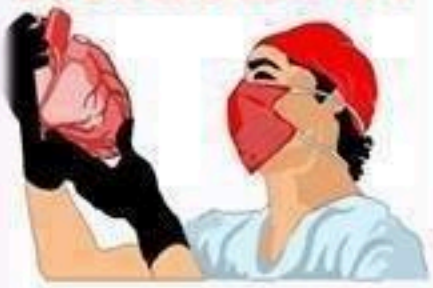
PATHOLOGY



Medical Committee
The University of Jordan

SHEET

SlIDE

Slide : 7

Doctor: Heyam Awad

Designed by: Majida Al-Foqara'

INFLAMMATION LECTURE 3

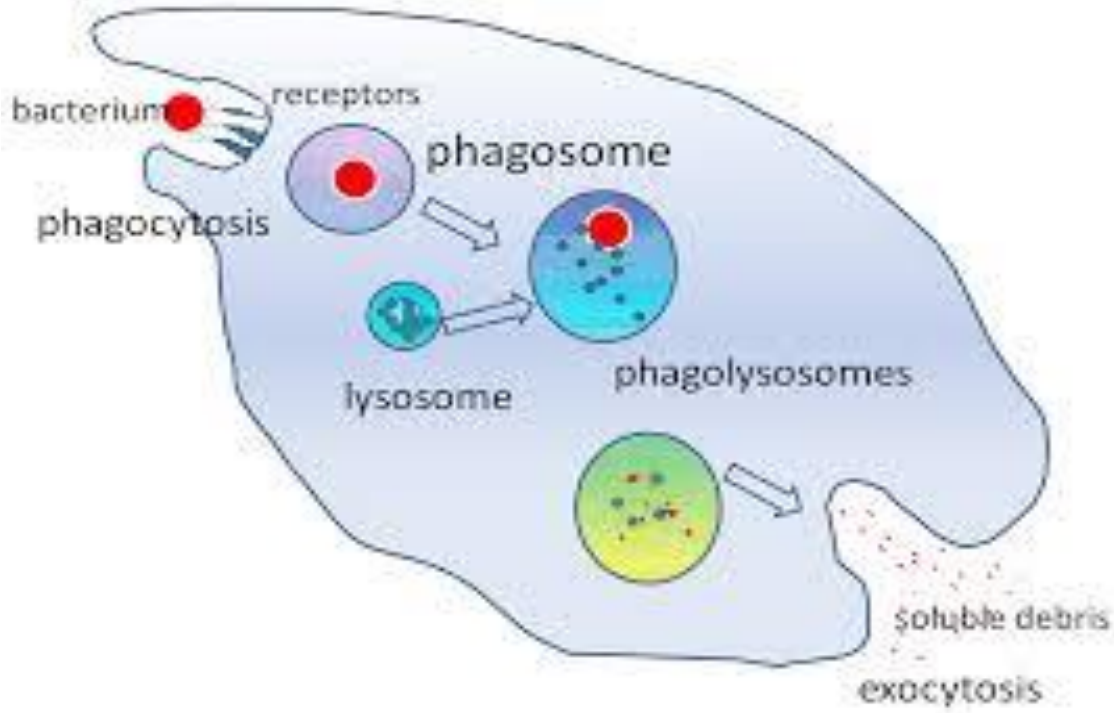
DR HEYAM AWAD, FRCPATH

INFLAMMATORY REACTION

- RECOGNITION.
- RECRUITMENT.
- REMOVAL OF THE AGENT.
- REGULATION.
- RESOLUTION/ REPAIR.

REMOVAL OF INSULT

- PHAGOCYTOSIS AND INTRACELLULAR KILLING.
- THREE STEPS : RECOGNITION AND ATTACHMENT, ENGULFMENT, KILLING OR DERGRADATION.


bacterium
receptors
phagosome
phagocytosis
lysosome
phagolysosomes
soluble debris
exocytosis

RECEPTORS FOR RECOGNITION

- MANNOSE RECEPTORS.
- RECOGNISE MANNOSE AND FUCOSE ON GLYCOPROTEINS AND GLYCOLIPIDS .

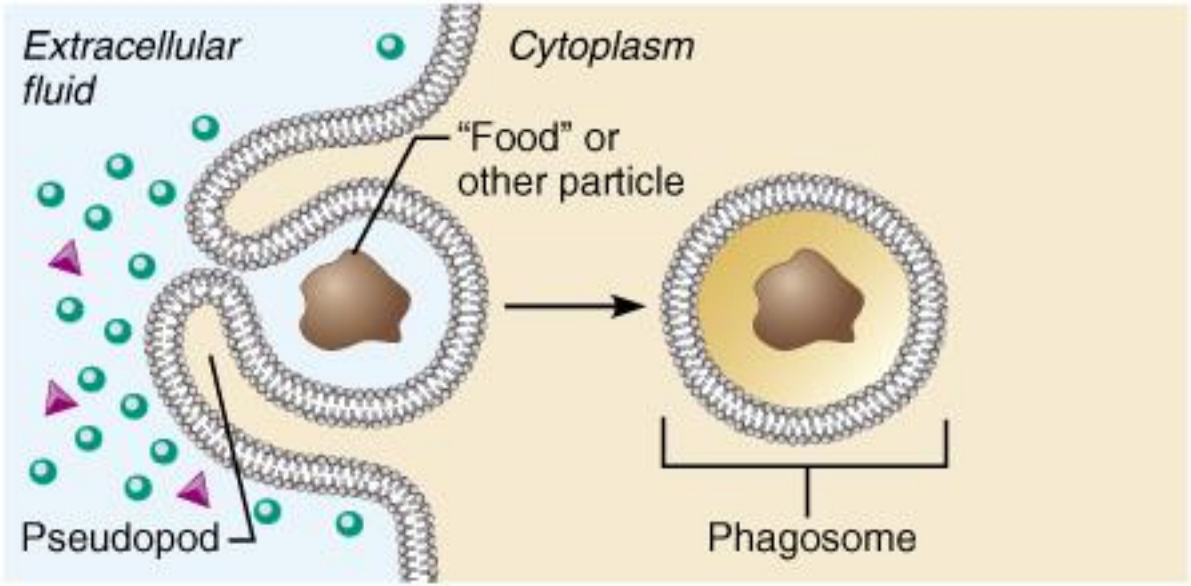
RECEPTORS

- SCAVENGER RECEPTOR.
- RECOGNISE MODIFIED LDL....OXIDISED OR ACETYLATED.

RECEPTORS

- RECEPTORS FOR OPSONINS.
- OPSONINS ARE PROTEINS THAT BIND MICROBES.
- OPSONINS: IgG, C3b, LECTINS.

ENGULFMENT



(a) Phagocytosis

INTRACELLULAR DESTRUCTION

- LYSOSOMAL ENZYMES.
- REACTIVE OXYGEN SPECIES.
- REACTIVE NITROGEN SPECIES.

NEUTROPHIL GRANULES

- 1. PRIMARY, LARGE, AZUROPHIL GRANULES.

  MYLOPEROXIDASE, BACTERIOCIDAL FACTORS, HYDROLASES.

2. SECONDARY, SMALL, SPECIFIC GRANULES.

  LYSOZYME, COLLAGENASE, GELATINASE, ALKALINE PHOSPHATASE, HISTAMINASE.

PROTEASES.

- ACID PROTEASES....DEGRADE ACIDIFIED DEBRIS .
- NEUTRAL PROTEASES... CAN DEGRADE COLLAGEN, ELASTIN, FIBRIN, CARTILAGE, BASEMENT MEMBRANE
- NEUTRAL PROTEASES CAN CAUSE TISSUE DESTRUCTION.

MACROPHAGES

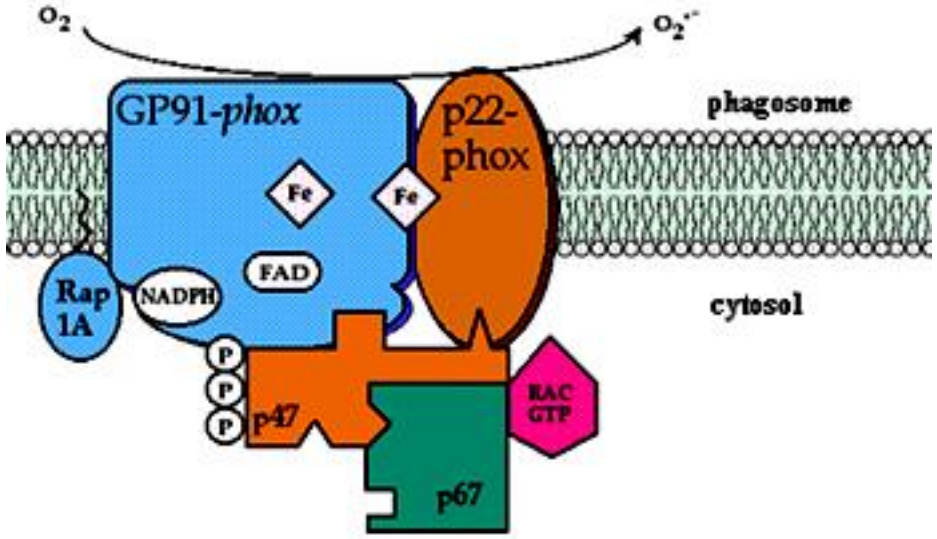
- CONTAIN: HYDROLASES, COLLAGENASE, ELASTASE, PHOSPHOLIPASE.

ANTIPROTEASES

- LYSOSOMAL PROTEASES ARE HARMFUL TO OUR TISSUE.
- CONTROLLED BY ANTIPROTEASES.
- ALPHA 1 ANTITRYPSIN INHIBITS NEUTROPHIL ELASTASE.

REACTIVE OXYGEN SPECIES

- OXIDASES CAN PRODUCE ROS, e.g: SUPEROXIDE ANION.
- OXIDASE CONSISTS OF 7 PROTEINS!!
- COMPONENTS IN PLASMA MEMBRANE AND CYTOPLASM.
- ROS PRODUCED IN PHAGOLYSOSOMES.



Subunits of the NADPH-oxidase complex

- SUPEROXIDE IS CONVERTED TO HYDROGEN PEROXIDE (H2O2)
- H2O2 CONVERTED BY MYELOPEROXIDASE TO HYPOCHLORITE (OCL2-)
- HYPOCHLORITE DESTROYS MICROBES BY HALOGENATION OR OXIDATION.

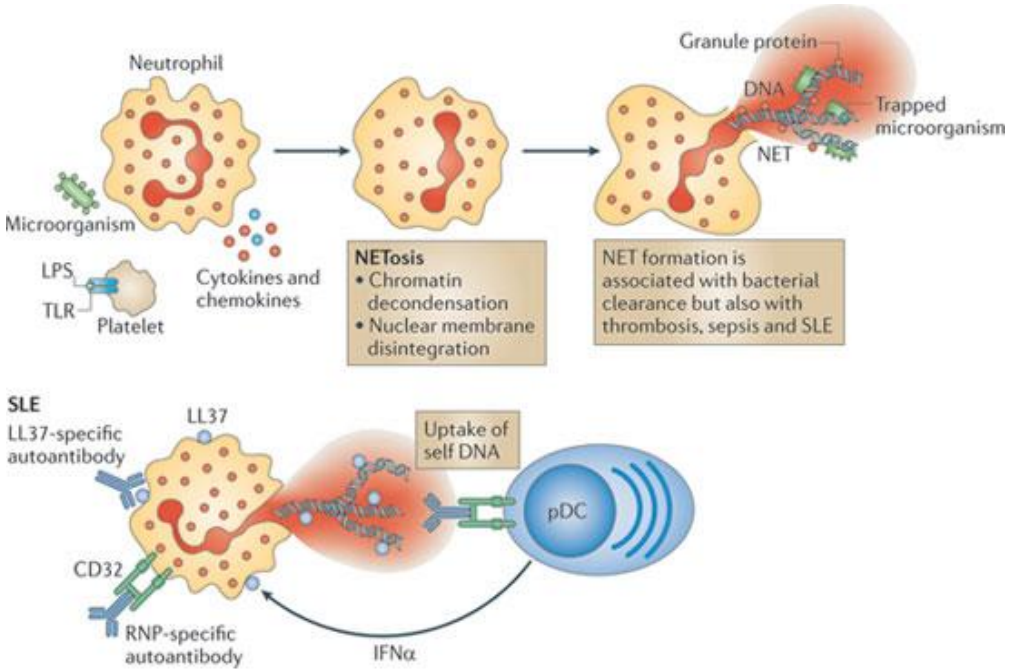
- SUPEROXIDE IS CONVERTED TO HYDROGEN PEROXIDE (H2O2)
- H2O2 CONVERTED BY MYELOPEROXIDASE TO HYPOCHLORITE (OCL2-)
- HYPOCHLORITE DESTROYS MICROBES BY HALOGENATION OR OXIDATION.

NITROGEN RADICALS

- NITRIC OXIDE (NO) PRODUCED BY NITRIC OXIDE SYNTHASE (NOS)
- NOS...eNOS, nNOS,iNOS.
- NO RECTS WITH SUPEROXIDE TO FORM PEROXINITRITE(ONOO-)

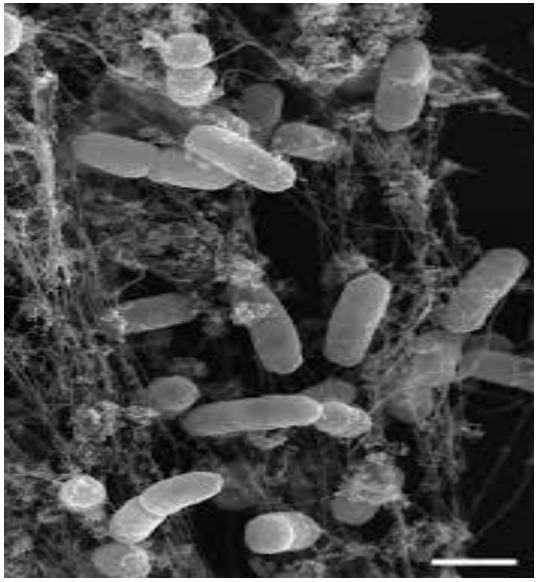
NET

- NET= NEUTROPHIL EXTRACELLULAR TRAPS.
- FIBRILLAR NETWORKS WITH A HIGH CONCENTRATION OF ANTIMICROBIAL SUBSTANCES.
- PRODUCED BY NEUTROPHILS IN RESPONSE TO INFECTIONS AND INFLAMMATORY MEDIATORS.



Nature Reviews | Immunology

NETs



REGULATION

- LEUKOCYTES .....SHORT HALF LIVES IN TISSUE AND DIE BY APOPTOSIS WITHIN HOURS AFTER LEAVING BLOOD.

REGULATION

- MEDIATORS...PRODUCED ONLY WHEN STIMULUS PERSISTS, SHORT HALF LIFE, DEGRADED AFTER RELEASE.

REGULATION

- STOP SIGNALS RELEASED:
- SWITCH OF ARACHIDONIC ACID METABOLITESFROM LEUKOTRIENS TO LIPOXINS.
- ANTI-INFLAMMATORY CYTOCHINES:TGF-B, IL10

REGULATION

- NEURAL IMPULSES THAT PREVENT NETs FORMATION.

RESOLUTION AND REPAIR

- VASCULAR CHANGES DURING INFLAMMATION.

VASODILATION

- *MEDIATORS...HISTAMINE.
- *ARTERIOLS ARE THE FIRST TO BE AFFECTED.
- *OPINING OF NEW CAPILLARY BEDS.
- *CAUSES INCREASED BLOOD FLOW.
- *HOTNESS AND REDNESS.

INCREASED PERMEABILITY

- *IN POSTCAPILLARY VENULES.
- *CAUSES ESCAPE OF PROTEIN RICH FLUID TO EXTRACELLULAR SPACE...EXUDATION.

EXUDATE VERSUS TRANSUDATE

- EXUDATE....INCREASED PERMEABILITY.

  RICH IN PROTEIN

  CELL DEBRIS

  HIGH SPECIFIC GRAVITY

EXUDATE VS TRANSUDATE

- TRANSUDATE....ULTRAFILTRATION OF PLASMA

  DUE TO INCREASED OSMOTIC OR HYDROSTATIC PRESSURE.

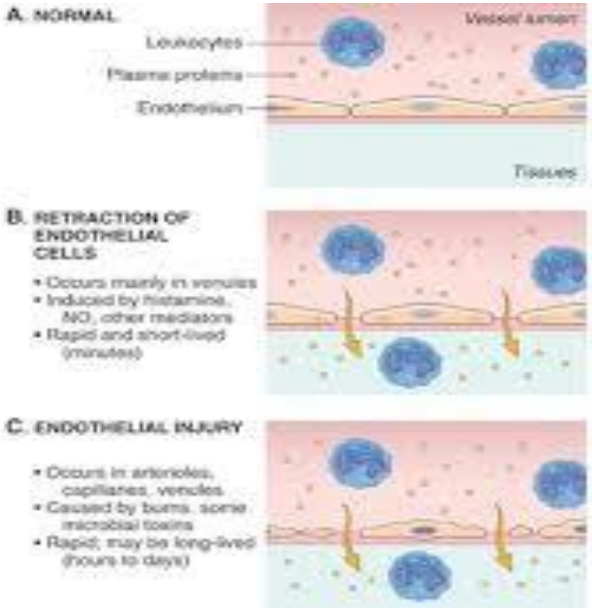
*LOW PROTEIN, NO CELL DEBRIS, LOW SPECIFIC GRAVITY.

- EDEMA CAN BE AN EXUDATE OR A TRANSUDATE.

VASCULAR CHANGES

- THE VASODILATION AND INCREASED PERMEABILITY CAUSE INCREASED VISCOSITY AND STASIS.
- STASIS HELPS RECRUITMENT!!!!

INCREASED PERMEABILITY



- LYMPHATIC VESSELS ARE ALSO INVOLVED IN INFLAMMATION.
- LYMPHANGITIS AND LYMPHADENITIS CAN OCCUR.