

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

رَبِّ زِدْنِي عِلْمًا

اللَّهُمَّ أَرِنِي حَقِيقَةَ الْأَشْيَاءِ كَمَا هِيَ

“O Allah! Show me the reality of all things as it (really) is..”

# **BLOOD Physiology**

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**LECTURER in Physiology**

# HEMATOPOIESIS

```
graph TD; A[HEMATOPOIESIS] --> B[LEUKOPOIESIS]; B --> C[Myelopoiesis<br/>(IL-1,3,GM-CSF, N-CSF)]; B --> D[Lymphopoiesis<br/>(IL-2,7,12,15)]; C --> E[Granulocytes]; C --> F[Monocytes]; D --> G[Lymphocytes];
```

The diagram is a hierarchical flowchart. At the top is a yellow rounded rectangle containing the word 'HEMATOPOIESIS' in large, bold, red capital letters. A vertical blue line descends from this box to a light green rounded rectangle containing 'LEUKOPOIESIS' in bold, red capital letters. From the bottom of the 'LEUKOPOIESIS' box, a horizontal blue line branches into two vertical lines. The left vertical line leads to a light green rounded rectangle containing 'Myelopoiesis' in bold, dark blue text, with '(IL-1,3,GM-CSF, N-CSF)' in bold, red text below it. From the bottom of this box, a horizontal blue line branches into two vertical lines leading to two light green rounded rectangles: the left one contains 'Granulocytes' and the right one contains 'Monocytes', both in bold, red text. The right vertical line from the 'LEUKOPOIESIS' box leads to a light green rounded rectangle containing 'Lymphopoiesis' in bold, dark blue text, with '(IL-2,7,12,15)' in bold, red text below it. A vertical blue line descends from the bottom of this box to a light green rounded rectangle containing 'Lymphocytes' in bold, red text.

## LEUKOPOIESIS

### Myelopoiesis

(IL-1,3,GM-CSF, N-CSF)

Granulocytes

Monocytes

### Lymphopoiesis

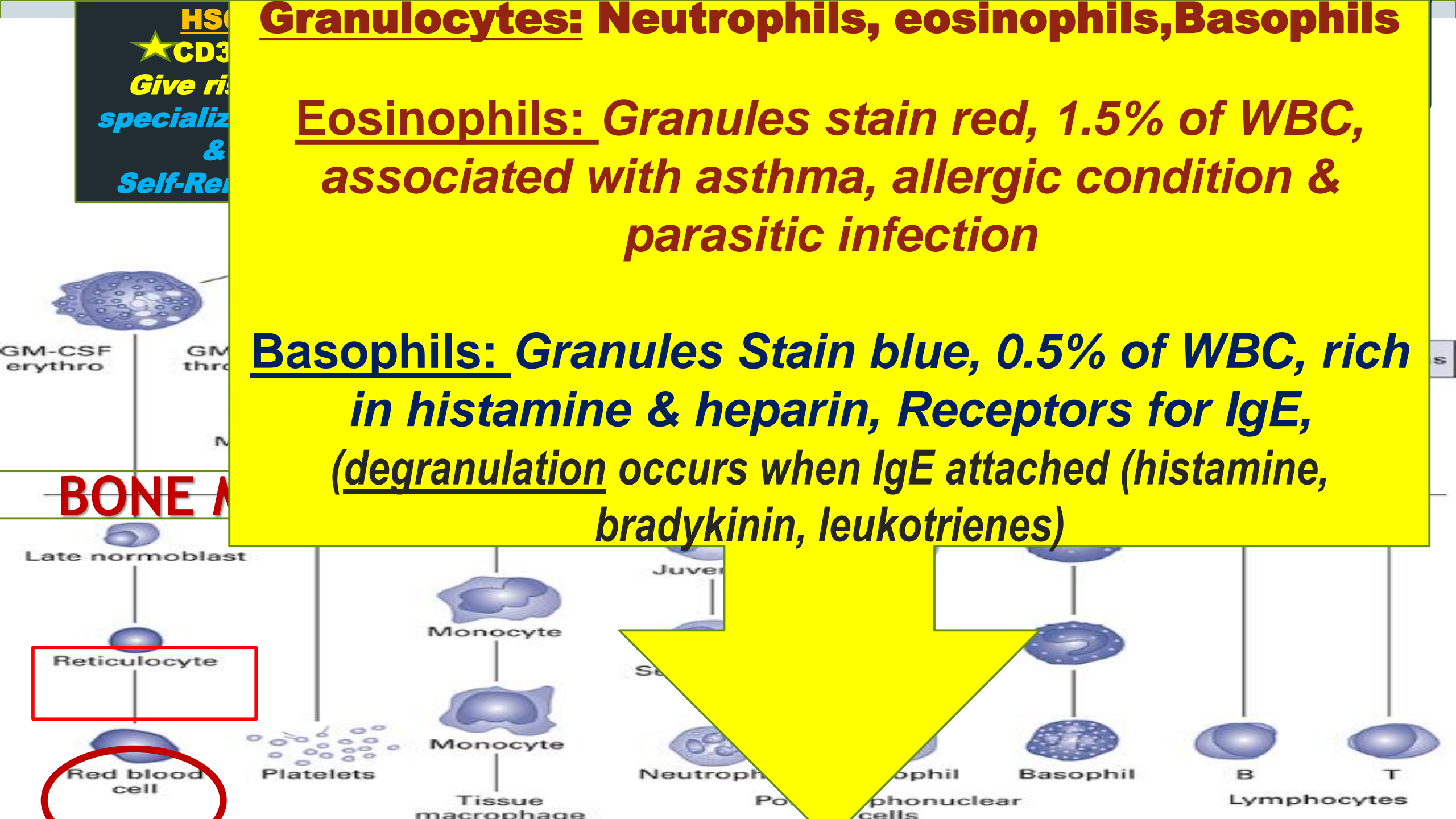
(IL-2,7,12,15)

Lymphocytes

# Granulocytes: Neutrophils, eosinophils, Basophils

Eosinophils: Granules stain red, 1.5% of WBC, associated with asthma, allergic condition & parasitic infection

Basophils: Granules Stain blue, 0.5% of WBC, rich in histamine & heparin, Receptors for IgE, (degranulation occurs when IgE attached (histamine, bradykinin, leukotrienes)



HS  
★ CD3  
Give ri  
specializ  
&  
Self-Re

**BONE MARROW**

Reticulocyte

Red blood cell

Platelets

Monocyte

Monocyte

Tissue macrophage

Juven

Seg

Neutrophil

Pol

phonuclear cells

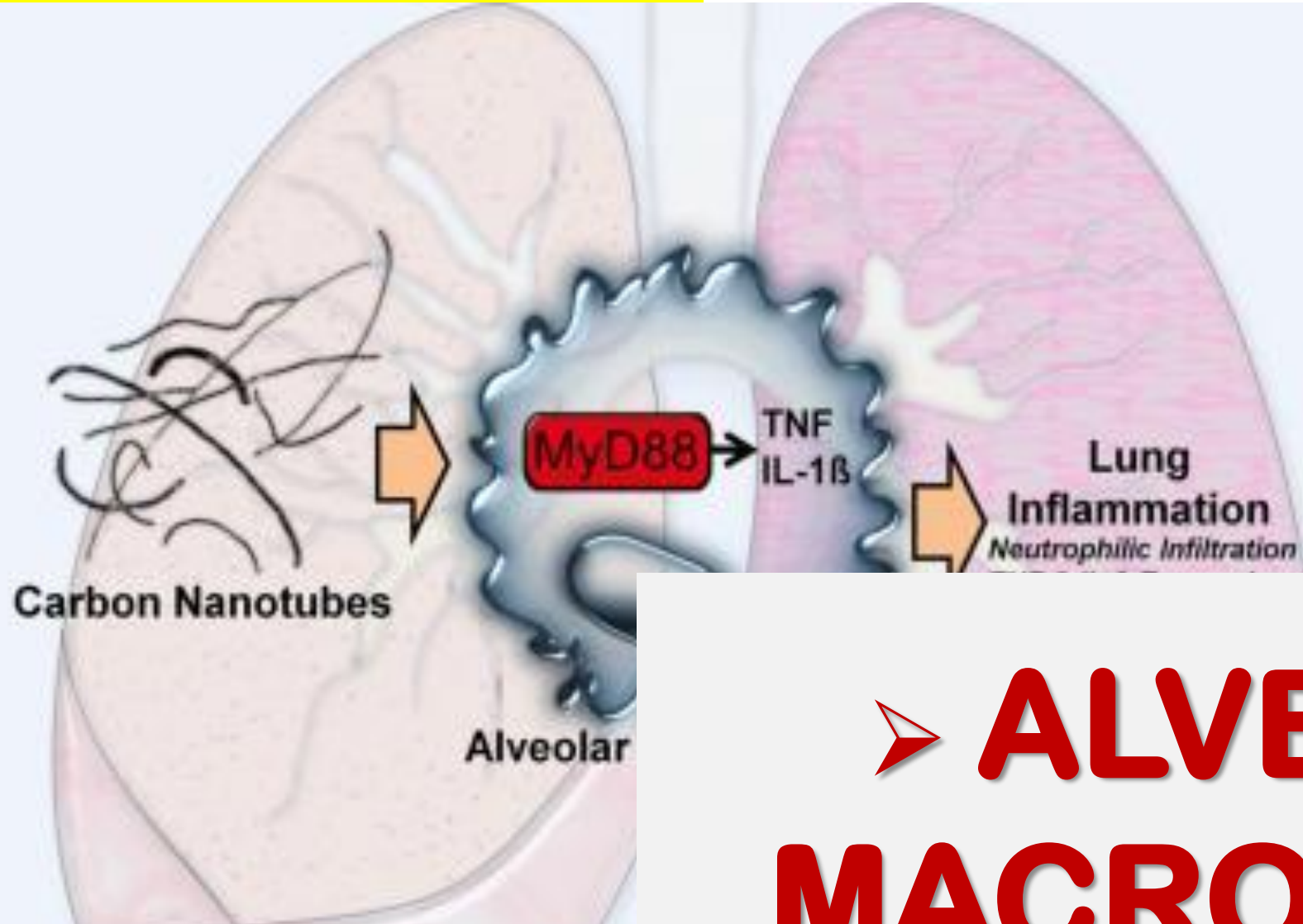
Basophil

B

Lymphocytes

T

# MACROPHAGES



## ➤ ALVEOLAR MACROPHAGES

<https://stacks.cdc.gov/view/cdc/36296>

# MACROPHAGES

## ➤ KUPFFER CELLS



# MACROPHAGES



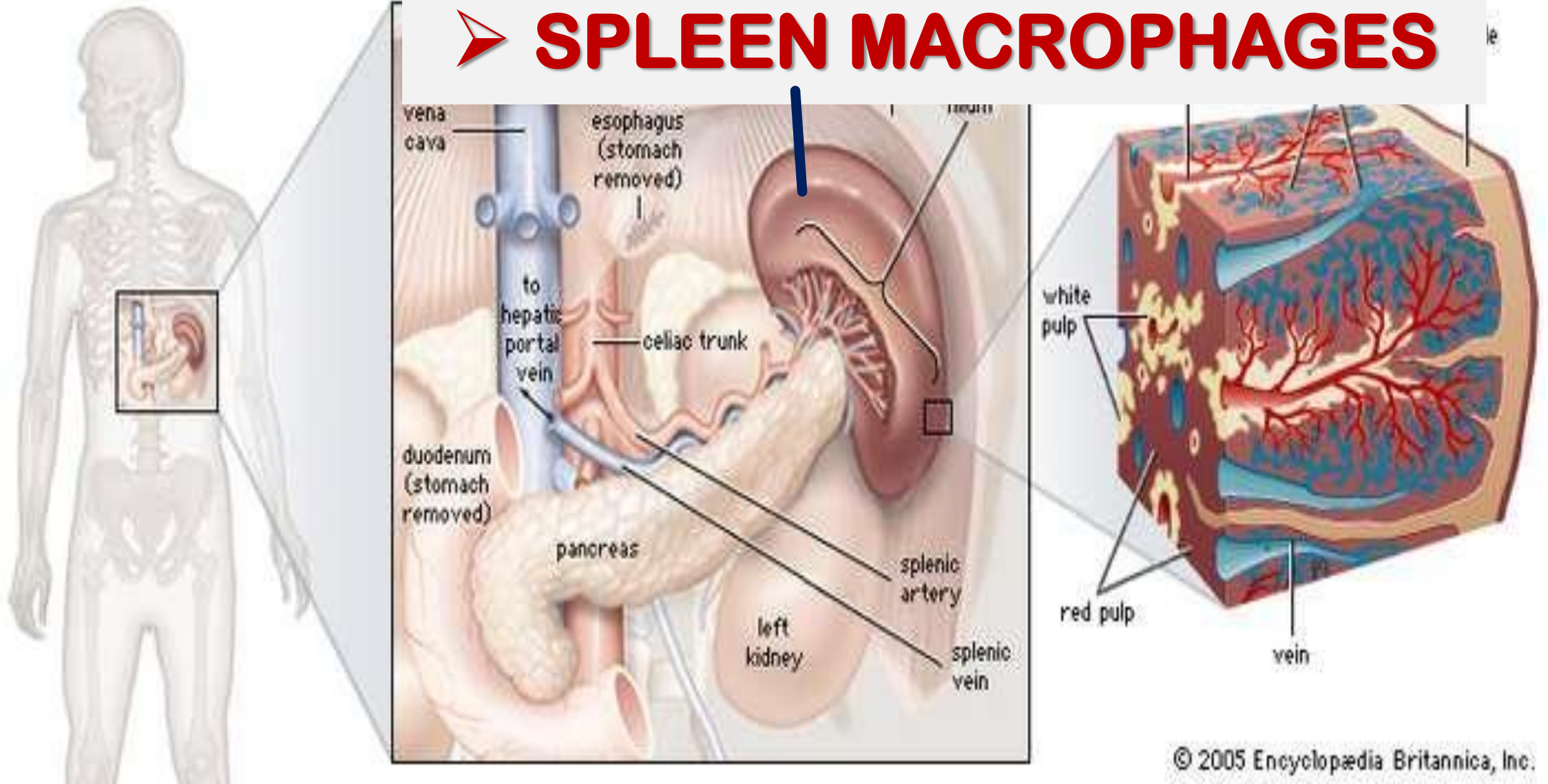
➤ **MICROGLIAL  
CELLS**

<https://www.eurotimes.org/glaucoma-research-neurophysiology/>



# MACROPHAGES

## ➤ SPLEEN MACROPHAGES



# INFLAMMATION

Trauma/Bacteria-Virus exposure



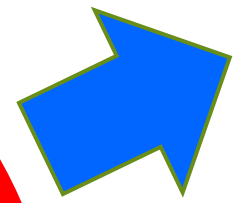
First Line Defense



Second Line Defense



Third Line Defense



**CHEMICAL MEDIATORS**  
(Histamine, Il-1, TNF)



**ACUTE**  
**INFLAMMATION**

**1. VASCULAR Event**  
**(Redness, Swelling, Heat, Pain, Loss of Function)**

**2. Cellular event**



# TISSUE DAMAGE - CELLULAR EVENT

1

ENDOTHELIUM

2

**MARGINATION**  
**ADHESION (*Integrins on Neutrophils*)**

3

**DIAPEDEDESIS**

5

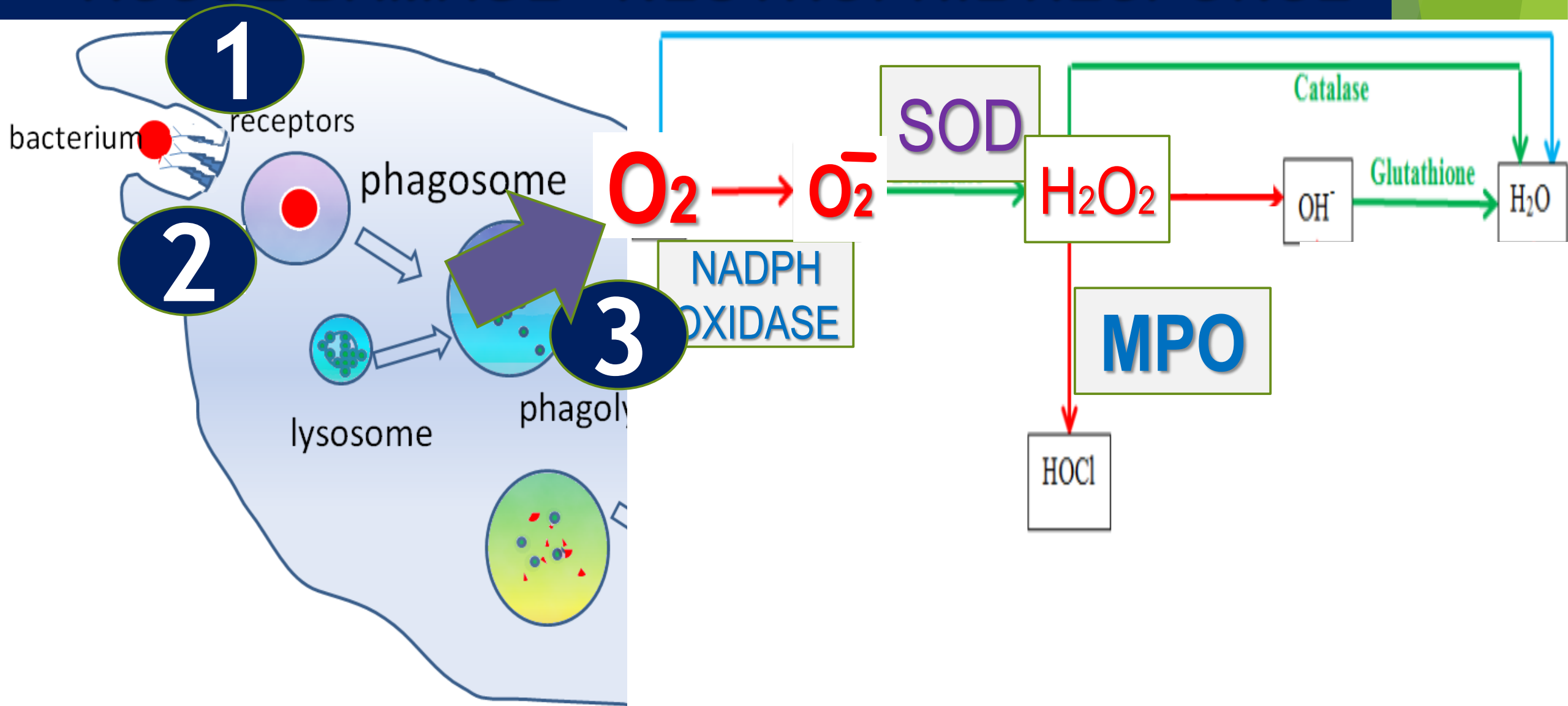
**PHAGOCYTOSIS**  
**(*Phagocytes*)**

4

**MIGRATION**



# TISSUE DAMAGE - NEUTROPHIL RESPONSE



# Phagocytosis

➤ **Factors Stimulating Production of neutrophils(neutrophilia) and monocytes ( TNF, IL-1, G-CSF, M-CSF)**

➤ **What is Pus?**

# Leukocytes

➤ **Leukopenia**

➤ **Leukemia**

(myelogenous , Lymphocytic)

; prone for developing

**anemia, infections, Bleeding**