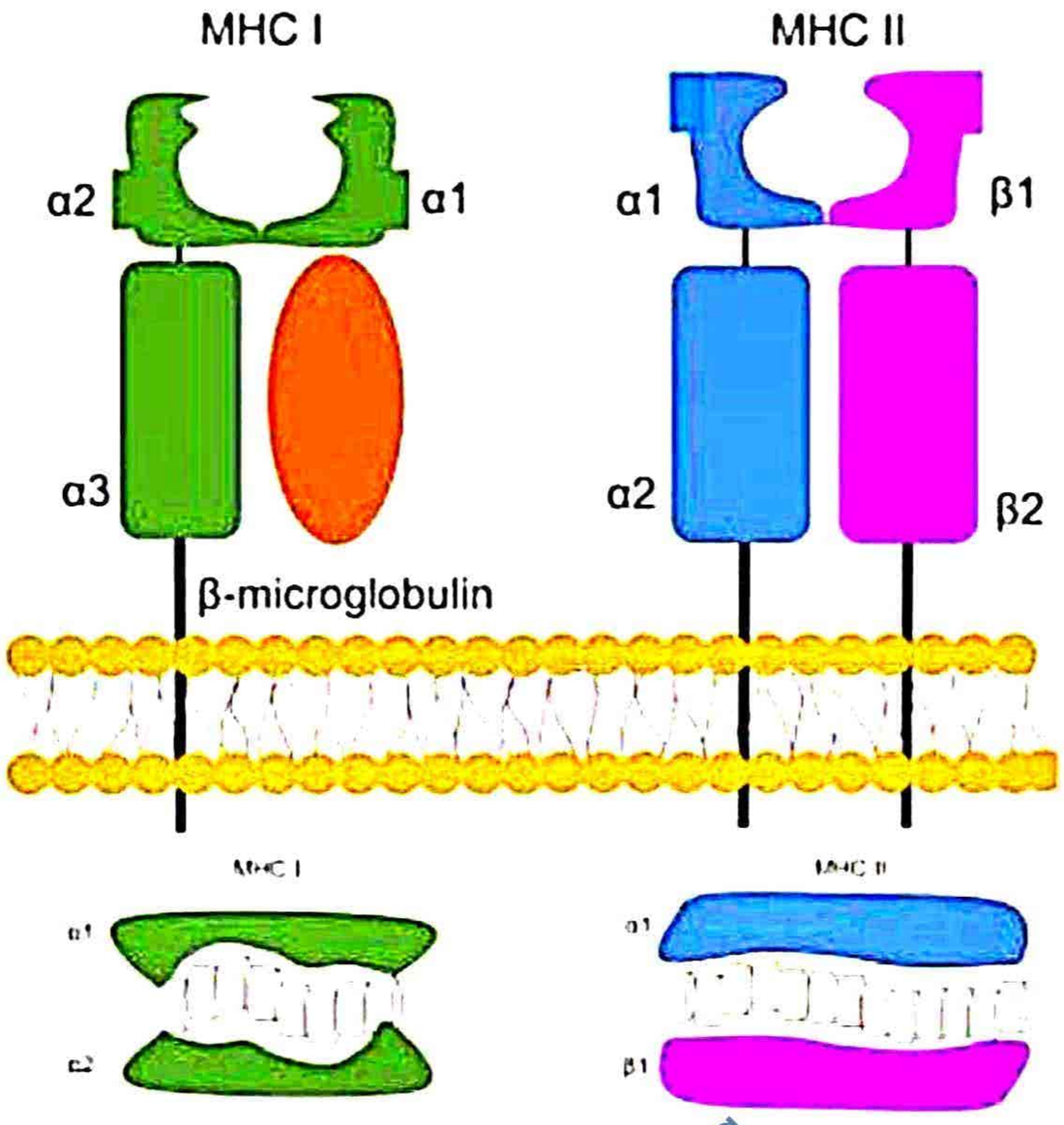
- MHCI protein are found in all vertebrates plasma membrane and also termed as Human Leucocytes Antigen (HLA).
- MHC-I complex interact with Tc cells and NK cells. If they recognize as "Self-Cells" no, adverse response show against them.
- If they any kind of alternation/modification / loss in MHC-I, the target cell consider them as non seef & terminate them from body.

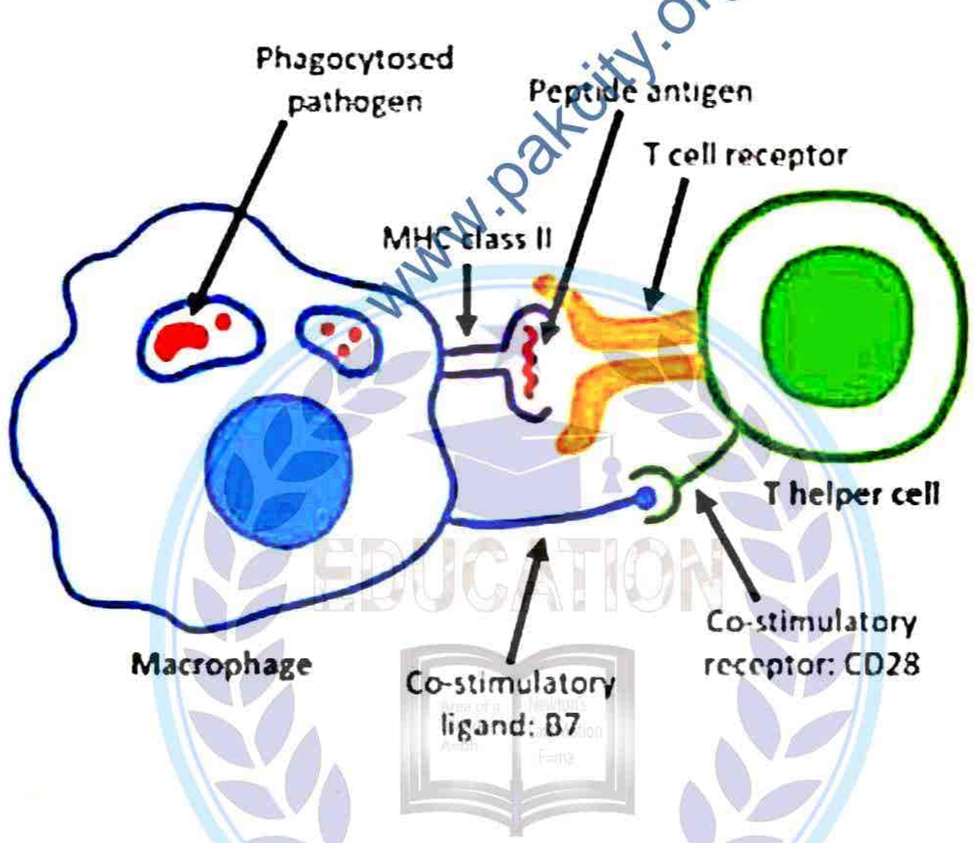
So in this both way MHC-I serve as global alarming system in our body's immune system

CHARACTER OF MHC II (CLASS-ID:

MHC-II protein are found on the cell of antigen presenting cells such as macrophages, dendritic cells & B cell.

- They interact CD4 T-Cells, (Helpher T Cell) & develop specific immune system.
- If no Peptide antigen displayed on MHC - II of macrophages, the TH cell remain inactive.
- In case of such antigen displayed on MHC-II of APC. The TH cell activate and released number of Lymphokines to active other immune cells.





IN BORN & ACQUIRED IMMUNITY:

There are two basic types of Immunity.

i. In born or Innate immunity.

ii. Acquired or Adaptive Immunity.

IN BORN OR INNATE IMMUNITY:

- It is non specific, natural defensive system.
- This immunity found in genetic make up of individual before the infection is acquired.
- It is found in physical barriers like skin, cellular barriers like macrophages, mast cell, biochemical barriers like cytokines or interferoms.

ACQUIRED OR ADAPTIVE IMMUNITY:

- It is specific and develop after infection.
- It is slower but long lasting due to existence of memory.

• There are two types of acquired Immunity.

i. Active Immunity.

ii. Passive Immunity.

i. ACTIVE IMMUNITY:

• It is develop in individual due to natural clinical or sub clinical infection.

• If immunity develop by inoculating vaccine it is termed as Artificial Active Immunity.

ii. PASSIVE IMMUNITY:

• It is develop in individual by inoculation of pathogenic organism or prepared antibodies from donor to recipient.

• If antibodies are transferred from pregnant women to fetus through placenta, this immunity is called Natural passive immunity.

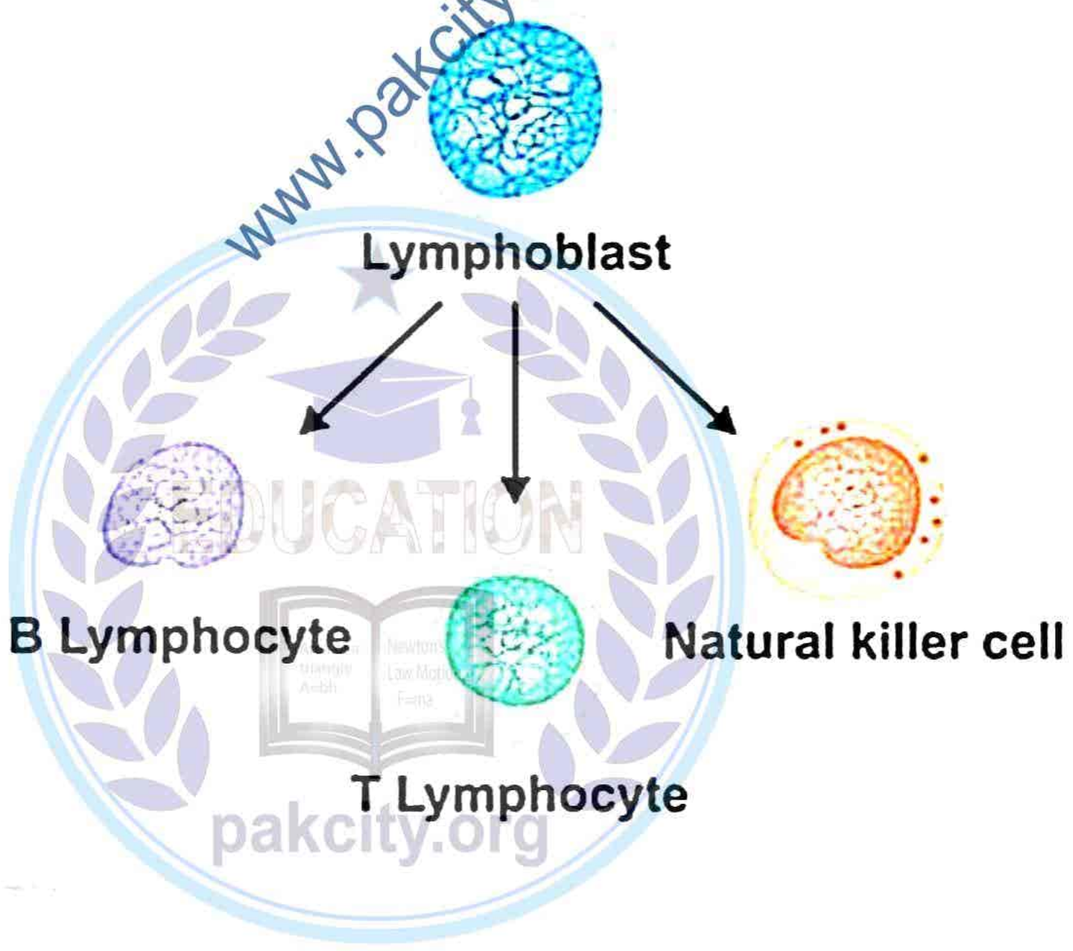
• If immune cells or serum from immune person transferred to non-infected person this immunity is called Artificial immunity.

LYMOPHOCYTES:

CELL MEDIATE IMMUNE RESPONSE:

• It is the first type of third line defence system and produce immunity through T-lymphocytes.

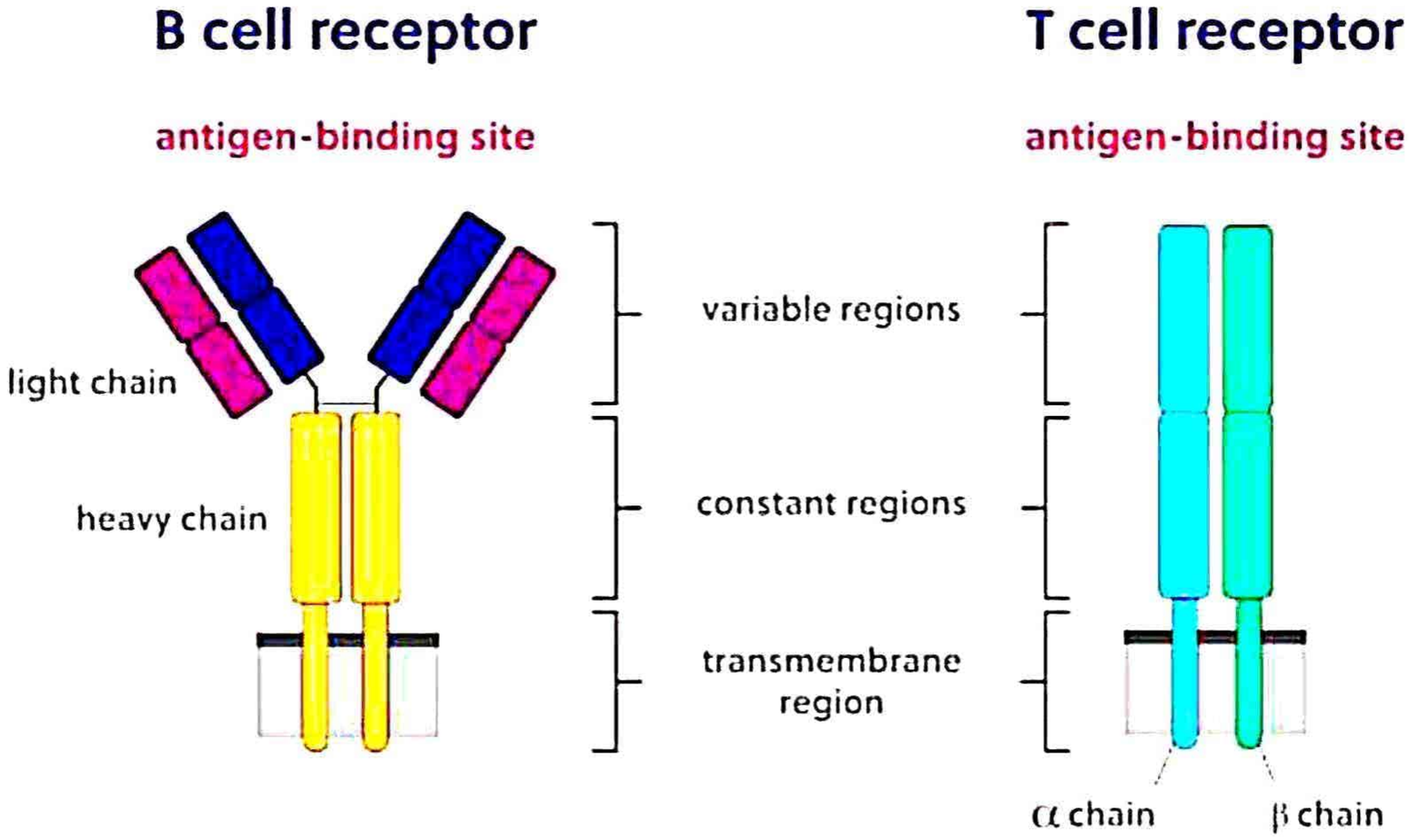
• T-lymphocytes do not produce antibodies & important against viruses, Parasites tumors cells & fungi.



T-LYMOPHOCYTES & ITS TYPES:

T-lymphocytes produce in bone marrow in immature form and then migrated into thymus and because nature, that why named as T-cells.

i. T-Cytotoxic (Tc) ii. T Heeper (TH) iii. T-Suppressor (Ts) iv. T-memory (TM)



T-Cytotoxic (Tc):

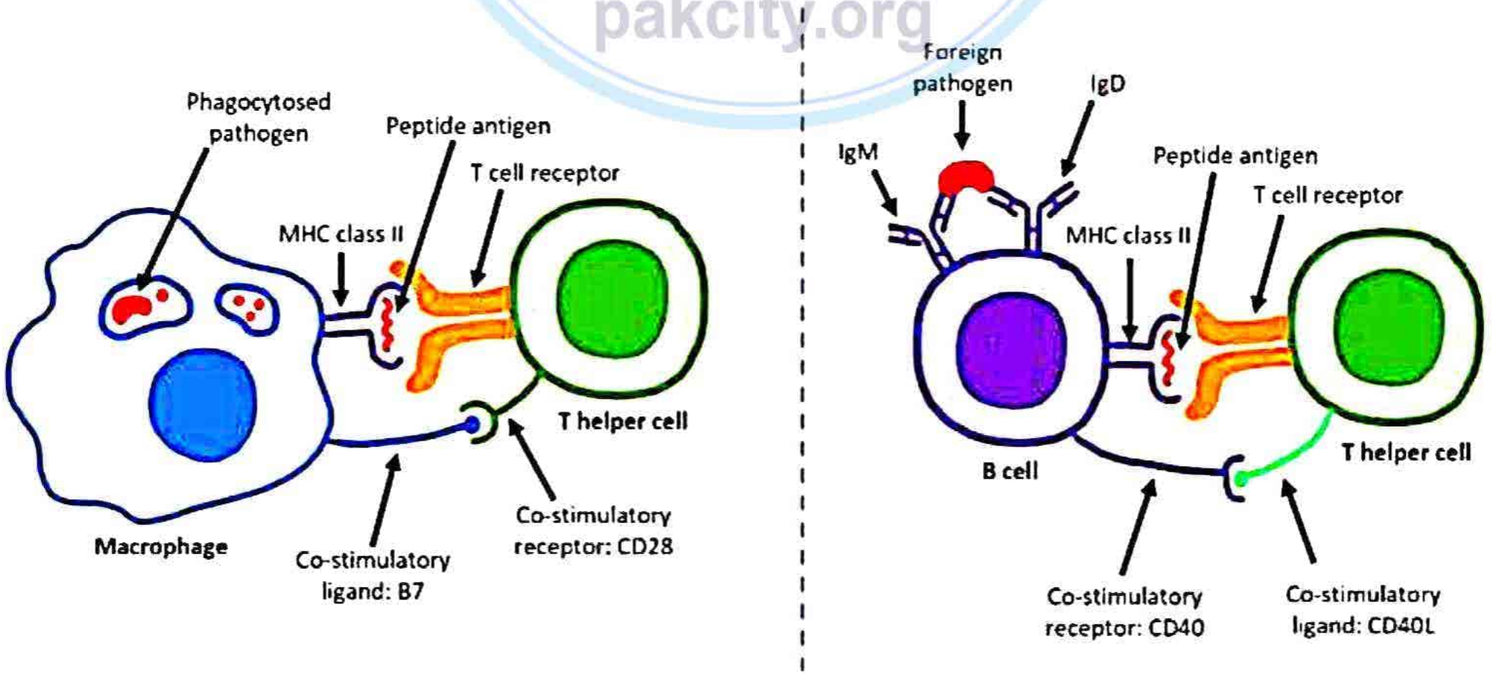
- These cells have CD8 (Co-Receptor) & Specify to kill target cell that bear specific antigen, that why called cytotoxic cells.
- They target virally infected cell, bacteria & tumor cells.

T-Helper Cell (TH):

- These cell have CD4 (Co - receptors), & activated by APCs & releasing cytokines to activate B-cells, Te Cells, macrophages to destroy specific pathogen.
- When they activate T-Cell they further differentiated into sub types which release cytokines, interleukin INF & WBCs.

T SUPRESSOR OR REGULATORY CELLS (Ts):

- Ts Cells have CD4,CD and TCR receptors on their surface.
- They deactivate TC, TH and B cell after they get ride of the specific antigen bearing pathogen.
- If they do not deactivate such cell they provide harm their own normal cells of the body



T MEMORY CELL (TM):

• There cells provide long term resistance after reinfection. When these cell reexposed to same antigen they become effector.
• The process of vaccination is greatly benefitted by the presence of TM cells.

B-LYMPHOCYTES:

• They are formed and mature in bone marrow, & produce humoval immunity by secreting antibodies through plasma cells.
• Their activation either T-dependent or T-independent mechanism.
• TH cells with MHC-II release B-cell actively, & these antibodies secreting B - Cells now called plasma cell.
• Some B - Cells turn into B - Memory cell (BM) and holding all records & data of antigen.

DISORDER OF IMMUNE SYSTEM:

• It is a exaggerated response of Immune system against some allergins like Polle, Molds, drugs, Pet dander.
• When WBCs consider normal substance as antigen specific antibodies IgE are produced by plasma cells.
• These antibodies release in blood & bind to allergin & than the receptors of mast cells or basophils.
• The cells now release histamine & produce inflammatory response like Itching, Rashes, runny nose, cough etc.

TREATMENT:

During runny nose, Tashes physician prescribe antihistamine therapy or steroids to induce inflammation.

AUTOIMMUNE DISEASE:

• In this immune system fats to recognize own tissues as "Self" & self antibodies are produced which destroy own tissues.
• Common symptoms are Malaise, low fever, fatigue, Rashes, Muscles ache etc.
• Some common Autoimmune disease are Diabetes type I, Reumatoid, Arthiritis, Psoriasis etc.
• Causes of such disease still not known but may be due to some bacterial, viral infection certain drugs or pollutants in human.

TRANSPLANT REJECTIONS:

When transplanted organs like live, kidney are rejected by recipient through its immune system, this immune response is called transplant rejection.
• Transplanted tissues rejected through host's immune system wither by consequence of CMI or humoral Immunity.

ROLE OF T CELL IN T - REJECTION:

• When dendrict cell of donor tissue migrate to lymphoid tissue of recipient. They recongnized by TH cells through APCs.
• These activated TH cells invite NK cells & Tc to attack on graffed tissues.

ROLE OF B-CELL IN T-REJECTION:

• Activated TH cell also activate B cells to produce antibodies plasma cells. These antibodies again destroy grafted tissues.

NOTE ON MALIGNANT MELONOMA:

MALIGNANT MELANOMO:

- It is a type of skin cancer produce by Melanocytes cell of skin.
- It is due to U.V radiation exposure or inherited.
- Initially Melanocytes show high uncontrolled growth radialy in basal development.
- Then it state move upward in epidermis & at this stage cancer different parts of body.
- At this stage Tumour infiltrating Lymphocytes (TLS) recognize the abnormal behavior of tissues & activate immune response through T & B Lymphocytes, NK cells, macropahges, dendritic cell, mast cells, borophillis, easoniphils and neutrophils.
- The TLS not enough to control Malignant melanoma & now micro environment, Number of molecules and cell start to suppress immune response through immune suppressing molecules.

NOTE ON MONOCLONAL ANTIBODIES:

MONOCLONAL ANTIBODIES (mAb):

In 1970 cesar Milstein and Georges Kohler working in Cambridge solved the problem of developing a technique for producing monoclonal antibodies. Each type of antibody is made by one type of B cells which cloned itself, in other words multiples to make many identical copies of itself in response to a particular antigen. Milstein and Kohlar fused B cells with cancer cells, which are immoral to form hybridoma cells. The hybridoma cells continue to multiply and can be cloned so that large quantities of antibodies can be produced. Monoclonal antibodies are hervested from cell cultures rather than animals. The ability to make monoclonal antibodies has been spawned a new industry.

APPLICATION:

A Common area of application is medical diagnosis. Monoclonal antibodies are used for determining pregnancy and for diagnosing diseases (such as gonorrhea, syphills), hepatitis rabies, cancer.

NOTE ON VACCINES:

Vaccines are live of killed pathogen used to induced the immune system of our body to protect against infection vaccine are of following types.

A vaccine is either a pathogen (live attenuated, or killed) or its product that is introduced in our body to induce a state of immunity for protection against natural infection with the same pathogen.

Vaccines are of following four types.

i. Live Attenuated Vaccines
ii. Inactivated Vaccines
iii. Toxoid Vaccine, and
iv. Sub-unit, Recombinates, polysaccharide and conjugate Vaccines.

DIFFERENCE BETWEEN INNAT IMMUNE SYSTEM AND ADAPTIVE IMMUNE SYSTEM

INNAT IMMUNE SYSTEM	ADAPTIVE IMMUNE SYSTEM
It is natural occurring Immunity.	It is acquired immunity.
It generate non specific Immune system.	It generate specific Immune system.
It generate rapide Immune response.	It generate delayed immune response.
Main components are plasma protein, phagocytes, chemical & physical barriers.	Humural and mediated immunity are the components.
It does not develop memory cells.	It develop memory cells.
Redness, Swelling.	Vaccination.

DIFFERENCE BETWEEN ACTIVE IMMUNITY AND PASSIVE IMMUNITY

ACTIVE IMMUNITY	PASSIVE IMMUNITY
This immunity produce by production of antibodies of own immune system.	This immunity results by the introduction of antibodies from outside.
It does not produce rapid response.	It produce rapid response.
It last for long time.	It does not last for long.
It generate immunology memory.	It does not generate Immunological memory.
Side effects are very low.	The body may need to antisera.

DIFFERENCE BETWEEN CELL MEDIATED IMMUNITY AND HUMORAL IMMUNITY

CELL MEDIATED IMMUNITY	HUMORAL IMMUNITY
It is a component of adaptive immunity where B cell secrete antibodies.	It is component of Adaptive immunity where antigen specific T-Cells are produce.
This immunity mediated by T-Cells, B- Cells & macrophages.	This immunity is mediated by T-Cells, Cytotoxic T-Cells, NK cells and macrophages.
It act on extracellular microbes & their toxin.	It act on intracellular microbes such as virus bacteria etc.
It Recognized unprocessed antigen.	In this Antiigen are processed and presented by HMC complexes.
It is rapid type hypersensitity.	It is delayed type hypertensitity.

SHORT QUESTION & REASONS:

Q#1: List out six biochemical barriers,

- Lactic acid and fatty acids in sweat is bacteriocidal.
- Sebaceous secretions are bacteriocidal.
- Enzymes e.g. lysozyme in saliva, sweat & tears.
- Gastric acid denature microorganisms.
- Mucous itself is acidic, indigestible and traps microorganisms.
- Mucus also contain antimicrobial peptides.
- NK and Tc cells secrete perforin and granzyme that help in the lysis of target cells.

Q#2: How the tumor cells are dealt with by our immune system?

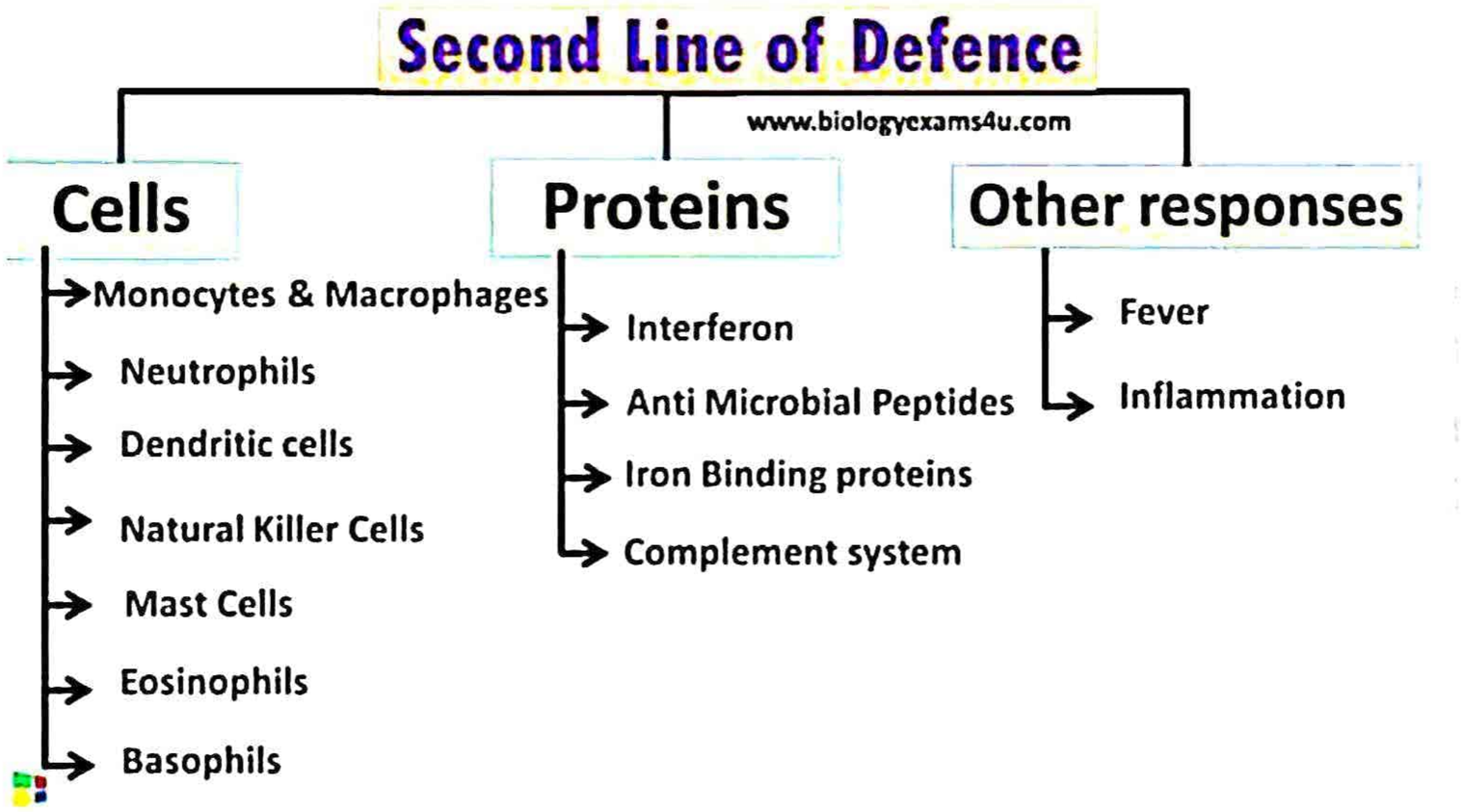
Tumor development can be controlled by cytotoxic innate and adaptive immune cells. The major effector cells of the immune system that directly target cancer cells include natural killer cells (NK), dendritic cells (DC), macrophages, polymorphonuclear leukocytes (neutrophils, cosinophils, and basophils), mast cells, and cytotoxic T lymphocytes.

Q#3: Differentiate between NK cells and Tc cells.

NATURAL KILLER (NK) CELLS	CYTOTOXIC T CELLS
A type of immune cells that can kill certain cells, such as foreign cells, cancer cells, and virally infected cells.	Lymphocytes able to bind to certain tumor cells and virus infected cells without the stimulation of antigens, and kill them by the insertion of granules.
Antigen specific.	No antigen specific.
Belong to adaptive immunity.	Belong to innate immunity.

Rapid response in hours.	Takes days to respond.
They do not have memory.	They have memory.

Q#4: List out the ways of second line of defence.



Q#5: Even though the core proteins are the same, how antibodies are different from each other?
Each antibody structure consists of two heavy chains and two light chains, which join to form a Y-shaped molecule. Each type of antibody has a different amino acid sequence at the tips of the "Y" and different binding sites, which is why each antibody is shaped differently. Different classes of antibodies are IgG, IgA, IgM, IgD and IgE.

Q#6: What is antipyretic therapy and why it is used?
Antipyretics therapy is used in case of fever. It is used to reduce the fever. Antipyretic drugs stop the prostaglandins secretion from hypothalamus by inhabiting cyclooxygenase enzyme There are 3 classes of antipyretic medications including;

i- Salicylates - aspirin (acetylsalicylic acid).
ii- acetaminophen – paracetamol.
iii- non-steroidal anti-inflammatory – ibuprofen.

Q#7: List out four autoimmune disorders of man.
Common autoimmune disorders include:
- Diabetes mellitus type I.
- Rheumatoid arthritis.
- Psoriasis/psoriatic arthritis.
- Multiple sclerosis.
- Celiac disease.

Q#8: What is phagocytosis? Name some WBCs acting as phagocytes.
The process where white blood cells surround, engulf, and destroy foreign substances is called phagocytosis, and the cells are collectively referred to as phagocytes. Phagocytes eventually die. Pus is formed from a collection of dead tissue, dead bacteria, and live and dead phagocytes.

Some WBCs are monocytes, macrophages, neutrophils, dendritic cells, osteoclasts, and eosinophils. These cells are in charge of eliminating microorganisms and of presenting them to cells of the adaptive immune system.

Q#9: What is inflammation?

Inflammation is one of the non-specific immune response to infection, tissue damage, irritants or autoimmune disorders. Inflammation can be either acute or chronic. Symptoms of inflammation include redness, hotness, pain, and swelling, loss of function, cardiovascular disorder and allergy. Harmful bacteria invade damaged part of the body, in response damaged tissues secrete histamine and prostaglandins which dilate blood vessels and attract neutrophils and macrophages to the site of infection. A white, yellow and green pus if formed in the damaged part.

Q#10: Outline the harmful effects of fever.

Although fever is beneficial to us yet it has following harmful effects also;

- Onsiderable amount of energy is lost as heat.
- It causes fatigue, dehydration, body ache and seizure.
- Temperature above than 105 F denatures our enzymes.
- If can denatures our own cells.
- It can cause death.

Q#11: What are the 5 classic signs of inflammation?

Based on visual observation, the ancients characterised inflammation by five cardinal signs, namely redness (rubor), swelling (tumour), heat (calor; only applicable to the body extremities), pain (dolor) and loss of function (functio laesa).

Q#12: Is inflammation good or bad?

When it's good, it fights off foreign invaders, heals injuries and mops up debris. But when it's bad, inflammation ignites a long list of disorders: arthritis, asthma, atherosclerosis, blindness, cancer, diabetes and quite possibly, autism and mental illness.

Q#13: How do immune cells work?

When the body senses foreign substances (called antigens), the immune system works to recognize the antigens and get rid of them. B lymphocytes are triggered to make antibodies (also called immunoglobulins). These proteins lock onto specific antigens.

Q#14: What are immune cells called?

Immune cells are called white blood cells. Immune cells develop from stem cells in the bone marrow and become different types of white blood cells. These include neutrophils, eosinophils, basophils, mast cells, monocytes, macrophages, dendritic cells, natural killer cells, and lymphocytes (B cells and T cells).

Q#15: What are immune organs?

It is in these organs where the cells of the immune system do their actual job of fighting off germs and foreign substances.

- **Bone marrow.** Bone marrow is a sponge-like tissue found inside the bones.
- **Thymus.** The thymus is located behind the breastbone above the heart.
- Lymph nodes.
- Spleen.
- Tonsils.

• Mucous membranes.

Q#16: What are killer T cells?

A type of immune cell that can kill certain cells, including foreign cells, cancer cells, and cells infected with a virus. Killer T cells can be separated from other blood cells, grown in the laboratory, and then given to a patient to kill cancer cells.

Q#17: Which cells produce antibodies?

Antibodies are exclusively synthesized by B cells. Antibodies are produced in billions of forms each with a different amino acid sequence and a different antigen-binding site.

Q#18: What is antigen vs antibody?

Antigens allow your body to create a defence against future invaders. Antibodies circulate in your body once created to identify, attack, and destroy the same type of antigens if they enter the body again.

Q#19: Are antibodies a protein?

An antibody is a protein produced by the body's immune system when it detects harmful substances, called antigens. Examples of antigens include microorganisms (bacteria, fungi, parasites, and viruses) and chemicals.

Q#20: What is the shape of antibody?

Antibodies are roughly Y-shaped molecules. Antibody molecules are roughly Y-shaped molecules consisting of three equal-sized portions, loosely connected by a flexible tether.

Q#21: What is the 1st and 2nd line of defence immune system?

The first line of defence against infection is the surface barriers that prevent the entry of pathogens into the body. The second line of defence is the non-specific phagocytes and other internal mechanisms that comprise innate immunity.

Q#22: What cells is the first line of defence?

Epithelial tissues cover most of the external and internal surfaces of the body and its organs. Inevitably, these tissues serve as first line of defence against inorganic, organic, and microbial intruders. Epithelial cells are the main cell type of these tissues.

Q#23: What is the 2nd line of defence immune system?

The second line of defence is nonspecific resistance that destroys invaders in a generalized way without targeting specific individuals: Phagocytic cells ingest and destroy all microbes that pass into body tissues. For example macrophages are cells derived from monocytes (a type of white blood cell).

Q#24: What is the 3rd line of Defence?

The third line of defence is called the immune response and is specific. It involves the production of two types of lymphocytes (B and T cells) which are specific to the invading particle. They work together to attack the pathogen.

Q#25: Which line of defence is fever?

Fever, although part of the second line of defence in immune response, is still a topic of discussion on whether an increase in body temperature during an infection is more beneficial tha

Q#26: Is saliva a first line of defence?
Salivary antibodies act in the first line of defence by performing immune exclusion of antigens in the saliva, in the mucus layer on the epithelial surfaces and in the acquired pellicle on the tooth surfaces. They are constitutively excreted into the saliva and the oral cavity.

Q#27: What are the 3 main types of phagocytes?
They are a key component of the innate immune system. There are three main groups of **phagocytes:** monocytes and macrophages, granulocytes, and dendritic cells, all of which have a slightly different function in the body.

Q#28: What are the four stages of the immune system?
The adaptive immune response in B cells, Helper T cells and Cytotoxic T cells involved four phases: encounter, activation, attack, and memory.

Q#29: What are Langerhans cells?
Langerhans cells are skin resident macrophages and T cells that help in the elimination of intruding microbes.

Q#30: What are Payer's patches?
Payer's patches are lymphoid tissues present in small intestine. Lymphoid tissues are rich macrophages and lymphocytes that protect the body from pathogenic organisms.

Q#31: list out pyrogens present in human body.
There are four types of pyrogens present in human body;
- Interleukin-1 (IL-1).
- Interleukin-6 (IL-6).
- Tumor necrosis factor (TNF).
- Interferon alpha (INF-ALPHA).

Q#32: Justify why physician prescribe antihistamine therapy to the patients of runny nose or skin rashes.
Runny nose or skin rashes are a type of hypersensitivity reactions in which histamine is release from the mast cells and basophils. Its release causes vasodilation, increased capillary permeability and smooth muscles contraction. Antihistamine drugs block histamine recept sites so histamine action cannot take place. So in this way they are effective in allergic rhinit i.e. runny nose and skin rashes.

Q#33: explain why a transplant recipient is given immune suppressant drugs and determine what implications does this has on his life.
Organs transplantation has become a routine procedure due to improvement of surgical techniques better tissue typing and the availability of drugs that selectively inhibit rejection of transplanted tissues and prevent the patient from becoming immunologically compromised. Transplant rejection occurs as a delayed hypersensitivity reaction as a function of lymphocytes and not due to antibodies administration of immunosuppressive drugs enhances tolerance. People receiving immunosuppressive drugs have side effects like pain, diarrhea, leukemia and sepsis.