

MIRACLE Academy

قال تعالى (يَزِفَعُ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ)

تفريغ المناة
زميلتكم يقين خليل

- اللهم لا سهل الا ما جعلته
سهل وانك تجعل العزن
اذا شئت سهل ...
- بسم الله



لجان الدفعات

* المحاضرة مهمة وليي مكتوب عنده م لها يكون جاي منه في الامتحان .

Cytokines (CKs)

Objectives

- Definition and general properties of cytokines
- Classification of cytokines
- Cytokine receptor
- Biological functions of cytokines
- Cytokine and disease

Definition →

لهم عبارة عن مجموعة من البروتينات المسؤولة عن
Activation + regulation للجهاز المناعي
لغة التخاطب بين الخلايا

- A group of **low molecular weight polypeptides** or **proteins** which are **secreted by activated immunocytes** or **some matrix cells** and **possess high activity** and various functions.
↳ Tumor microenvironment تحدياً في
- Cytokine or immunocytokine is a generic name used to describe a **diverse group of soluble proteins** and **peptides** which act as **humoral regulators** at **nano- to- picomolar concentrations**
تراكيها قليلة لكن مهمتها كثيرة
- Their major functions are to **mediate** and **regulate immune response** and **inflammatory reactions**.

السلامة من أمراض وراثية يجب منحه استشارة الكليد .

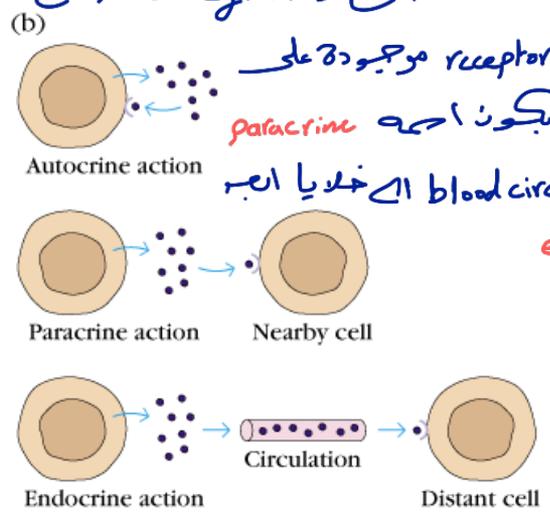
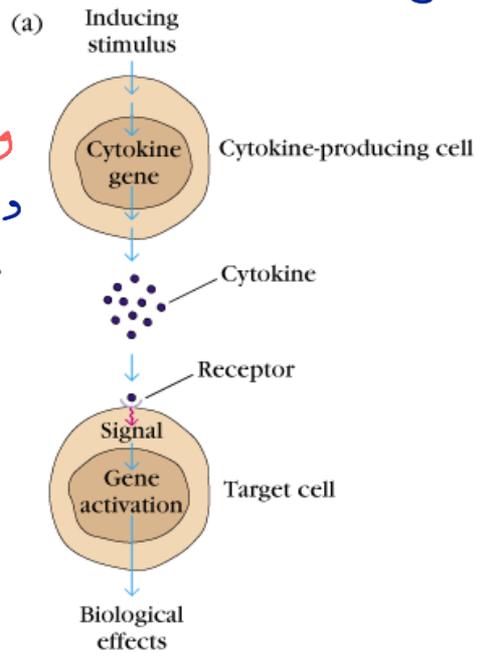
General Properties

- Most cytokines are **low molecular weight polypeptides or glycoprotein** (8~80 KD), and most of them are **monomer**
- Natural cytokines are **secreted by activated cells** such as activated **immune cells**, **matrix cells** and **tumor cells**
- One kind of cytokines can be produced by different cells. One kind of cells can secrete different cytokines
- Cytokines initiate their actions by **binding to specific membrane receptors** on target cells.
- Cytokines can **act on the cells that produce them (autocrine)**, **on other cells in the immediate vicinity (paracrine)**, or on **cells at a distance (endocrine)** after being carried in blood or tissue fluids.

السلامة

الخلية لما يصير لها stimulation تبص cytokines اذا، جمع اشتغل على نفس الخلية يلي صنعته يكون اسمه *autocrine*

الرسالة من الخلية و مطلوبه دلي تو منح للنقطه الا خيرة .



اذا راع اشتغل على receptors موجودة على خلية قريبه منها يكون اسمه *paracrine* اذا انتقل من خلية blood circulation الى خلية اوبه يكون اسمه *endocrine*

Cytokine Names

بيحث الاسم على مصدر ، cytokine

- **Interleukins** - produced exclusively by **leukocytes**
- **Lymphokines** - produced by **lymphocytes**
- **Monokines** - produced exclusively by **monocytes**
- **Interferons** - involved in **antiviral responses** viral infected cells
- **Colony Stimulating Factors (CSF)** - support the **growth of cells** in semisolid medias
← كثير ينتج ويستخدم في المختبرات لتنمية الخلايا السرطانية
- **Chemokines** - promote **chemotaxis**

المجذب الكيمائي

[يجذب الخلايا المهاجرة من مكان لكان inflammation]

Effects of Cytokines

الرسمه مطلوبه وهي عبارة عن امثله مع كل نوع

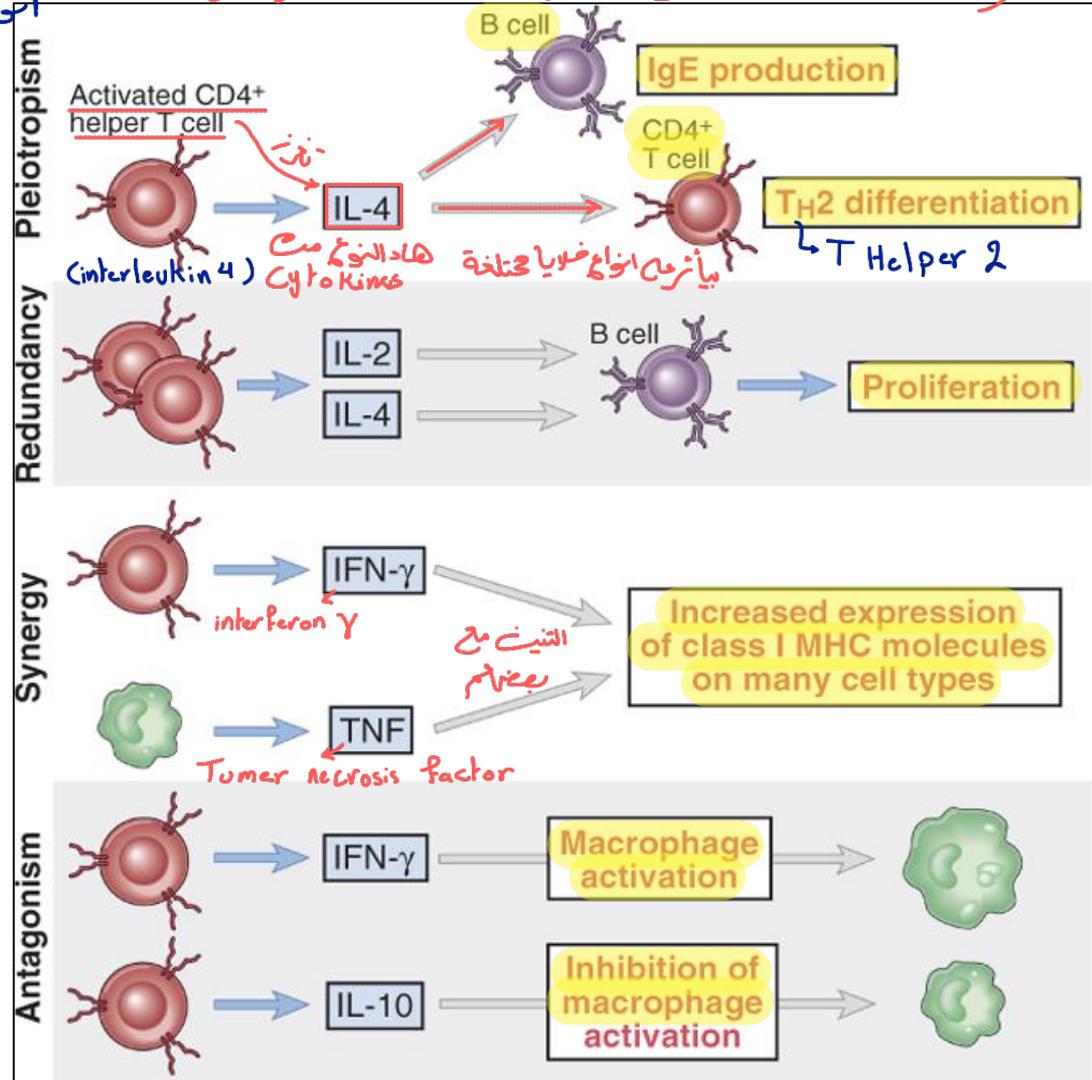
ان يكون لل cytokine الواحد قدرة على التأثير على اكثر من نوع خليا

- **Pleiotropism** refers to the ability of one cytokine having multiple effects on diverse cell types.

- **Redundancy** refers to the property of multiple cytokines having the same or overlapping functional effects.

- **Synergy** refers to the property of two or more cytokines having greater than additive effects.

- **Antagonism** refers to the ability of one cytokine inhibiting the action of another.



Cytokine General Actions

- Development of cellular and humoral immune responses
- Induction of inflammation
- Regulation of hematopoiesis
- Control of cellular proliferation and differentiation
- Induction of wound healing
- Chemotaxis

Classification of cytokines

الإختصاصات العامة

- Interleukin, IL
- Interferon , IFN
- Tumour necrosis factor, TNF
- Colony stimulating factor (CSF)
- Chemokine
- Transforming growth factor (TGF)

1. Interleukin (IL)

- Cytokines secreted by leukocytes that have the ability to act as signal molecules between different population of leukocytes

• IL-1~IL-29 → في سائر من 1 الى 29

- Th1: IL-2
- Th2: IL-4, IL-5
- Th3/Treg: IL-10
- Th17: IL-17

T. regulator

هون كل نوع من
T. helper cell
و شو interleukin يبي يتبعه

inhibition of
Macrophage
Activation
IFN γ بيحلكس شخو.

Specific Interleukins Functions

كل نوع لاهو وظيفته

- **IL1:** Play role in inflammation
- **IL2:** Growth factor for B and T cells (clonal expansion)
- **IL3:** Haematopoietic growth factor which stimulates colony formation of blood cells
- **IL4:** Stimulates development of Th2 cells from naïve Th cell. Stimulates Ig class switch from IgG1 to IgE (allergy)
- **IL5:** Produced by Th2 cells and aids in the growth and differentiation of eosinophils
- **IL6:** acute phase response
- **IL10:** Suppresses inflammatory responses and Inhibits production of IFN- γ , IL-2, IL-3, TNF α , GM-CSF

بالتالي, 2 يثبط وظائفهم

2. Interferon (IFN)

← نبتستغزرها للعلاج

- A group of glycoproteins that produced by human or animal cells following the infection of virus and exposure to various inducing agents

نوع الخلية التي تبنتها

المجدول رقم

	Types	Produced cells	Main functions
IFN- α	Type I	leukocyte	anti-virus, immune regulation
IFN- β	Type I	fibroblast	anti-tumor
IFN- γ	Type II	Th1, NK ↳ Natural killer	weaker anti-virus effect, stronger immune regulation effect, anti-tumor

3. Tumor Necrosis Factor (TNF)

- TNFs were originally thought of as selective antitumour agents, but are now known to have a multiplicity of actions.
- TNF- α is produced mainly by liposaccharide (LPS) activated monocytes and macrophages.
- TNF- β is produced mainly by activated Th0 and Th1.

↓
Naive

4. Colony-Stimulating Factors (CSF)

الخلايا الأم التي تنقسم لتنتج أنواع الخلايا المختلفة ↓ وظيفتها ↓

- Cytokines that stimulate proliferation or differentiation of pluripotent hematopoietic stem cell and different progenitors.

انواعها

• Multi-CSF (IL-3) ^{مهم قديم} _{الإسم الجدي}

• Granulocyte macrophage-CSF (GM-CSF)

• Monocyte-CSF (M-CSF)

• Granulocyte-CSF (G-CSF)

• Stem cell factor (SCF)

• Erythropoietin (EPO)

↓
يستخدمه الناس يلي

عندهم chronic kidney disease

لأنه بغير فيه نقص وهو المسؤول

عن تصنيع RBC

5. Chemokine

وظيفة جذب الخلايا المناعية لنقطة الالتهاب
inflammation

- Chemokines are cytokines which recruits monocytes, granulocytes and lymphocytes in blood to the sites of inflammation.

6. Transforming Growth Factor

- Growth-factor are cytokines which stimulate the growth of their target cells.

انواع من الاضغاث

- Transforming growth factor- β (TGF- β)
- Epithelia growth factor (EGF)
- Vascular endothelia cell growth factor (VEGF)
- Fibroblastic growth factor (FGF)

يعتبروا Markers و rich area في الأبحاث السرطانية
لما بيدرسوا شو الأدوية الي بتنشط وتنشطها هي cytokines

CK receptor

حکینا لحتی تشنجل cytokines ونعمل وظیفها لازم
ترتیب ب receptors موجوده على الخلیا

- Membrane-binding cytokine receptors: جصاصها receptor
- The receptor consists of extra-cellular region, trans-membrane region and cytoplasmic region. جزء منه على السطح و جزء عبر الغشاء و جزء داخل الخلية
- CK receptors can be grouped into five families according to structure and function.

Cytokines and Clinical Applications

يا بنستخدم cytokines او
Cytokines inhibitors.

- **Cytokines** and **cytokines inhibitors** can be used in many clinical applications and treatments.
 - **Advantages:** Known ligands, receptors and mechanisms of action
 - **Problems** with cytokine therapies: Effective dose levels, short half-life, can cause unpredictable side effects
الجرعة الختالة منها مش معروفه
- **Colony stimulating factors (CSFs):** hematological disorders associated with cancer therapy
- **Erythropoietin (EPO):** anemia associated with kidney disease
- **Interferon α :** antiviral therapy (chronic Hepatitis B and C)
- **IFN- β :** multiple sclerosis
لے بتادي الي Carcinoma
- **IFN- γ :** chronic granulomatous disease (CGD)
- **IL-2:** kidney cancer, melanoma