Immunity (1)

Immunity → (14 chapters)

1 Normal immunity Ch. (1) → ch. (10)

Rest of ch. 1 مؤجل

2 أمراض المناعه Ch. (11) → ch. (14)

- Overview — Ch. (1)
- Innate imm. — Ch. (2)
- Acquired imm.
  - Humoral imm. (B-cells and Abs) — Ch. (6) + Complement Ch. (7)
  - Cell mediated imm. (T_H, T_c) — Ch. (4) + Cytokines Ch. (5)
- Antigen — Ch. (3)
- Acquiring imm. — Ch. (8)
- Imm. to microbes — Ch. (9)
- Imm. to tumors — Ch. (10)
- أمراض زيادة المناعه
  - Hypersensitivity — Ch. (11)
  - Transplantation and Graft rejection — Ch. (12)
  - Autoimm. Dis. — Ch. (13)
- أمراض نقص المناعه — Immunodeficiency — Ch. (14)

Chapter 1: Overview of Immune System

Innate imm. الجلد وما شابه	Acquired (Adaptive) imm. مروة ← الحصبة ← مناعة ضد الحصبة
• Present since birth	• acquired during life time of the person
• 1st line of Defense → immediately available after infection	• 2nd line of Defense → Delay for few days until it acts
• Non-specific → in all individual # all M.Os	• Specific → in specific individual # specific M.O. (مروة / الحصبة)
• Less efficient in eliminating M.Os	• Very effective
• Doesn't require previous exposure to M.O.	• Require previous exposure to M.O.
• Doesn't increase with repeated exposure to the same M.O. (NO memory cells)	• Increase with repeated exposure to M.O. (Memory cells) → life long protection # the same pathogen
• **Depends on:- 1)** Granulocytes → Neutrophils, Eosinophils, basophils **2)** Monocytes/Macrophages **3)** N.K cells	• **Depends on:- 1)** B-lymphocytes. **2)** T-lymphocytes

Chapter 2: Innate imm.

1 Mechanical Barriers and Surface Secretions

1 Skin
- Intact skin → barrier
- Sweat and Sebaceous secretions → inhibit M.O.

2 Eye
- Blinking reflex
- Tears → lysozyme, Flushing

3 R.T.
- Intact m.m. → barrier
- Mucous → sticky → Trap M.O., lysozyme
- Cilia → Sweep out M.O.
- Sneezing and coughing → expel foreign particles.

4 GIT
- Saliva → Flushing, lysozyme
- GIT secretions
- Gastric acidity →-- M.O.

5 Genito-urinary tracts
- Urine → Flushing, Acidic
- Vagina → Acidic
- Secretions of GUT → lysozyme

2 Normal flora
- Compete with pathogens for nutrients and space.
- Produce bacteriocins and acids → Destroy M.O.
  - Suppression of NF by ABs → inf. with pathogens (Super-infection)

2 Soluble Defence factors

- Microbicidal Substances → present in body fluids

Lysozyme
- In different body Secretions
- -- P.G. of cell wall of bact.

Complement XXXXXX

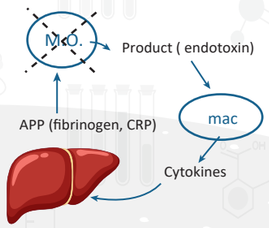
C1 → C9

Inactive (c3) ?? (M.O. ??) Active (C3a, C3b)

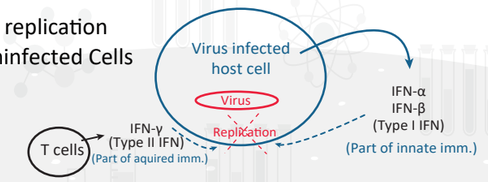
Acute phase ptns
- Normally, very low conc. in serum
- After inf. → ++ conc. in serum

3 Cellular Defence factors

في الصفحة القادمة

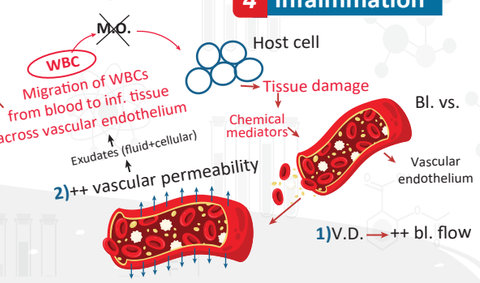


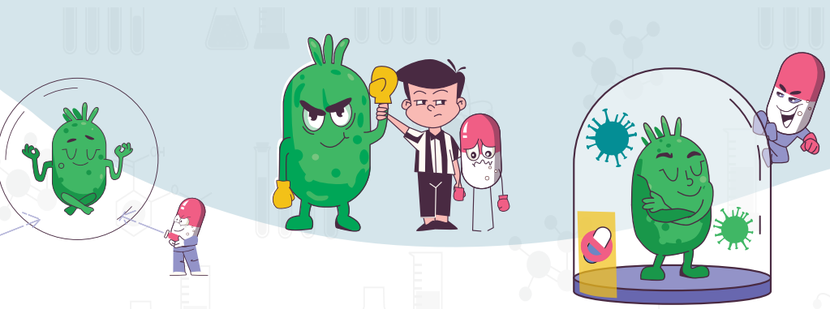
IFN
- Interfere with viral replication in neighbouring uninfected Cells



This migration is mediated by adhesion molecules on Surface of WBCs and vascular endothelium

4 Infalmmation

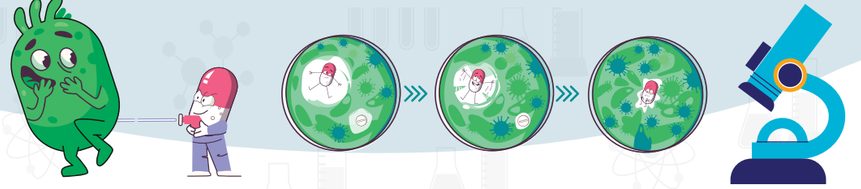




There is cooperation between innate and aquired imm.

1- Innate imm. helps acquired imm. → as in Ag presentation

2- Acquired imm helps innate imm. → as in opsonization



4 Cellular Defence factors

1-Phagocytes

Phagocytic cells

- Neutrophils=microphages = PMNLs=polymorphs
- Monocytes (in blood) → macrophages (in tissues)
- Dendritic cells

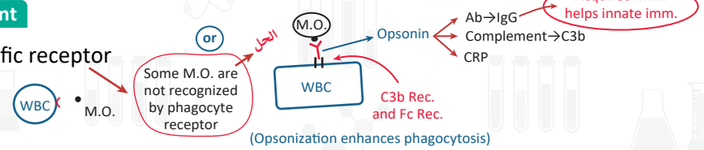
Steps of phagocytosis

1 Migration=chemotaxis:

- Movement of WBCs towards M.O. in response to chemotactic factors → from M.O. / from damaged tissue
  - E.g. 1) Some cytokines 2) Complement

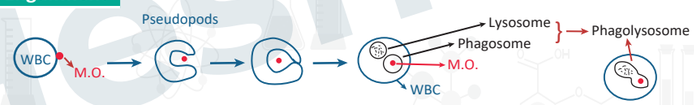
2 Attachment

- By non-specific receptor



(Opsonization enhances phagocytosis)

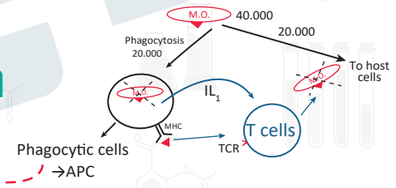
3 Engulfment



4 Killing

- O_2 dependent Killing: → by $H_2O_2^-$, O_2^-, OH^- → (FR) → lethal to bact.
- O_2 independent Killing: → by lysosomal enz. (lysozyme, elastase,.....)

5 Ag presentation



6 Other functims of monocytes and macrophages

1- Ag presentation

2- Secretion of cytokines (Interleukins) e.g. IL1

3- Direct cytotoxicity→Direct killing without engulfment

- **Helminthic parasites**
- **Tumor cells**

(Too large to be engulfed) → killed by releasing macrophage toxic contents onto them

2-Eosinophils

- **Granulocytes** present mainly in Tissues
- In blood → 1:3% of TLC

1- Defence # helminthic Parasites (too large to be phagocytosed → Direct cytotoxicity

2- Role in allergy (histaminase enz.)

3- Phagocytic

3-Basophils & mast cells

- **Granulocytes:**
  - 1- Basophils in blood 0-2% of TLC
  - 2- Mast cells → Present either around bl. vs. or in submucosa of bl. vs.

Functions

- Their granules Contain imp. mediators (as histamine)
  - 1- ++ inflammation
  - 2- Role in allergy

4-NK cells

- Large granular lymphocytes (non-B, non-T cell)
- 10-15% of blood Lymphocytes

Functions

1- Non Specific killing of tumor cells. and virus infected Cells (as T_c Cells → They differ in the way they recognize their targets)

	Neutrophils	Monocytes / Macrophages
Content	• 60 : 80 % TLC	• 1 : 5 % TLC
Presence	• Absent from normal tissues → with inf., they migrate to site of inf. in response to chemotactic factors	• Continuously leave blood to tissues → mature into mac. • **e.g. 1-** Kupffer cells of liver **2-** Alveolar mac. in lung
Size	• Smaller	• Larger
Life span	• Shorter → die after phagocytosis → form pus cells	• longer → survive after phagocytosis
Response during inflammation	• Rapid ++ in production • Rapidly form pus	• Slight ++ in bl. vs. • Slowly form granuloma
Importance	• Most numerous and most imp. cells of innate imm. → phagocytosis	• Phagocytosis • Ag presentation • Cytokines secretion • Direct cytotoxicity

Immunity (2)