

3下其目中,

P10d: 呼吸造 YL 型

病症:

Asthma 氣喘

Rhinitis 鼻炎

Cough 咳嗽

Chronic Obstructive Pulmonary Disease
(COPD) 慢性肺阻塞

? histamine 為上述

病症的成因

嗎?

? cromoglycate 藥水.

must cell 的關係?

#治 asthma Y. 物.

1. β_2 agonist (Adrenergic agent)

by increasing the cAMP amid 氣管
sm. muscle, more \downarrow Ca^{2+} , 使舒張

→ short acting.

pirbuterol、terbutaline 和 albuterol (sel. β_2 ⊕)

' β_2 不是抗 inflammation, 故
不可單獨使用.

→ long acting.

salmeterol 是 albuterol 的衍生物

'onset slow, 故不用於治
急性 asthma.

2. corticosteroids. (類固醇!)

→ 吸入性為首選 (可理解)

→ 吸入性:

beclomethasone、triamcinolone 及 flunisolide

→ 全身性:

methylprednisolone (靜脈注射) 或 prednisone (口服)

→ 嚴重惡化的病人,

→ 預防性投予 by block mast cell
Cromolyn 和 nedocromil
↓
Ca²⁺ channel

適時給孕婦, 也可緩過敏性鼻炎

! 非直接氣管舒張G, 不可用
急性惡化的病人

! note 急性 → 需直接解除病症,
故 need 氣管舒張G

3. Cholinergic antagonists (替代 β -agonist)

→ Ipratropium 的 onset 慢, 不是副作用,

Theophylline

!note. (机制同 β -agonist)

Theophylline, \ominus phosphodiesterase PDE

\uparrow cAMP, \downarrow Ca^{2+} > 舒张

1. 治疗狭窄 2. PDE 多(见后)

!note: 呼吸道的舒张也 γ G 转

1. β_2 agonist.

2. corticosteroid

plus NO (在後)

3. \ominus mast cell b Ca^{2+} channel

4. Cholinergic antagonist

5. \ominus PDE 6. leukotriene

使鬆: cAMP

使緊: Acetylcholine (平滑肌)

? Adenosine (?) need 腺能

抗緊 M阻、theophylline (⊖PDE)

PDE of theophylline

代謝 ⊕ Phenytoin

→ 性腺能

⊖ Cimetidine (抗H₂)

· Erythromycin

治 rhinitis 鼻炎的藥物 (類氣喘 Y)

1. Antihistamines (H₁-ant.)

ex:

diphenhydramine、chlorpheniramine、
loratadine、terfenadine 及 astemizole

2. α -Adrenergic agonists

phenylephrine 和 oxymetazoline (長效型)

不適合長期使用

3. Corticosteroids

beclomethasone、fluticasone、flunisolide 及 triamcinolone 等

4. Cromolyn (預防用)

5. 抗體

Omalizumab (抗 IgE)

治咳嗽

dextromethorphan

可治咳嗽中樞但不具成癮，可仿 codeine.

DRUGS AFFECTING THE RESPIRATORY SYSTEM

DRUGS USED TO TREAT ASTHMA

β -Adrenergic agonists

Theophylline

Cromolyn

Corticosteroids

Cholinergic antagonists

+ leukotrine

DRUGS USED TO TREAT RHINITIS

Antihistamines

α -Adrenergic agonists

Corticosteroids

Cromolyn

+ - zanamab

DRUGS USED TO TREAT COUGH

Opiates

Dextromethorphan

咳嗽

治療慢性肺阻塞的藥物
(Drugs for chronic obstructive pulmonary disease)

不可逆 \rightarrow 只能控制

Use 支氣管舒張劑

β_2 -agonists、anticholinergics 和
theophylline 等

✓ 1st line

合用 β_2 -agonists 和 ipratropium

雾化吸入 glucocorticoids control

✗ NO 治肺高P, 使血管舒张

sGC \rightarrow cGMP \uparrow \rightarrow PKG

\ominus Ca^{2+} channel \downarrow Ca^{2+} \rightarrow 舒张

? (类 PKC)

免疫學 (必修)

1. 皮質類固醇⁽¹⁾

2. 分子⁽⁴⁾ 3. 抗体⁽¹⁾

1. : 糖皮質、鹽皮質、hormone

皮高 cushing 低 addison

皮質醇過高：會導致庫興氏症候群 (Cushing's syndrome)

皮質醇過低：會導致愛迪生氏病 (Addison's disease)

分泌類固醇。

→ mech: 1. cortisol 合成 → PLAZ

(3用途) 2. imm. \ominus + G \ominus cell imm.

大程度抑制 Cellular immunity

• 小程度抑制 Humoral immunity

大 G \ominus plasma cell
Ab 合成.

3. 調造血 WBC \uparrow ,

腎上腺皮質淋巴調節

Prednisone, Prednisolone, Triamcinolone, Methylprednisolone

分子 calcineurin inhibitors. CNIs

Calcineurin

Cyclosporine

Binds to cyclophilin

IL-2, IL-3, IFN- γ transcription

合併

TGF- β >> tumor invasion and metastasis

AEs: 齒齦增生、器官輕微、多毛

Hirsutism

牙齦增生 Gingival overgrowth

like.

Phenytoin, Cyclosporin,
Calcium channel blocker

CCBs

Standard combination for transplantation

(1) Azathioprine + Cyclosporine + Glucocorticoids

(2) MMF + Cyclosporine + Glucocorticoids

Tacrolimus

Binds to FK-binding protein (FKBP)

AEs 同前

但沒有 多毛、牙齦增生 副作用

Proliferation signal inhibitors (PSIs)

1. mTOR inhibitor. 2. JAK inhibitor

1.

Sirolimus, Everolimus

阻止由 G1 phase 進入 S phase

AEs

(Thrombocytopenia 血小板減少症)

2.

Tofacitinib

用於治療類風濕性關節炎、乾癬性關節炎、僵直性脊椎炎、異位性皮膚炎

-deinib. and

Immunomodulatory imide drugs (IMiDs) [小分子]

Thalidomide 止吐、海豹肢那個

Anti-angiogenesis, Anti-inflammatory, GVH, disease

Lenalidomide, Pomalidomide 類似IMiDs
AEs 少

Cytotoxic agents [大分子]

1. Antimetabolites
2. Alkylating agents
3. Pyrimidine synthesis inhibitors
4. Adenosine deaminase inhibitor

[-] Purine blockers Mycophenolate mofetil (MMF)

-ester of mycophenolic acid (MPA) ? pro drug?
-inhibit IMPDH

MMF \rightarrow MPA \rightarrow \ominus IMPDH.

Azathioprine, Mercaptopurine (6-MP)

Metabolized by xanthine oxidase

#因Allopurinol(xanthine oxidase inhibitor)會抑制Aza的代謝，
所以Azathioprine的劑量應減至原劑量的1/2-1/4

病人同時有免疫相關疾病/自體免疫疾病，合併高尿酸血症或痛風

1-2 Folic acid blockers

Methotrexate (MTX)

⊖ Dihydrofolate reductase (DHFR)

Alkylating agent

Cyclophosphamide 似 芥子氣

pro drug: 活性代謝物：丙烯醛 Acrolein → 出血性膀胱炎

(血液性癌症 (Burkitt's淋巴瘤 首選用藥)
(Retinoblastoma)(首選用藥)，乳或肺癌(首選用藥))

Pyrimidine synthesis inhibitors

pro. Leflunomide  Teriflunomide 活性代謝物

dihydroorotate irr. ⊖ 二氫乳清酸脫氫酶

Adenosine deaminase inhibitor

Pentostatin 治? severe combined immunodeficiency,
SCID, B/T/NK cells 均失去功能

Chronic lymphocytic leukemia (CLL)

others.

Hydroxychloroquine (奎寧，俗稱金雞納)

副作用：心律不整 (QT 延長)

抗体

Immunosuppressive antibodies

1.

□ Monoclonal Ab

-ximab (70% humanized)

-zumab (90% humanized)

-mumab (100% human)

習
祖
人

2.

Polyclonal Ab

Antilymphocyte globulin (ALG) Antithymocyte globulin (ATG):

Immune Globulin Intravenous (IGIV / IVIG)

idiopathic thrombocytopenic

purpura (特發性血小板低下紫斑症，IGIV 增加其血小板)

Rho (D) Immune Globulin

Rh⁺

Rh-媽媽懷了Rh+的嬰兒時，該藥打在媽媽身上。

1. Monoclonal Ab ③ Anti-B cell / T cell / NK cell mAb

① Anti-B cell mAb ② Anti-T cell mAb Anti- IL-2 Receptor
Anti- CD80/86

④ TNF- α mAb

①

Belimumab *tar. B cell 活化因子, BAFF*
SLE treatment

Rituximab *tar. CD20*
• CLL, RA treatment

②

Anti- IL-2 Receptor Basiliximab Daclizumab
multiple sclerosis treatment *多发性硬化*

Anti- CD80/86 Abatacept CTLA-4 analog
 \Leftrightarrow *anti CTLA-4*

③

Alemtuzumab anti-CD52

Daratumumab Anti-CD38

④

TNF- α mAb

Adalimumab, Etanercept, Certolizumab pegol, Golimumab, and Infliximab

- cept 融合 protein.

⑤

(IL-1) receptor antagonist

Anakinra (CAPS) RA, cryopyrin-associated periodic syndrome

⑥

Anti $\alpha 4$ integrin

(白血球 X 4 unit)

Natalizumab

MS

Vedolizumab

IBD

⑦

Anti-IgE

Omalizumab

• allergic asthma

⑧

Anti IL-17

Ixekizumab, secukinumab, brodalumab

多集

Ustekinumab

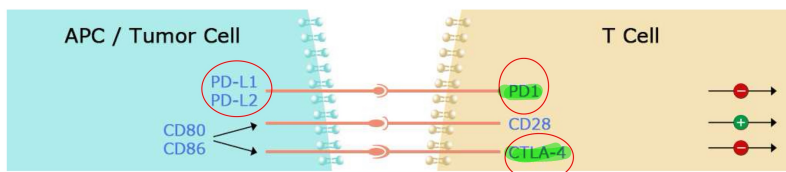
Anti IL-12, IL-23

plaque psoriasis
斑塊型乾癬

Immune Checkpoint Inhibitors (ICIs) Mabs



Immune Checkpoint Inhibitor Mabs



- PD-1, CTLA-4, LAG-3, TIM-3

打斷T cell 之間的 binding

Ipilimumab Anti-CTLA-4 on T cells

Nivolumab, Pembrolizumab

- Anti PD-1 on T cells

Atezolizumab

- Anti PD-L1 on tumor cells/ APC

• Anti-CD19 CAR-T (Chimeric Antigen Receptor-T cell) 治療於小兒或年輕的B細胞急性淋巴性白血病

依病症進行分類 cross 安平符

RA

(NSAIDs)-Sulfasalazine

(corticosteroids) -Prednisolone

(disease-modifying antirheumatic drugs, DMARDs) -
MTX Leflunomide Anti-TNF α Anti-IL-1

乾癬 Psoriasis

生物製劑 Anti- TNF α Anti-IL17 Anti-IL23

• 免抑：Cyclosporin MTX Corticosteroids
Retinoid

SLE 治療藥物

NSAID, hydroxychloroquine,
corticosteroid, MMF, Aza, MTX,
cyclophosphamide Vit.D

• 生物製劑：Anti-B cell Anti-IL12/23
JAK inhibitor

MS (Multiple sclerosis) 治療藥物

Glatiramer acetate (免抑藥) mitoxantrone (化療藥) Aza
Corticosteroid

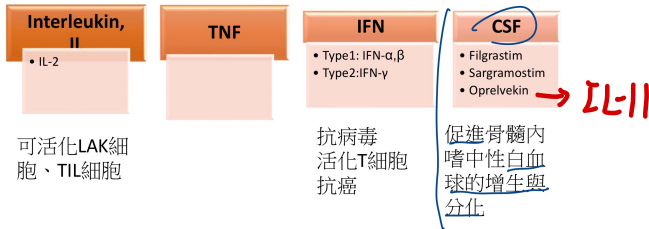
Cyclophosphamide, MTX, Cyclosporine, Fingolimod, Dimethyl
fumarate ,
Teriflunomide

• 生物製劑：Anti-VLA1 , INF β

cytokine agents (免抑劑)

Cytokine agents

- increases immune system



Filgrastim : granulocyte colony stimulating factor
Sargramostim : granulocyte-macrophage colony stimulating factor
Oprelvekin : thrombopoietic growth factor

check point 必須知道

降血脂 y 物

1. \ominus HMG-CoA
2. Niacin
3. Fibrates
4. Bile acid sequestrants

5. other (cholesterol absorption inhibitor ^{mevalonate})

Acetyl-CoA 需 HMG-CoA 合成 甲羟戊酸

→ 活性變化因子. (活化 → 去活化)

⊕ 胰島素、甲狀腺素

⊖ 升糖素、葡萄糖皮質素、甲羟戊酸、膽固醇、飢餓狀態

lovastatin, simvastatin, and atorvastatin 以 CYP3A4 代謝
fluvastatin and rosuvastatin 以 CYP2C9 代謝

Niacin \ominus lipolysis ^{by} ↓ cAMP → ↓ FFA → ↓ VLDL-LDL

AEs 為臉潮紅, 可連送服用 aspirin 改善
→ HDL 效用最強、糖尿病不適宜

fibrates

(Gemfibrozil and fenofibrate)

活化 PPAR- α \uparrow LPL - Apo A-I - II, \downarrow Apo-III
促 lipolysis (血內皮 cell)
 \rightarrow TG 效用最強

bile acid-binding resins

(Colestipol, cholestyramine, and colestevlam)

前兩者在 high dose 下會影響 Vit ADEK 的 absorption

亦影響許多大分子在腸的吸收

other: Ezetimibe, 直接由腸吸收
搭配 statin 使用更佳 (因 onset 慢)

④ mech: 阻斷膽汁在腸道的 reabsorption

AEs: 便秘

自泌素

Amine

* Histamine (組織胺) store mast. basophils,

過敏. 胃A(H₂) 血舒 MAO-β代謝

(+ DAO, HNMT)

→ 抗組織胺 (Antihistamines)

HDC 轉 histidine → Histamine

Serotonin (血清素) 腸道腸嗜鉻細胞 (enterochromaffin cells) 、CNS



Eicosanoids

Prostaglandins (前列腺素, PG)

→ NSAIDs

Thromboxanes (血栓素, TX)

Leukotrienes (白三烯, LT)

抗白三烯藥物 (如 Montelukast)

Peptides

Angiotensin (血管收縮素)

→ ACE 抑制劑 (降血壓)

Bradykinin (緩激肽)

Interleukins (介白素)

Gas

Nitric Oxide (NO, 一氧化氮)

→ NO 衍生藥物 (如硝酸甘油)



#

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