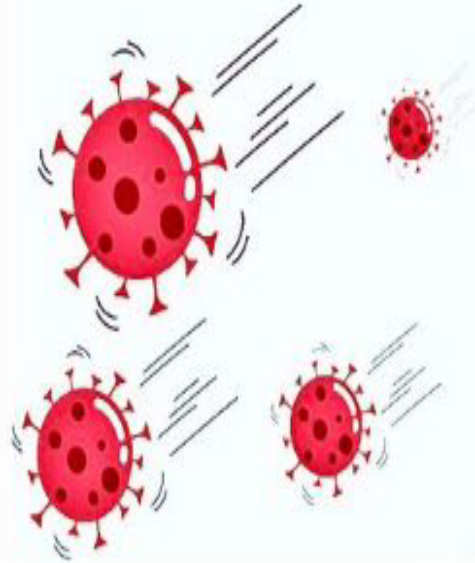




IMMUNOLOGY

-hayat batch-



SUBJECT : Immunology

LEC NO. : 2

DONE BY : Hala Shmari

وَقُلْ رَبِّ زِدْنِي عِلْمًا



مشهور بالبسترة لكي يتحقم الحليب من المايكروبات

- In 1880: Pasteur discover Anti-cholera **live-attenuated** vaccine. He noticed that old cultures in his lab did not kill chicken after inoculation and that chicken become immune to cholera. He applies the same principle for **anthrax** and **rabies** vaccine

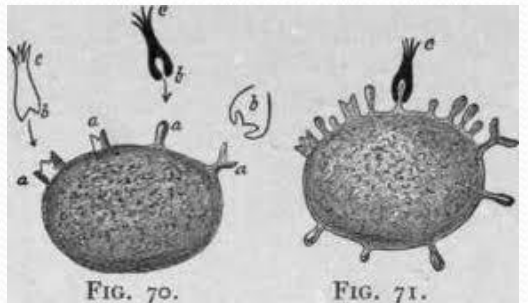
جعل لمدة ورح تصحف البكتريا ويجذب حياها بالدجاج وشفاف انها تعيين كحم يوم وصارت immunized ضد ال cholera



بداية الحضرة الماتية :-

- In 1890: Von Behring and Kitasato discover diphtheriae antitoxin. They notice that serum from animals previously immunized to diphtheria could transfer the immune state to unimmunized animals
- 1883 **Ellie Metchnikoff** that cells like phagocytes contribute to the immune state of animals

أول واحد عمل رسمته قريبة لشكل ال phagocytes



- In 1890: Von Behring and Kitasato discover diphtheriae antitoxin. They notice that serum from animals previously immunized to diphtheria could transfer the immune state to unimmunized animals



هدول الحالين ما جا بوا ال **Agent** نفسه هم أخذوا ال Serum تابع السخن المصاب ونقلوه لسخن

ليس صلح هم بجونا نقلوا ال Antibodies جاهزة وسادوا هاد السخن بحسب مناعة ولكن هاتو المناعة

بكون مناعة مؤقتة

سؤال: كيف إيش الأحسن أنه اعطيه ال **active disease** ولا ال **Immune response** جاهزة؟
 فإبرد سد مقول او مهنق

جواب: الأحسن انو اعطيه ال **(active disease)** عشان يعيد ال memory cells نفس مبدأ ال vaccine

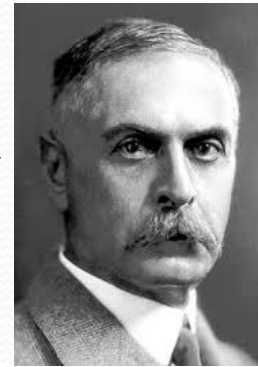
لكن لو اعطيت السخن ال **(Immune response)** عالبارد المستريح أول إيش الجسم ما راح يعيد ال Memory cells

تاني إيش هدول Antibodies مؤقتين ما راح تفضل بالجسم بشكل دائم ما كسبيام تفضل للأشهر

Blood Grouping and Immunology

- Experiments with blood transfusions have been carried out for hundreds of years with out any success.

- In 1901, Karl Landsteiner discovered human blood groups, and blood transfusions became safer.

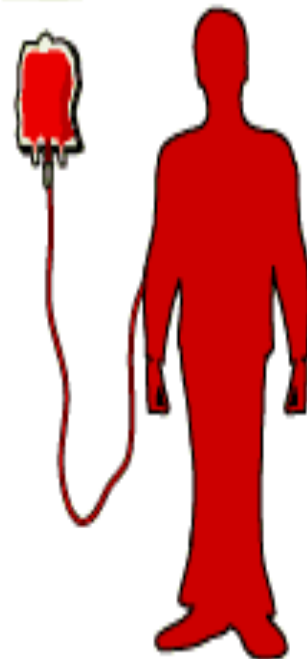


- He found that mixing blood from two individuals can lead to blood clumping. The clumped RBCs can crack and cause toxic reactions. This can be fatal.

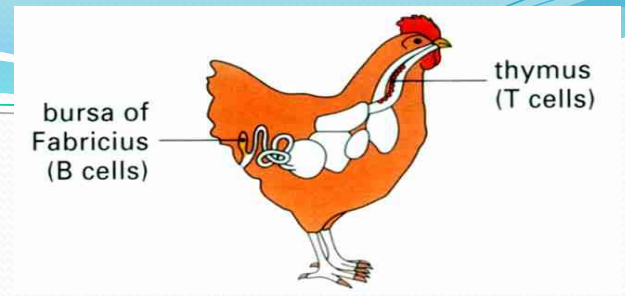
- Karl Landsteiner work on blood grouping has discover the fundamental principles of

Immunology The First person who discover the ABO Blood grouping

(Antibody Antigene reaction) لأنه أول من اكتشف



In human : thymus → T cells → cytokines - - - -
 Bone marrow → B cells → AB



Modern Immunology

1. Study on immune system

- In 1957, Glick Fabricius and Xianguang Zhang: Chicken without bursa can not produce Ab by B cells
- In 1961, Good and Miller: cell mediated immune of new born mice whose thymus were taken away are defective of T cells

special organ in chicken produce B cells.

2. Study on monoclonal antibody In 1975, Kohler and Milstein

☆ *treatment + diagnosis* إلى استخدامات متعددة بال

☆ ELISA : Enzyme-Linked Immunosorbent Assay

AB
 Monoclonal Antibody Formation

☆ لوبيدي ادورج (Antigene) بالجسم لستو بنتاج ؟
 كمين كانوا زمانه يبييجا AB عيبوا حيوان غالباً Camels or horse كمينو لانهم كايرو مطبوخة كمينو ويختوا مع ال Antigene يستوا عيه اسبون نكارت ومدين بنتوه ويهدوا ال serum وينتوا ال AB وينتوا به



3. Study on immune genetics In 1978, genetic control of antibody diversity

4. Study on molecular mechanism of T/B lymphocyte activation and signal transduction

رجحكي عنها معايزة كاملة

5. Study on effective mechanisms of immune cells

6. Clinical and transplantation Immunology

لمرمة تستخدمها الخلايا لقتل المايكروبون

TABLE 1-2

Nobel prizes for immunologic research

Year	Recipient	Country	Research
1901	Emil von Behring	Germany	Serum antitoxins
1905	Robert Koch	Germany	Cellular immunity to tuberculosis
1908	Elie Metchnikoff Paul Ehrlich	Russia Germany	Role of phagocytosis (Metchnikoff) and antitoxins (Ehrlich) in immunity
1913	Charles Richet	France	Anaphylaxis
1919	Jules Bordet	Belgium	Complement-mediated bacteriolysis
1930	Karl Landsteiner	United States	Discovery of human blood groups
1951	Max Theiler	South Africa	Development of yellow fever vaccine
1957	Daniel Bovet	Switzerland	Antihistamines
1960	F. Macfarlane Burnet Peter Medawar	Australia Great Britain	Discovery of acquired immunological tolerance
1972	Rodney R. Porter Gerald M. Edelman	Great Britain United States	Chemical structure of antibodies
1977	Rosalyn R. Yalow	United States	Development of radioimmunoassay
1980	George Snell Jean Dausset Baruj Benacerraf	United States France United States	Major histocompatibility complex
1984	Cesar Milstein Georges E. Köhler Niels K. Jerne	Great Britain Germany Denmark	Monoclonal antibodies Immune regulatory theories
1987	Susumu Tonegawa	Japan	Gene rearrangement in antibody production
1991	E. Donnall Thomas Joseph Murray	United States United States	Transplantation immunology
1996	Peter C. Doherty Rolf M. Zinkernagel	Australia Switzerland	Role of major histocompatibility complex in antigen recognition by T cells
2002	Sydney Brenner H. Robert Horvitz J. E. Sulston	S. Africa United States Great Britain	Genetic regulation of organ development and cell death (apoptosis)

Table 1-2

Kuby IMMUNOLOGY, Sixth Edition

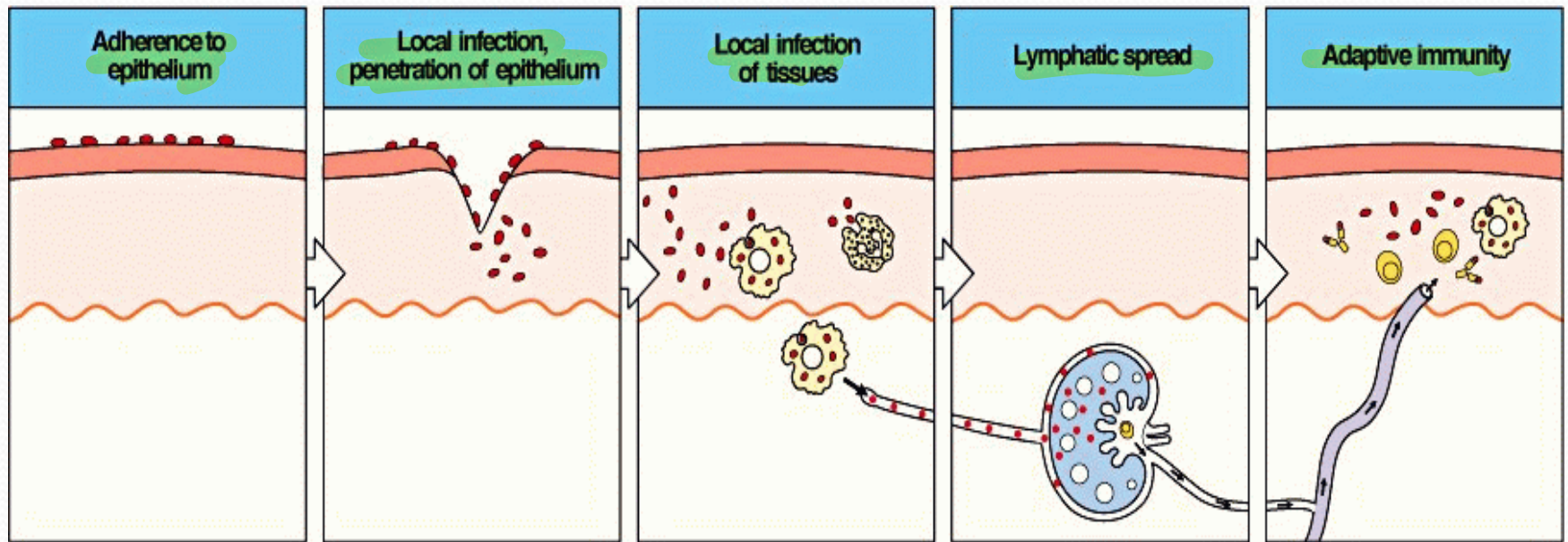
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☆ بالبداية كان علم الـ Immunology ملحق بالـ Microbiology
في عام 1971 صار علم مستقل كالهـ .

- Immunology act as an independent subject: (In 1971, International Conference of Immunology, in USA)

Immune system :- - skin → Mechanical barrier .
- Mucus membrane → GI / RS
- T cells - B cells. - Acidity in stomach

Stages of Response to Infection



Protection against infection

Normal flora
Local chemical factors
Phagocytes
(especially in lung)

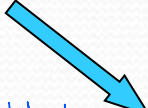
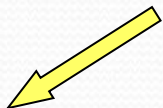
Wound healing
Antibacterial proteins
and peptides
Phagocytes
 $\gamma\delta$ T cells?

Complement
(alternative pathway)
Phagocytes, cytokines
NK cells, activation
of macrophages

Phagocytes
Antigen trapping
NK cells

Specific antibody
T-cell dependent
macrophage activation
Cytotoxic T cells

Immune system



Innate (non-specific) immunity

- ① • Anatomic barriers (Skin, mucous membranes)
 - ①
 - ②
- ② • Physiological barriers (temperature, pH)
 - ①
 - ②

← شدة في المعدة للميكروب
Acidity in stomach
- ③ • Phagocytic Barriers (cells that eat invaders)
 - ①
 - ②
 - ③

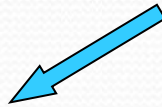
phagocytes in general → non specific → (AB - AG) reaction
تغير (Adaptive (specific))
- ④ • Inflammatory barriers (redness, swelling, heat and pain)
 - ①
 - ②
 - ③
 - ④

نتيجة النسبة للبرص الا ايضا immune response
- ⑤ Gut flora → innate immunity.

← لخصه اسمها لاننا نتعلم كل ما يحترق بالسن تكسب زيادة

Adaptive (specific) immunity

- Antigen specificity → specific to certain pathogen.
- Diversity
- Immunological memory
 - Memory cells → نزيها حتى تتكرر
 - تكون بعد دخول الـ Antigenه اذ مرة ولكن
 - انما دخل هاد الـ Antigenه مرة ثانية للجهاز الثاني يعاينه ويقلبه متباين
- Self/nonself recognition
 - يصير بين الـ self + non-self Antigens ويجاهد المنز



Humoral → B cells

Cellular → T cells

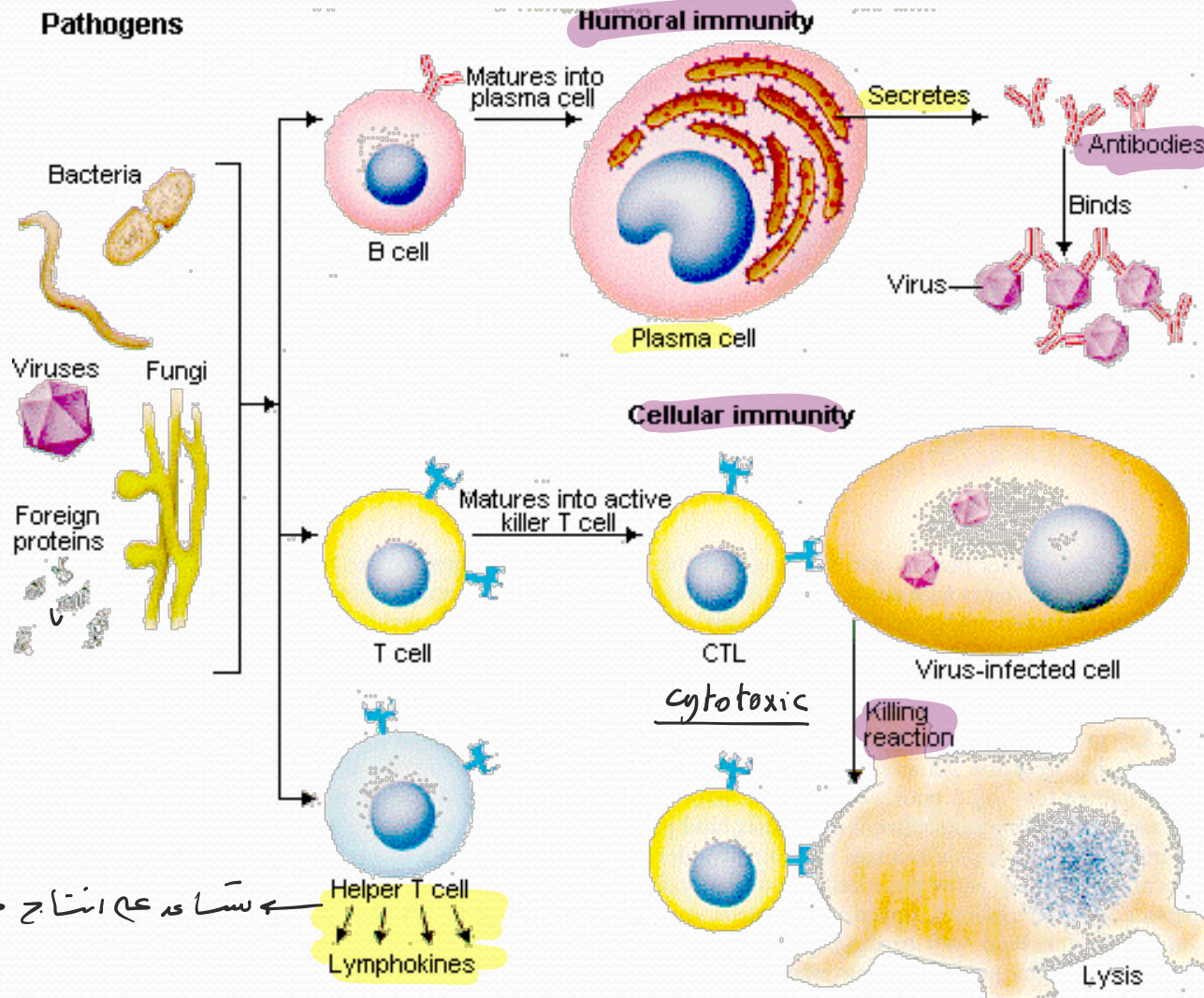
The Antibody binds to the Antigen
← ويجعل المناعة الى
ويجرب من يتغير الـ phagocytes
وتقبل الـ AGs

الـ Antigenه يرتبط مع الـ Antibody
بين سوال الـ AB لكي تقبل الـ AG
بتسعي الـ phagocytes صرايح لكي تقبل
هناك الـ phagocytes يتشغل في الـ innate والـ Adaptive
الـ Adaptive يتسببها (AB AG reaction) لما الـ innate لا يتسبها.

كها في العملية اسمها (Humoral response Antibody dependent)

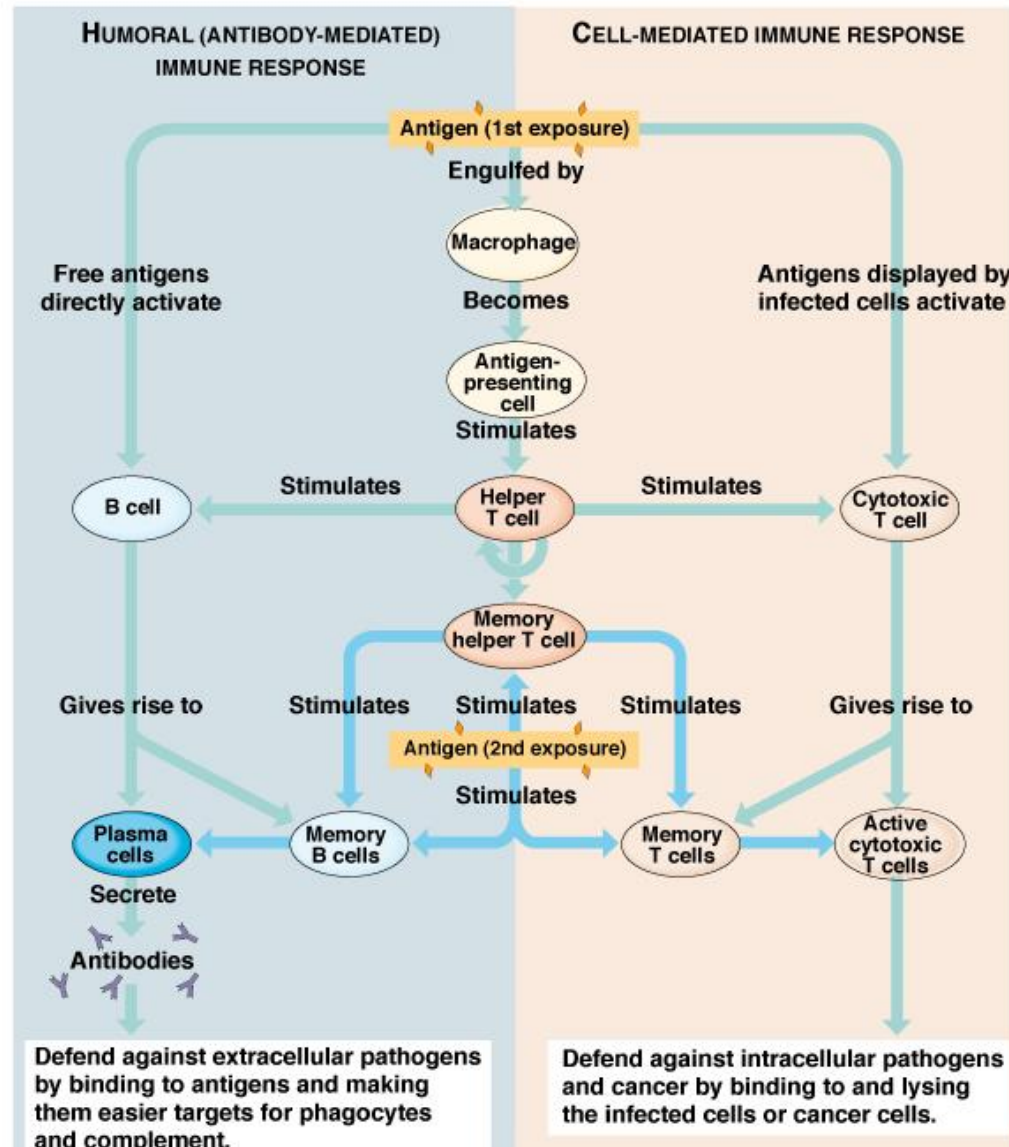
systemic Fungal infection → Immune deficiency.

Humoral and Cellular Immunity



سے اس سے ان تاج خلاصہ حاصل ہے؛

Overview of Immune Response



Innate Versus Adaptive Immunity

	Innate	Adaptive
Response time	Hours	Days
Specificity	Limited and fixed	Highly diverse, improves during the course of immune response
Response to repeat infection	Identical to primary response	Much more rapid than primary response ↳ ☆ prevent the Secondary infection by the Memory cells.

Innate (non-specific) immunity

Adaptive (specific) immunity

☆ Less effective → أضعف

☆ More effective → أقوى
because the presence of Memory cells.

☆ ثابتة عند الكل يعني الجلد موجود
عند الكل ال Gut flora يرضو
موجوده عند الكل .

☆ هكنا نحل Auto immune disease

☆ تختلف بين فرد إلى آخر حسب ال Genetics
وبرهño بأثر شو مرعا الجسم فايرومات وبكتيريا

☆ أسرع

☆ أبطأ

☆ دائماً نسبق ال Adaptive immunity

حتى لو كان عندها Memory cells

☆ ما عندها (Memory)

☆ عندها (Memory)

Immunology- The Balance

Immune System must work in Balance

Hyporeactive
Immunodeficiency

Hyperreactive
Immunopathology

Health

- 1) Neutrophil Disorders
- 2) Antibody Deficiency
- 3) Complement Deficiency
- 4) T & B Cells Dysfunction

- 1) Systemic Autoimmunity
- 2) Organ-Specific Autoimmunity
- 3) Allergies and
- 4) Asthma

Example on Systemic Autoimmunity :- (SLE) Systemic Lupus Erythematosus

↳ Anti DNA → عشان يكون يهزب الجسم كله

Example on Organ Autoimmunity :- (MS) Multiple sclerosis.