CELLS OF IMMUNE ~~CELL~~ SYSTEM!—

① **MONOCYTES!**— These are mono-nuclear phagocytic cells when present in blood are known as monocytes and when present in tissue are known as Macrophages. These are the most effective phagocytic cells that also acts as professional antigen presenting cells along with dendritic cells and B-cells. These cells represent exogenous antigen which is processed by endocytic pathway. Macrophages secretes proinflammatory molecule interferon-γ (IFN-γ) and IL-12. IFN-γ is used for proliferation of macrophages. Depending upon to position diff. name given of the macrophages —

(i) Kupffer cells — Liver
(ii) Microglial — Brain
(iii) Osteoclast — Bones
(iv) Mesangial — Kidney
(v) Histocytes — Connective tissue

Bone forming cell - osteoblast
Bone eating cells - osteoclast

② **DENDRITIC CELLS!**— These are the most active professional Ag presting cells which are present in tissue, blood and lymph. Depending upon the position diff names are given to these cells —

(i) Langerhans cells — Dermis
(ii) Interdigitating cells — Lymph nodes
(iii) Interstitial cells — Kidney, lung, heart.
(iv) Veiled cells — Blood & lymph

(3) MAST CELLS:- These cells participates in inflammation & allergy. They have the receptor for IgE. After activation they secrete several chemical compd —

(i) Histamine — Histidine aa act as a precursor for Histamine production. It increases the vascular permeability so that large no of immune cells can be recruited at the affected area. It is also responsible for the dialation of blood vessels. Histamine is also responsible for deactivation of tight junction.

(ii) SEROTONIN:- It increases vascular permeability & smooth muscle relaxation.

(iii) PROTAGLANDIN:- They are responsible for inducing pain.

(iv) BRADIKININ:- It promote the synthesis of protoglandin.

(v) LEUKOTRIENES:- They increases the vascular permeability and smooth muscle relaxation.

(3) NEUTROPHILS:- These are granular leukocytes that are very strong phagocytic cells. Neutrophils are the Ist cell tobe recruited at the affected area through Vascular permeability. This process is known as extravasation or Diapedesis. Neutrophils have large granule which secretes chydrolytic enzyme for killing the pathogens.

Smaller granules are also present which secretes anti-bacterial proteins like defensins, Sperlocidins. Neutrophils have the receptor for IgG that participates in Ab dependent cell cytotoxicity (ADCC).

(4) BASOPHILS!— These are non-phagocytic cells which have the receptor for IgE that participates in allergic responses. These cells participates in chypersensitive rx^n like Asthama and are also effective against ectoparasitic ~~inf~~ infection.

(5) EOSINOPHILS!— These are weak phagocytic cells that have the receptor for IgE and IgG. They are effective against endoparasitic infection.

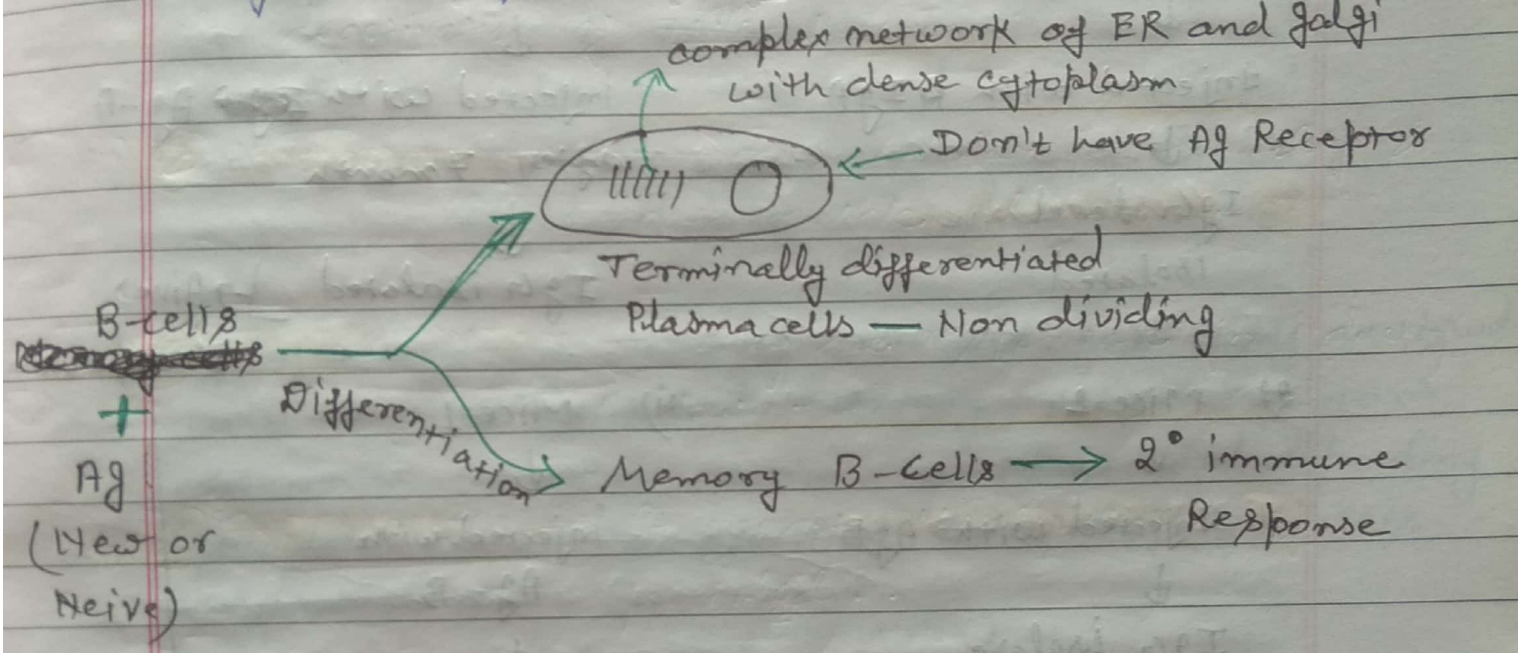
(6) LYMPHOCYTES!— These are responsible for providing adaptive immune response in ~~both~~ which recognition and memory is involved. Immune system contains 3 diff. lymphocytes

(i) B-lymphocytes
(ii) T- "
(iii) NK-cells.

NK-cells do not participate in Ag recognition and develop^t of memory. The ratio of T to B cell in the individual is T : B → 3 : 1

(i) B-LYMPHOCYTES! — Upon antigen recognition B-cell get differentiated into Plasma-cells and memory B-cells. Plasma cells have no receptor for Ag recognition and they contain a complex network of ER and GB which participates in the production of Ab. Memory B-cells participates in providing 2° immune response against the same Ag.

→ B-cells also act as professional APCs which expresses high level of MHC-II molecule



1° & 2° IMMUNE RESPONSE :—

1° IMMUNE RESPONSE	2° IMMUNE RESPONSE
(i) Ag enters the body for the 1st time.	(i) Same Ag enters the body for the 2nd time.
(ii) Response is provided by Naive B-cells.	(ii) Response is provided by memory B-cells.
(iii) Longer lag-phage is present.	(iii) Shorter or no lag phage is present.
(iv) Ab Conc^{n} rises slowely.	(iv) Ab Conc^{n} rises abruptly.
(v) Response is slow.	(v) Response is rapid and massive
(vi) Predominant Ab is IgM	(vi) Predominant Ab is IgG.

(ii) T-LYMPHOCYTES:- T cells are MHC restricted cells that means they recognized the antigen only when it is displayed by MHC molecule. Depending upon the cell surface marker two diff. T-lymphocytes are present —

(a) CD_4^+ — T_H cells
(b) $CD8^+$ — T_C cells

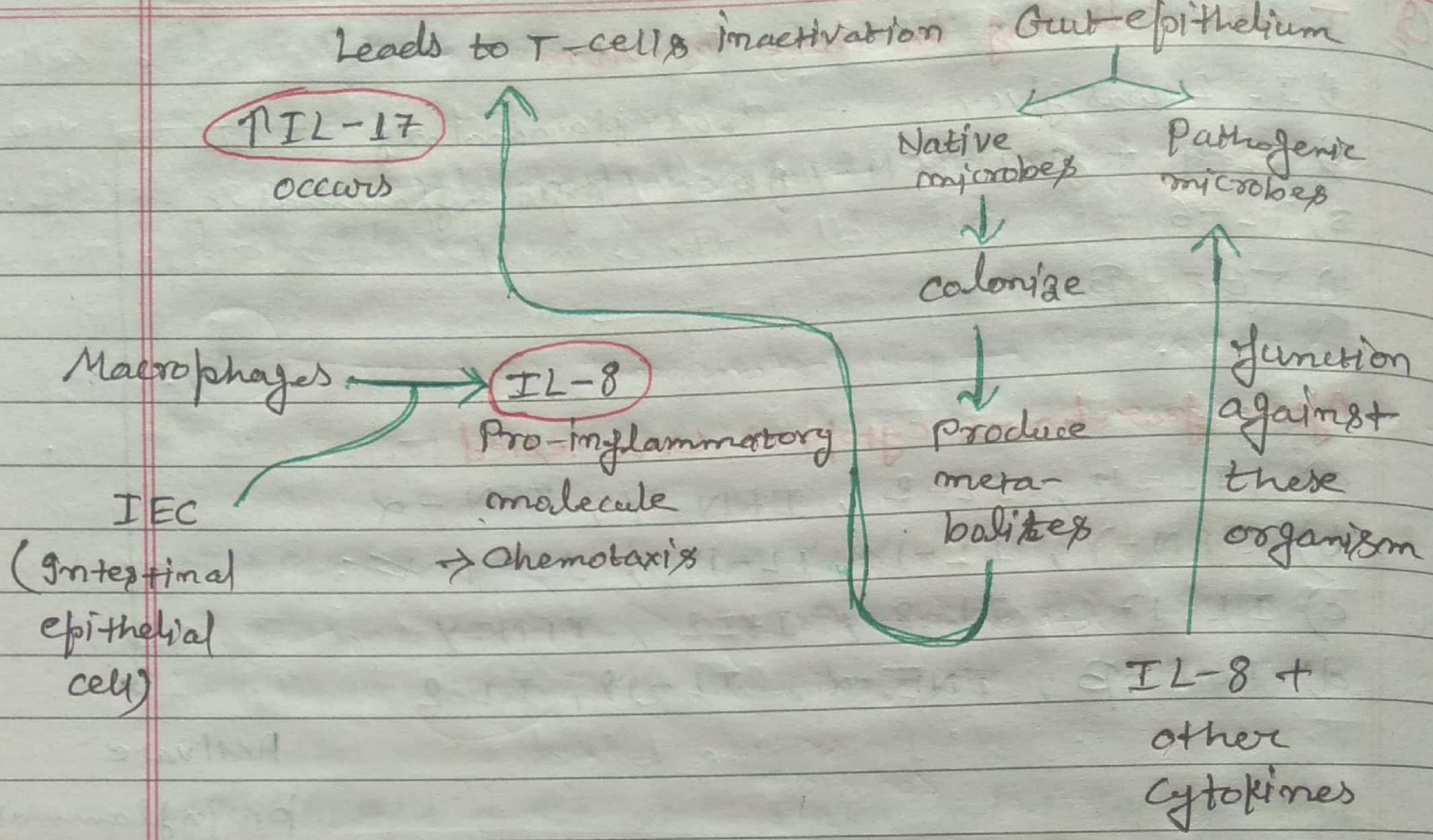
T_H cells recognizes MHC-II molecule and T_C cell recognizes MHC-I molecule. Ratio of T_H to T_C cells is 2:1 in the blood.

$$T_H : T_C \rightarrow 2:1$$

After recognizing the Ag T_H cells gets differentiated into effector cells and memory cells. Effectors cells starts secreting several cytokines and depending upon the nature of cytokines two diff. subsets are present —

T_H cells
- → TH_1 (Proinflammatory) — secretes proinflammatory molecule like IL-2, IFN-γ, TNF-α (Tumor necrosis factor).
- → TH_2 (Antiinflammatory) — secretes Anti inflammatory molecules like IL-4, IL-5, IL-6 and IL-10.

IL-3 is a master colony factor i.e secreted by both TH_1 and TH_2 subset.



T_C cells after recognizing the Ag get differentiated into cytotoxic T-lymphocytes (CTL) that participates in cellular mediated lysis.

NK-cells!- NK-cells do not invalve in ~~mammal~~ memory they contain granules which promotes cellular lysis. NK-cell recognizes non-MHC representing cells as yorigen cell and carrier out cell mediated lysis. These cells are highly effective against- cancer cell, Viral infected cells etc.