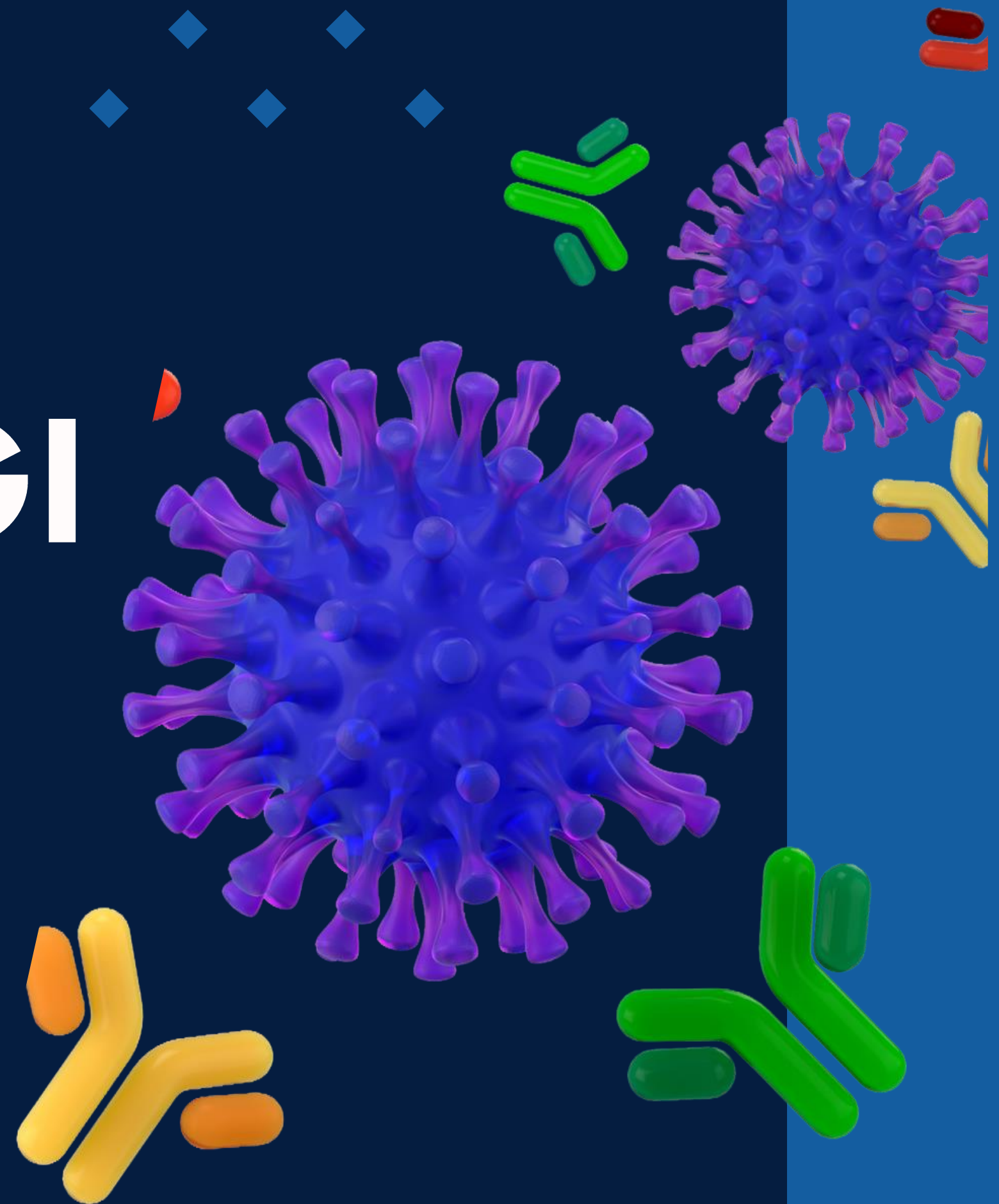


STIKES NOTOKUSUMO  
YOGYAKARTA

# PATOFISIOLOGI SISTEM IMUN

*Presented by: Maria Putri Sari Utami, M.Kep.*

KEPERAWATAN DEWASA 2  
PRODI NERS



# JENIS PATOFISIOLOGI SISTEM IMUN

01

IMUNODEFISIENSI

02

AUTOIMUN

03

HIPERSENSITIFITAS



# IMUNODEFISIENSI



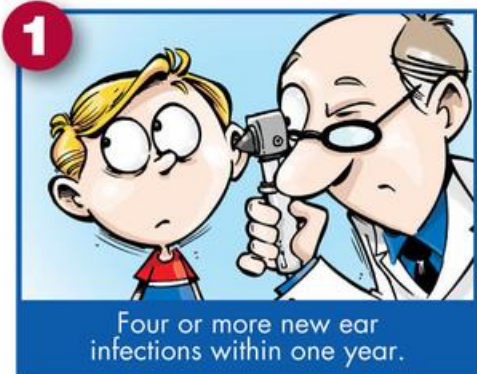
Imunodefisiensi merupakan penyakit yang disebabkan oleh hilang atau terjadinya gangguan fungsi dari sebagian sistem imun termasuk sel imun, molekul imun, atau proses kerja sistem imun



Patofisiologi dari imunodefisiensi sangat bervariasi dan kompleks, menimbulkan gejala klinis yang banyak berbeda untuk setiap kejadian, megakibatkan penyakit serius

# 10 Warning Signs of Primary Immunodeficiency

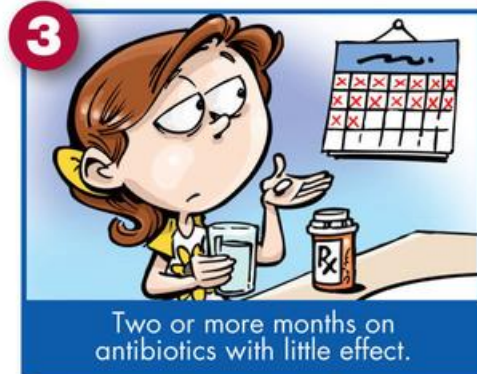
Primary Immunodeficiency (PI) causes children and adults to have infections that come back frequently or are unusually hard to cure. 1:500 persons are affected by one of the known Primary Immunodeficiencies. If you or someone you know is affected by two or more of the following Warning Signs, speak to a physician about the possible presence of an underlying Primary Immunodeficiency.



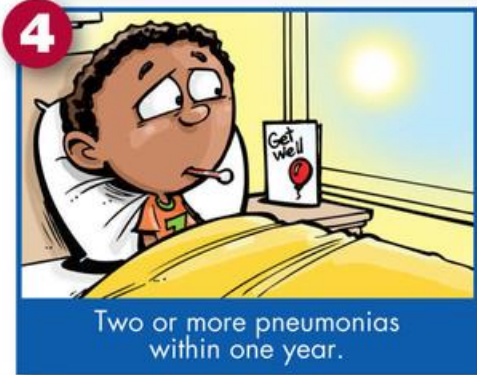
Four or more new ear infections within one year.



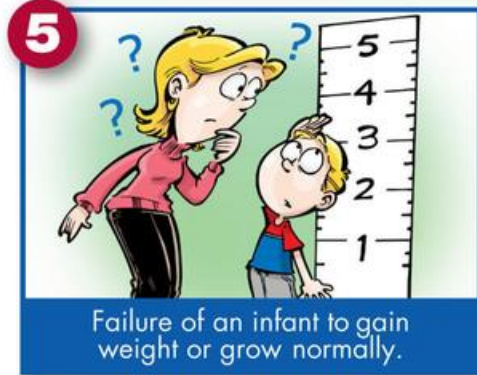
Two or more serious sinus infections within one year.



Two or more months on antibiotics with little effect.



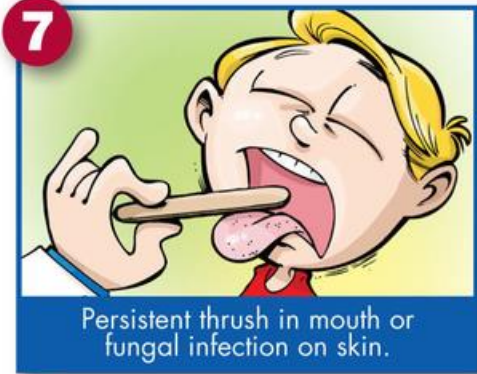
Two or more pneumonias within one year.



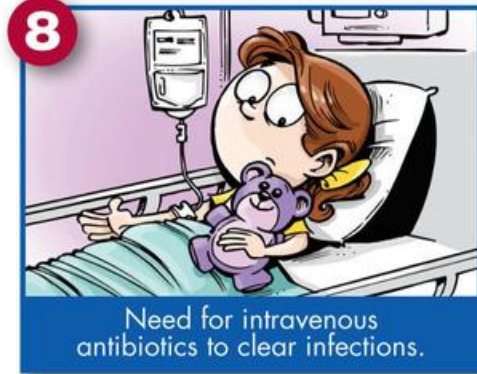
Failure of an infant to gain weight or grow normally.



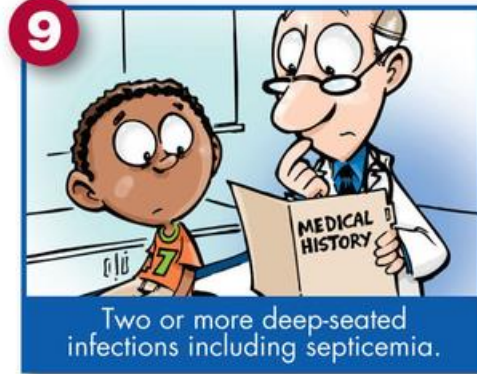
Recurrent, deep skin or organ abscesses.



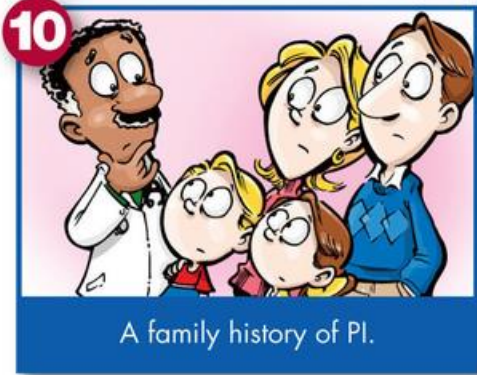
Persistent thrush in mouth or fungal infection on skin.



Need for intravenous antibiotics to clear infections.



Two or more deep-seated infections including septicemia.

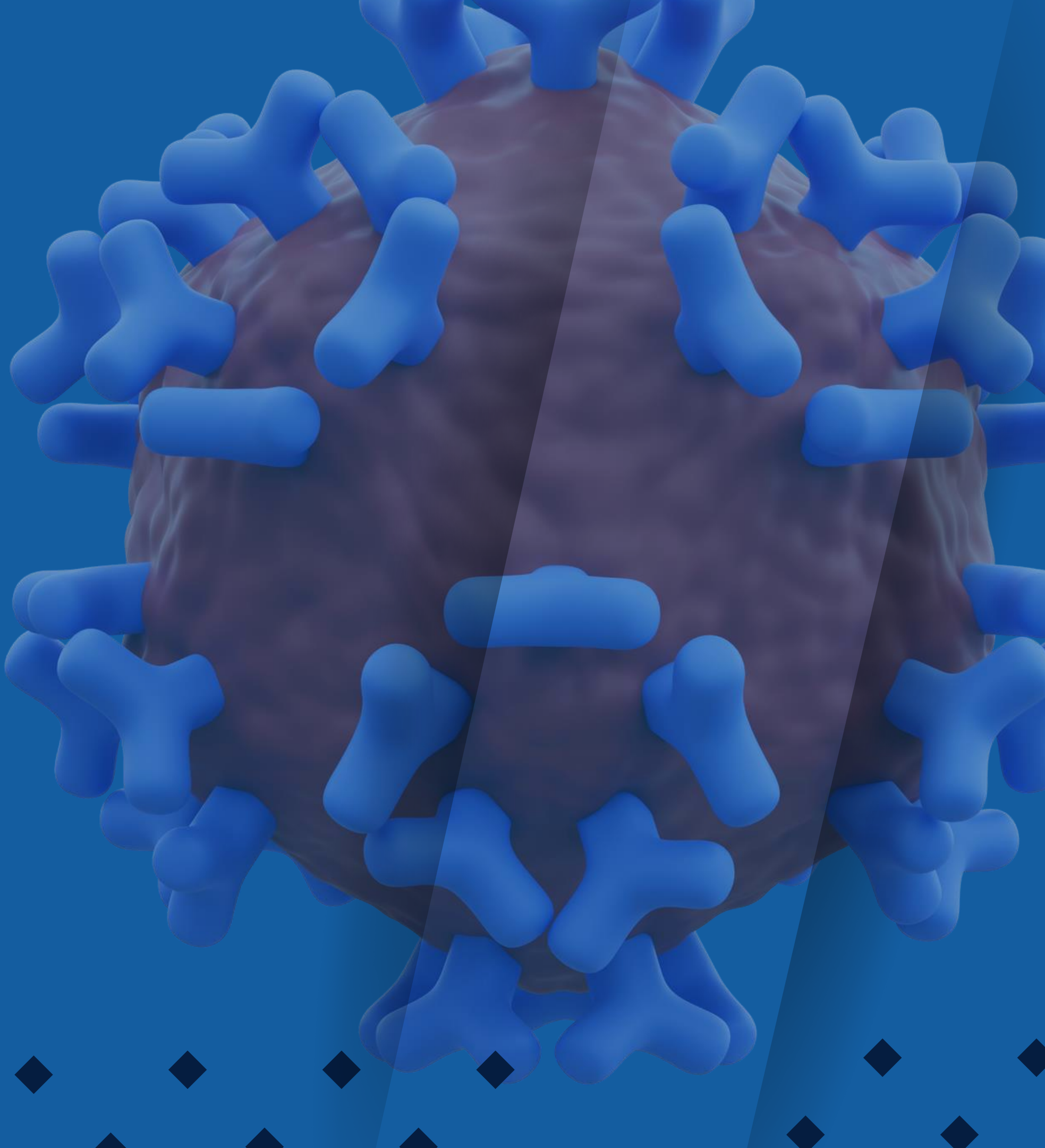


A family history of PI.

Presented as a public service by:



These warning signs were developed by the Jeffrey Modell Foundation Medical Advisory Board. Consultation with Primary Immunodeficiency experts is strongly suggested. © 2013 Jeffrey Modell Foundation. For information or referrals, contact the Jeffrey Modell Foundation: [info4pi.org](http://info4pi.org) | 866-INFO-4-PI



# IMMUNODEFISIENSI



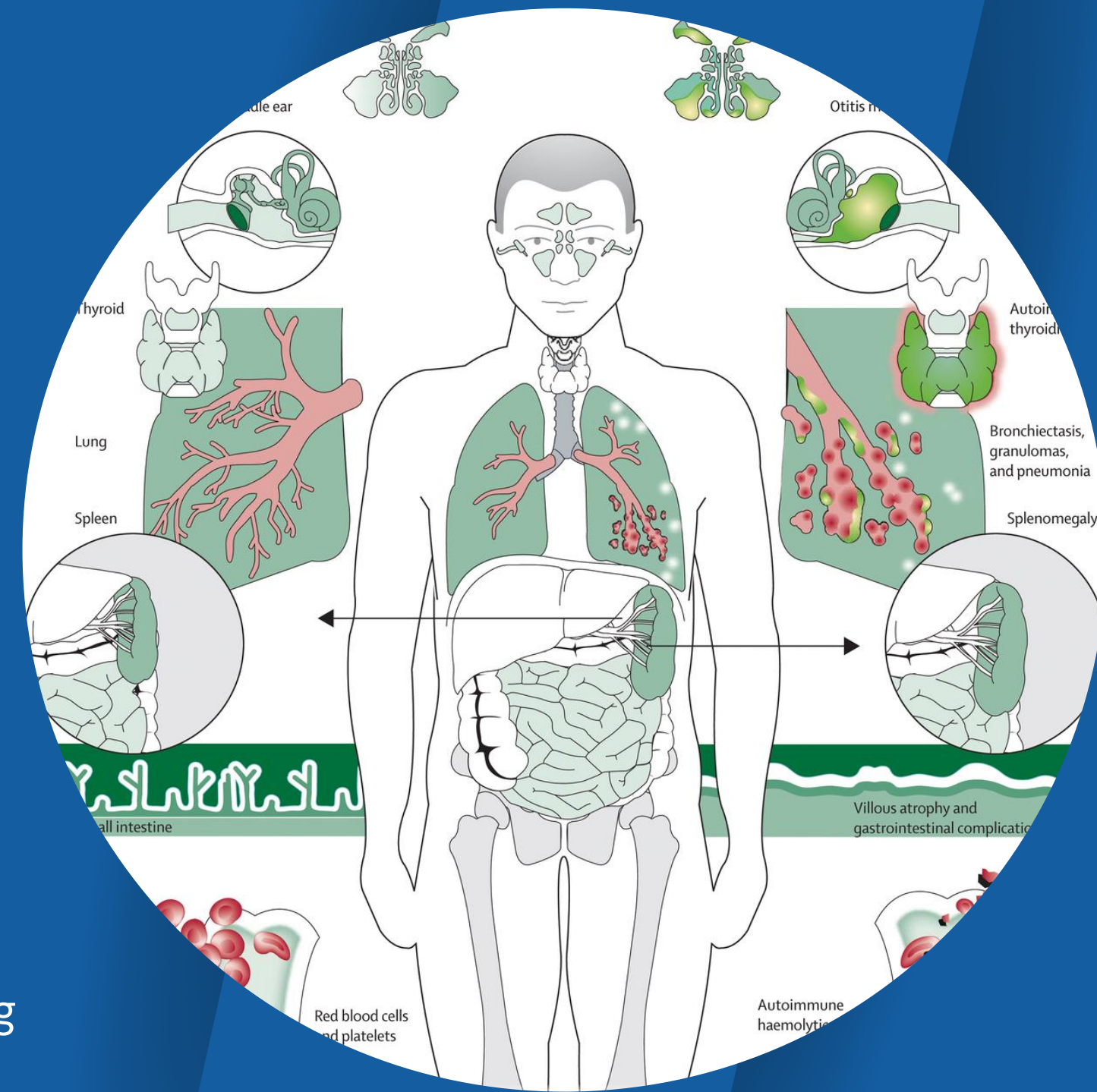
## PRIMARY

- < 10 %
- Intrinsic
- Missing enzyme (ADA)
- Missing cell type
- Nonfunctioning component
- Congenital
- Manifest since early age

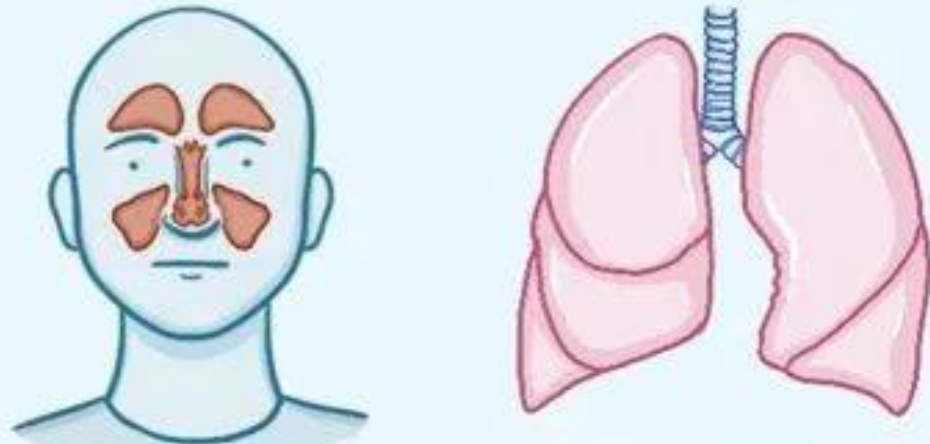


## SECONDARY

- 90 %
- Underlying disease
- Lymphoid malignancy
- HIV Infection
- Malnutrition
- Immunosuppressant drug
- Acquire
- Manifest in any age



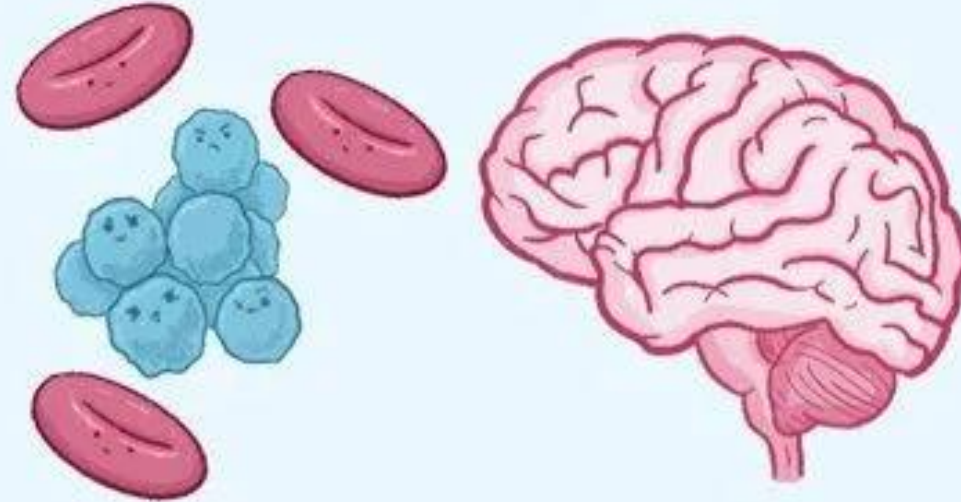
## 2+ in 1 YEAR



SERIOUS  
SINUSITIS

SERIOUS  
PNEUMONIA

## 2+ in LIFETIME



SEPSIS

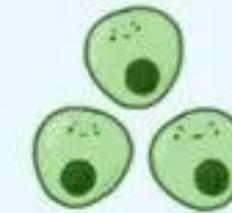
MENINGITIS

## PATHOGENS are OPPORTUNISTIC



Candida albicans

nontuberculous  
Mycobacteria



Pneumocystis jirovecii

- ~ PERSISTENT FEVER
- ~ CONFINEMENT to BED for 1 WEEK+
- ~ DIFFICULT to TREAT
  - ↳ 2+ MONTHS of ANTIBIOTICS
  - ↳ IV ANTIBIOTICS
  - ↳ HOSPITALIZATION
- ~ UNUSUAL **COMPLICATIONS**

- ~ ORGAN ABSCESSSES
- ~ NON HEALING WOUNDS
- ~ CHRONIC DIARRHEA
- ~ FAILURE to THRIVE
- ~ PERSISTENT LAB ABNORMALITIES
  - ↳ LEUKOCYTOSIS
  - ↳ ↑ ESR & CRP
- ~ PERSISTENT IMAGING ABNORMALITIES
  - ↳ BRONCHIECTASIS



# CAUSES OF SECONDARY IMMUNODEFICIENCY

Uremia, diabetes, malnutrition

**Metabolic**

**Iatrogenic**

Cytostatics, immunosuppressants

**Malignant tumors**

**Viral Infections**

HIV, CMV, measles, infectious mononucleosis

**Splenectomy**

**Stress**

**Injury, operations,  
general anesthesia**

# CAUSES OF PRIMARY IMMUNODEFICIENCY

<u>Contoh Penyakit</u>	<u>Kelainan/kerusakan yang disebabkan</u>	<u>Dampak klinis</u>
<u>Defisiensi imunitas kombinasi (Severe Combined Immunodeficiency/SCID)</u>	<u>Penurunan jumlah sel T, Sel B, sel NK, dan atau antibodi</u>	<u>Rentan terhadap infeksi virus, fungi, dan bakteri karena kecacatan pada system kekebalan selular dan humoral</u>
<u>X-linked agammaglobulinemia</u>	<u>Kegagalan maturase sel B di sumsum tulang belakang</u>	<u>Penurunan atau sama sekali tidak ada produksi sel B dan antibody</u>
<u>Sindrom DiGeorge</u>	<u>Ketidaksempurnaan perkembangan organ timus dan kegagalan maturase sel T</u>	<u>Rentan terhadap infeksi virus dan fungi karena kegagalan system imunitas humoral</u>
<u>Sindrom Wiskott-Aldrich</u>	<u>Cacat fungsi trombosit, sel T, dan kekurangan antibody (terutama IgA)</u>	<u>Rentan terhadap eczema atopic dan infeksi yang mudah kambuh</u>
<u>Hyper-IgM syndrome</u>	<u>Cacat pada sel B sehingga tidak dapat melakukan pergantian kelas antibody (immunoglobulin)</u>	<u>Kadar IgM didalam tubuh menjadi berlebih dan kekurangan IgA, IgG, dan IgE. Hal ini menyebabkan ering terjadinya infeksi berulang</u>



# WISKOTT-ALDRICH SYNDROME

[ECZEMA-THROMBOCYTOPENIA-IMMUNODEFICIENCY SYNDROME]

ATOPIC DERMATITIS

PROBLEM with IMMUNE SYSTEM

↓  
REPEATED  
INFECTIONS

MICROTHROMBOCYTOPENIA

- VERY FEW PLATELETS

SMALL →





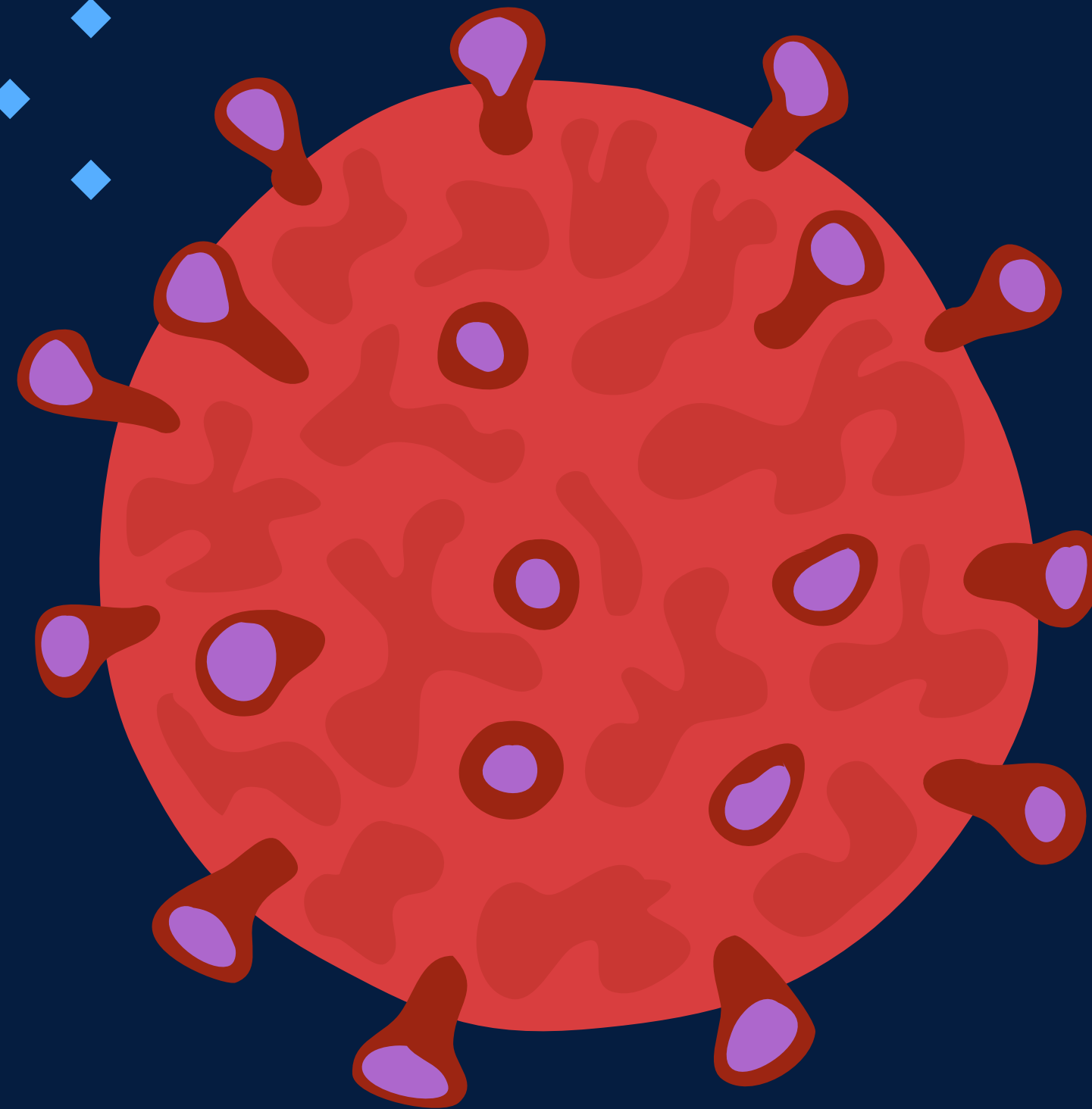
## **ATAKSIA TELANGIEKSIA**

Penyakit autosomal resesif mengenai syaraf, endokrin, dan sistem vaskuler

Ciri klinisnya berupa gerakan otot yang tidak terkoordinasi dan dilatasi pembuluh darah kecil terlihat di sklera mata, limfopenia, penurunan Ig A, Ig E, dan kadang Ig G.

# AIDS

*Aquired Immunodeficiency Syndrome* adalah suatu penyakit retrovirus epidemik, menular yang disebabkan infeksi *Human Immunodeficiency Virus*, yang pada kasus berat bermanifestasi depresi berat imunitas selular.



# PENULARAN HIV

## SEKSUAL



Hubungan seksual yang tidak aman,  
heteroseksual/Homoseksual

## PARENTERAL



Melalui darah/cairan tubuh/semen/organ  
donor yang ditransplantasi

## PERINATAL



Transmisi vertikal dari ibu yang terinfeksi HIV  
ke janin

# PENULARAN HIV PADA KEHAMILAN

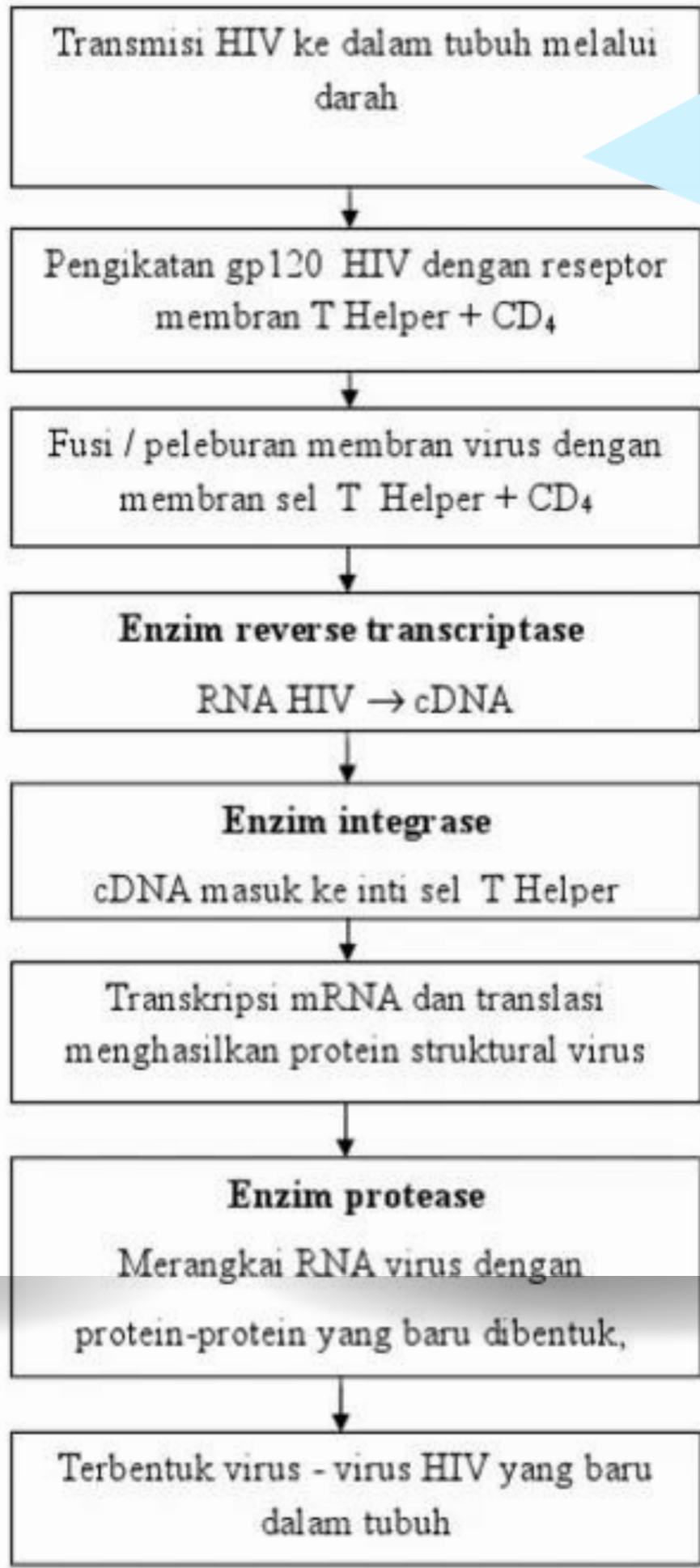
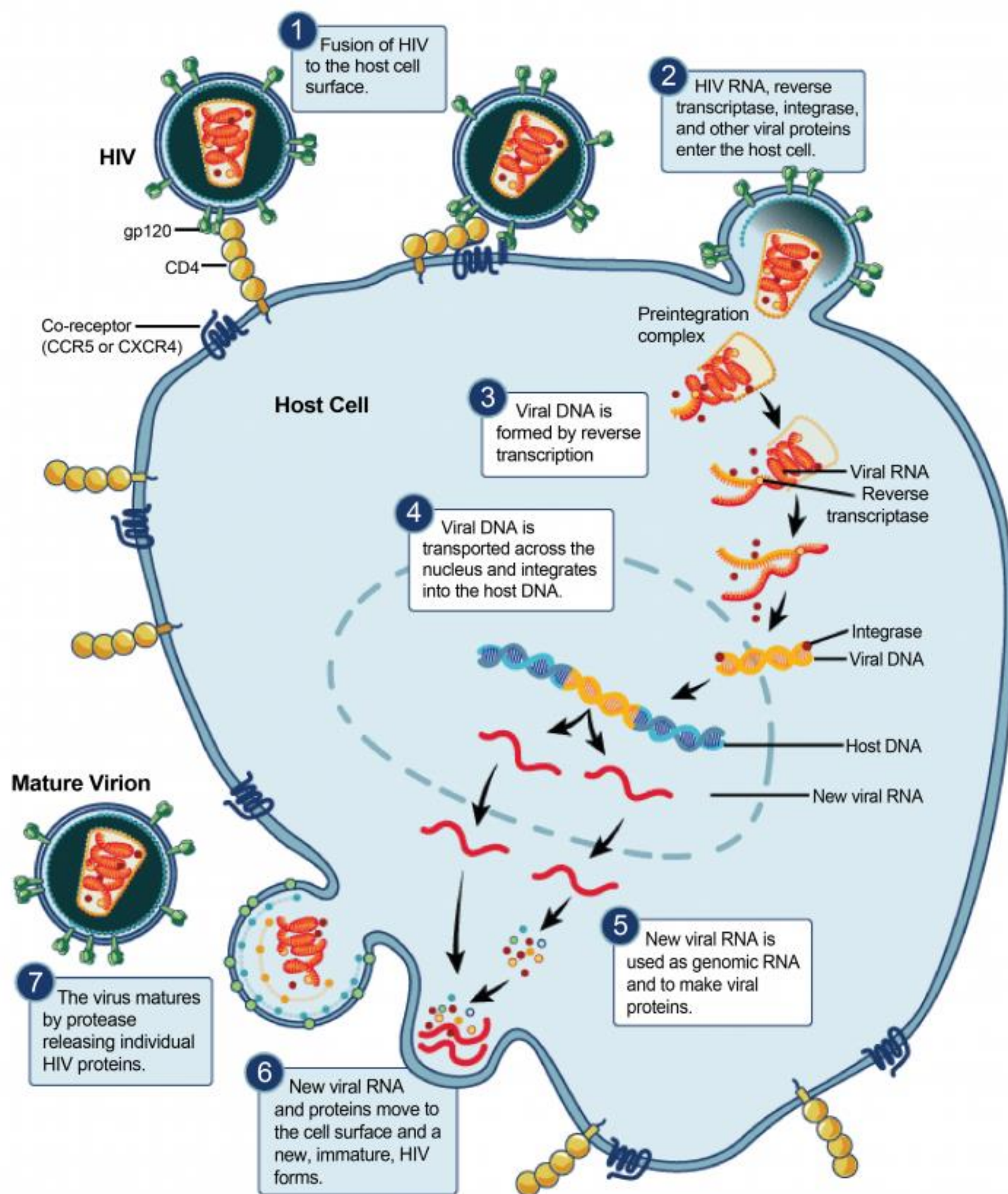
intrauterin

intrapartum

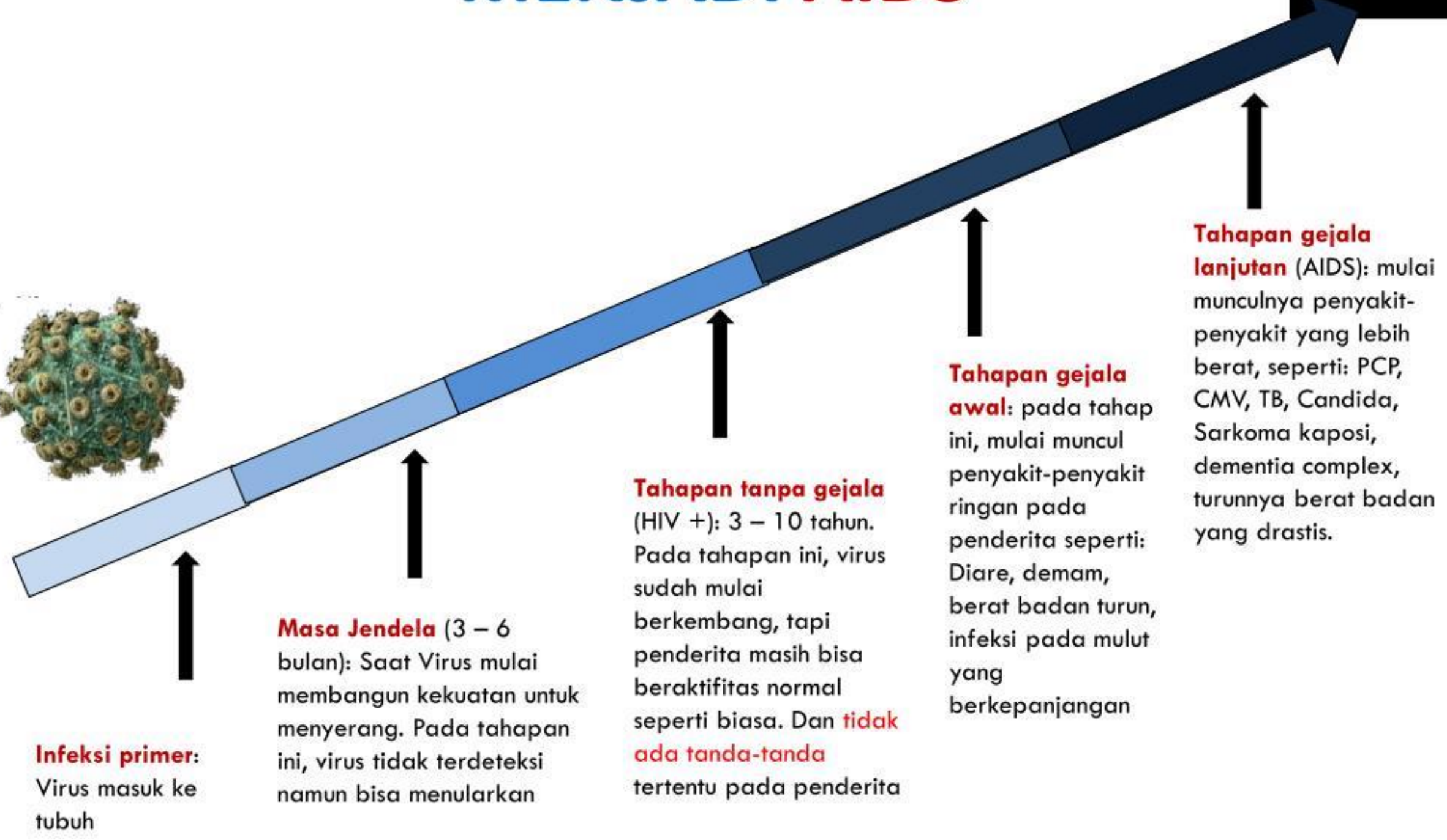
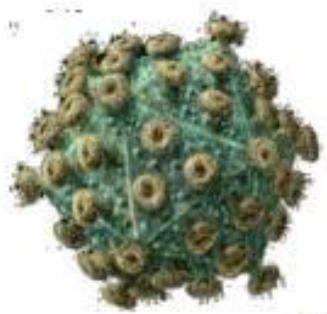
Pasca  
persalinan

- ✓ Faktor virus : makin tinggi titer virus , makin infeksius.
- ✓ Faktor Host (ibu hamil) : sistim kekebalan tubuh, nutrisi, anemia.
- ✓ Faktor Obstetrik : lama dan cara persalinan.
- ✓ Faktor bayi : Menyusui

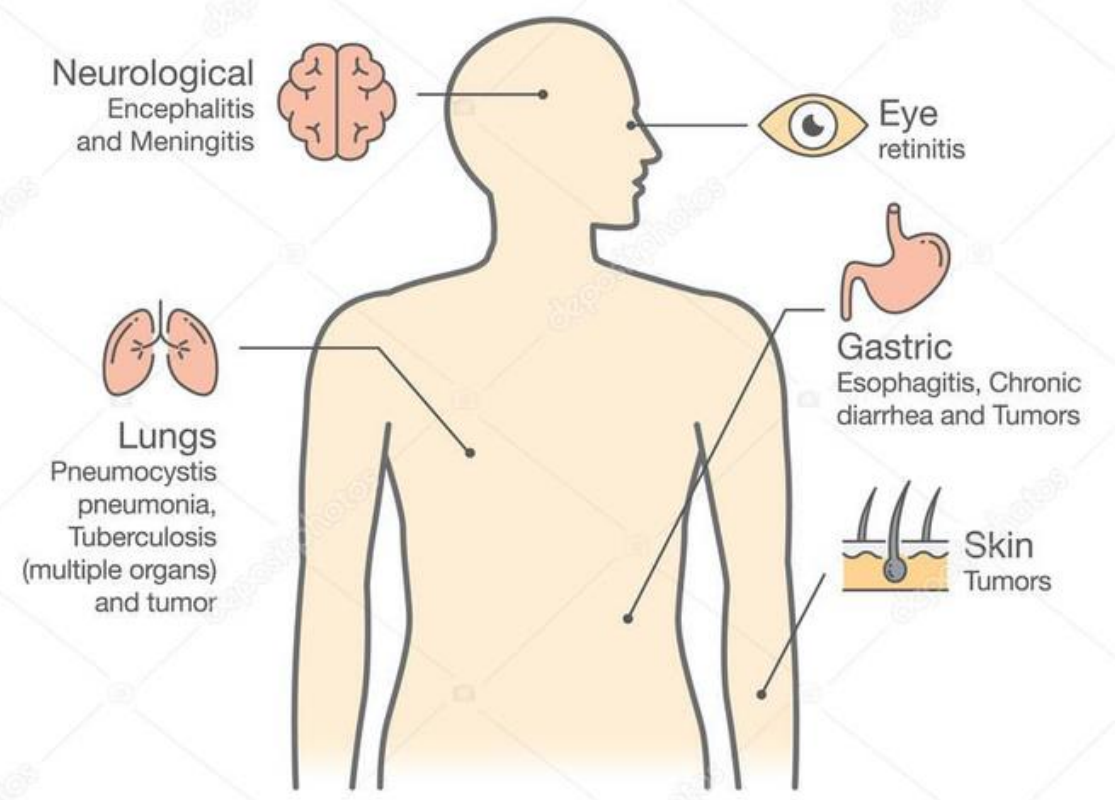
## PATHWAY PATOFISIOLOGI HIV/AIDS

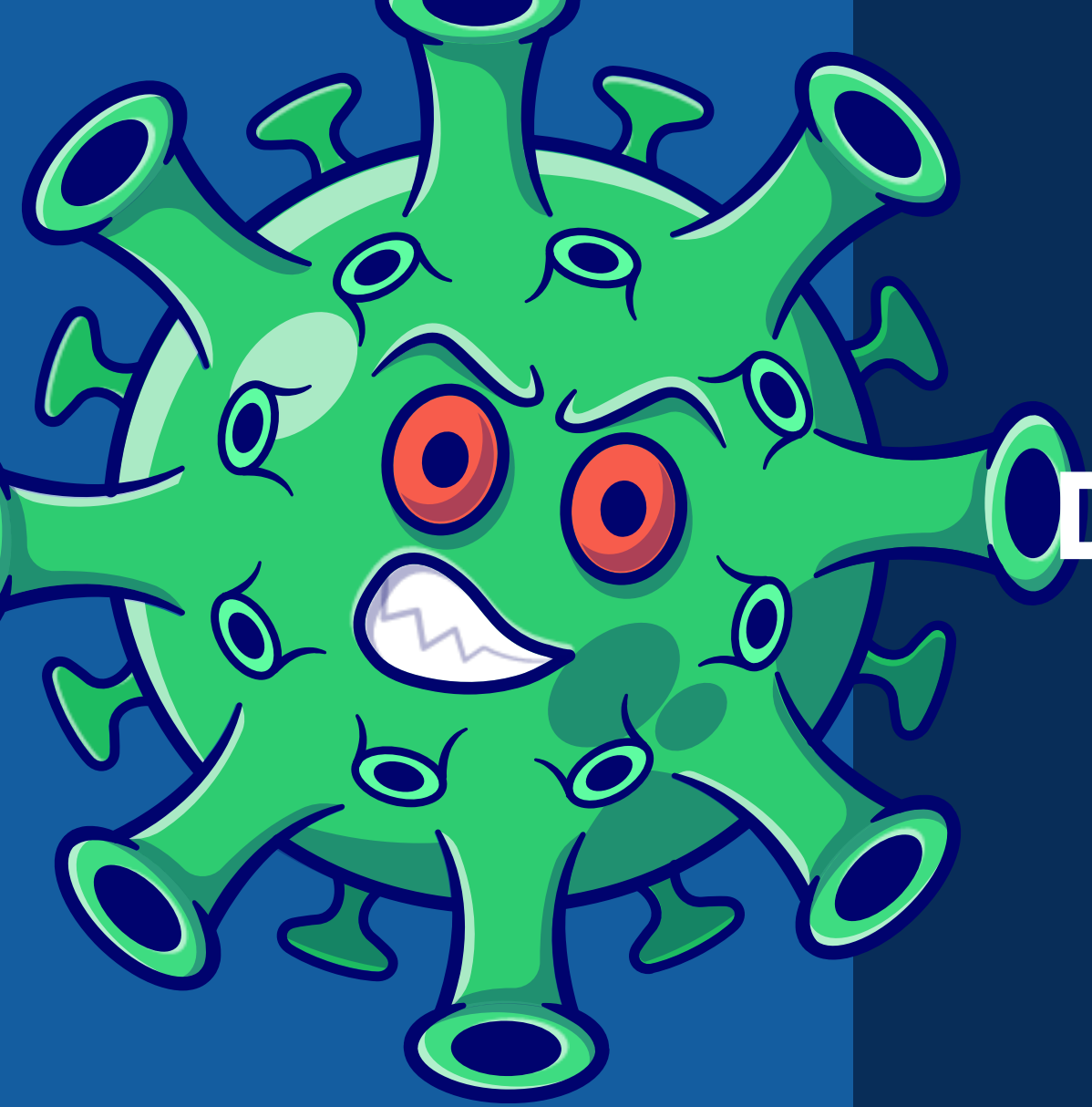


# TAHAPAN PERKEMBANGAN HIV MENJADI AIDS



## Main symptoms of AIDS





# DEFISIENSI AUTOIMUNE

## AUTOIMUNITAS

Merupakan respon imun terhadap antigen jaringan sendiri yang disebabkan oleh kegagalan mekanisme mempertahankan self tolerance sel B, sel T, atau keduanya.

---

**Kegagalan pada toleransi imunitas sendiri**

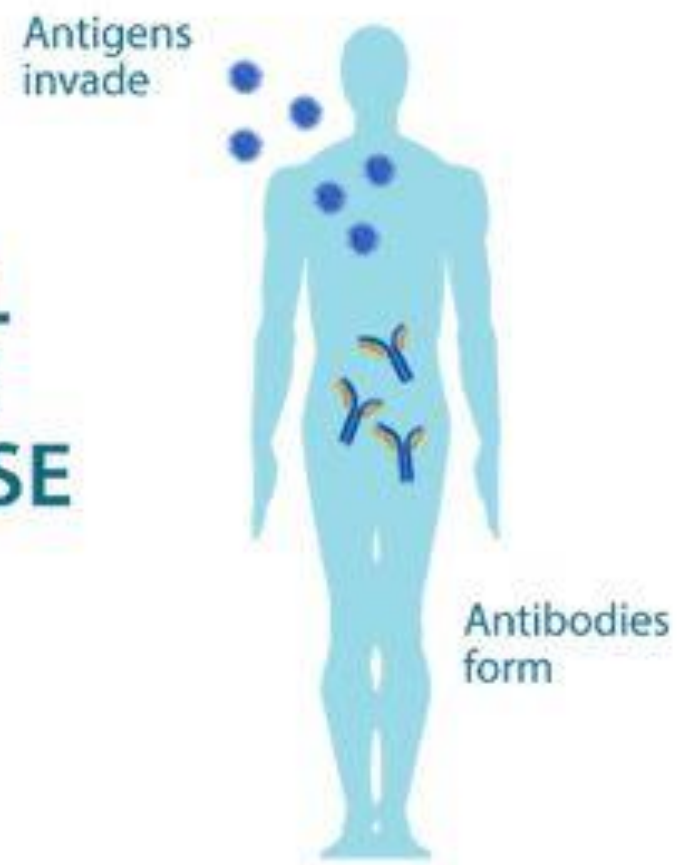
↓

Penyakit autoimun adalah kerusakan jaringan atau gangguan fungsi fisiologis yang ditimbulkan oleh respon autoimun

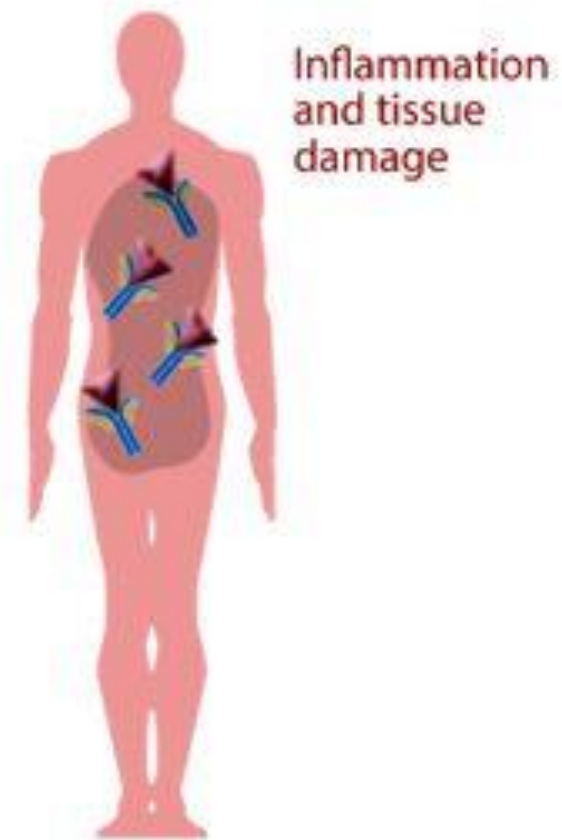
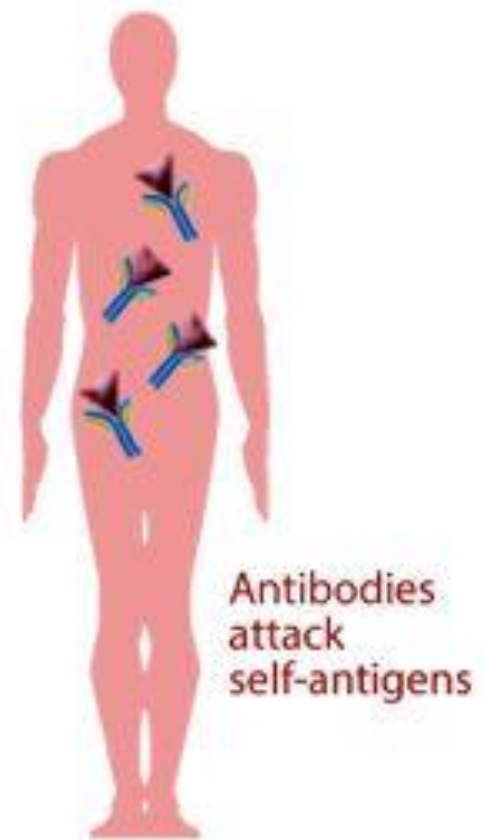
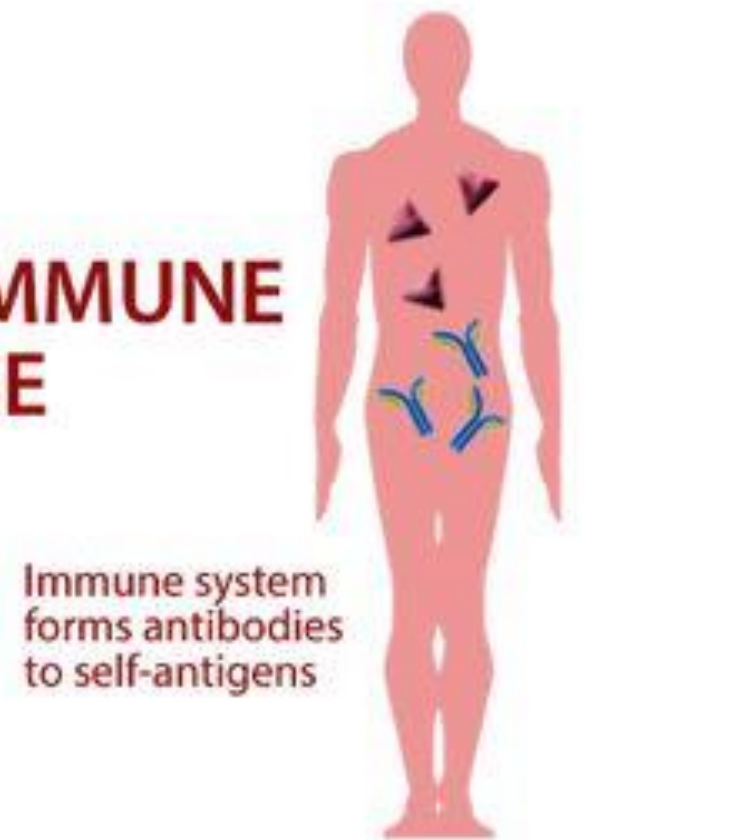
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## NORMAL IMMUNE RESPONSE



## AUTOIMMUNE DISEASE



# ETIOLOGI AUTOIMUN



1

Reaksi silang  
dengan antigen  
bakteri



2

Rangsangan  
molekul poliklonal



3

Kegagalan  
utoregulasi

# AUTOIMMUNE DISEASES

## Brain

Multiple Sclerosis  
Guillain-Barre Syndrome  
Autism



## Thyroid

Thyroiditis  
Hashimoto's Disease  
Graves' Disease

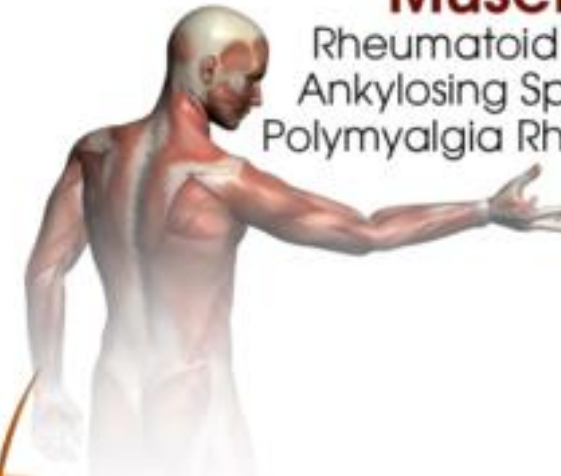


## Bones

Rheumatoid Arthritis  
Ankylosing Spondylitis  
Polymyalgia Rheumatica

## Muscles

Rheumatoid Arthritis  
Ankylosing Spondylitis  
Polymyalgia Rheumatica



## Skin

Psoriasis  
Vitiligo  
Eczema  
Scleroderma



## Lung

Fibromyalgia  
Wegener's Granulomatosis



## Nerves

Peripheral Neuropathy  
Diabetic Neuropathy



## GI Tract

Celiac's Disease  
Crohn's Disease  
Ulcerative Colitis  
Diabetes Type I

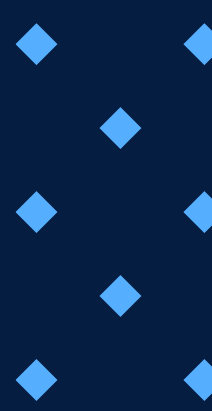


## Blood

Leukemia  
Lupus Erythematosus  
Hemolytic Dysglycemia



**Over 100**  
**Different Types of**  
**Autoimmune**  
**Disorders**



# DM TIPE 1



## Pathogenesis of Type I DM

### Other Autoimmune disorders:

- PS Glomerulonephritis
- Graves, Hashimoto thyroiditis.
- Rheumatic heart disease
- SLE, Collagen vascular disease
- Rheumatoid arthritis.

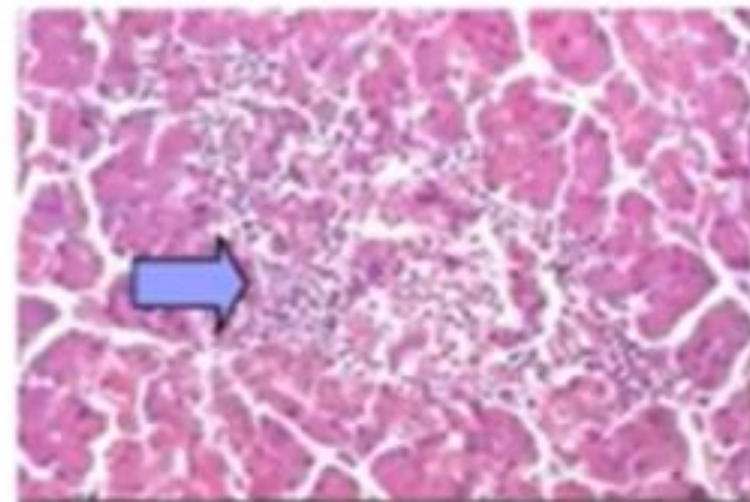
### Antibodies:

Islet cell Ab - **ICA**  
Insulin Auto Ab - **IAA**  
Glut. Acid Decarb - **GAD65**

Autoimmune Insulinitis  
Ab to  $\beta$  cells/insulin

Environment  
Viral infe..?

Genetic  
HLA-DR3/4



Secondary DM  
Inflammation,  
Tumor,  
Infection  
Trauma  
Pancreatitis

Insulin deficiency

$\beta$  cell  
Destruction

# Pathophysiology of Diabetes Mellitus Type 2

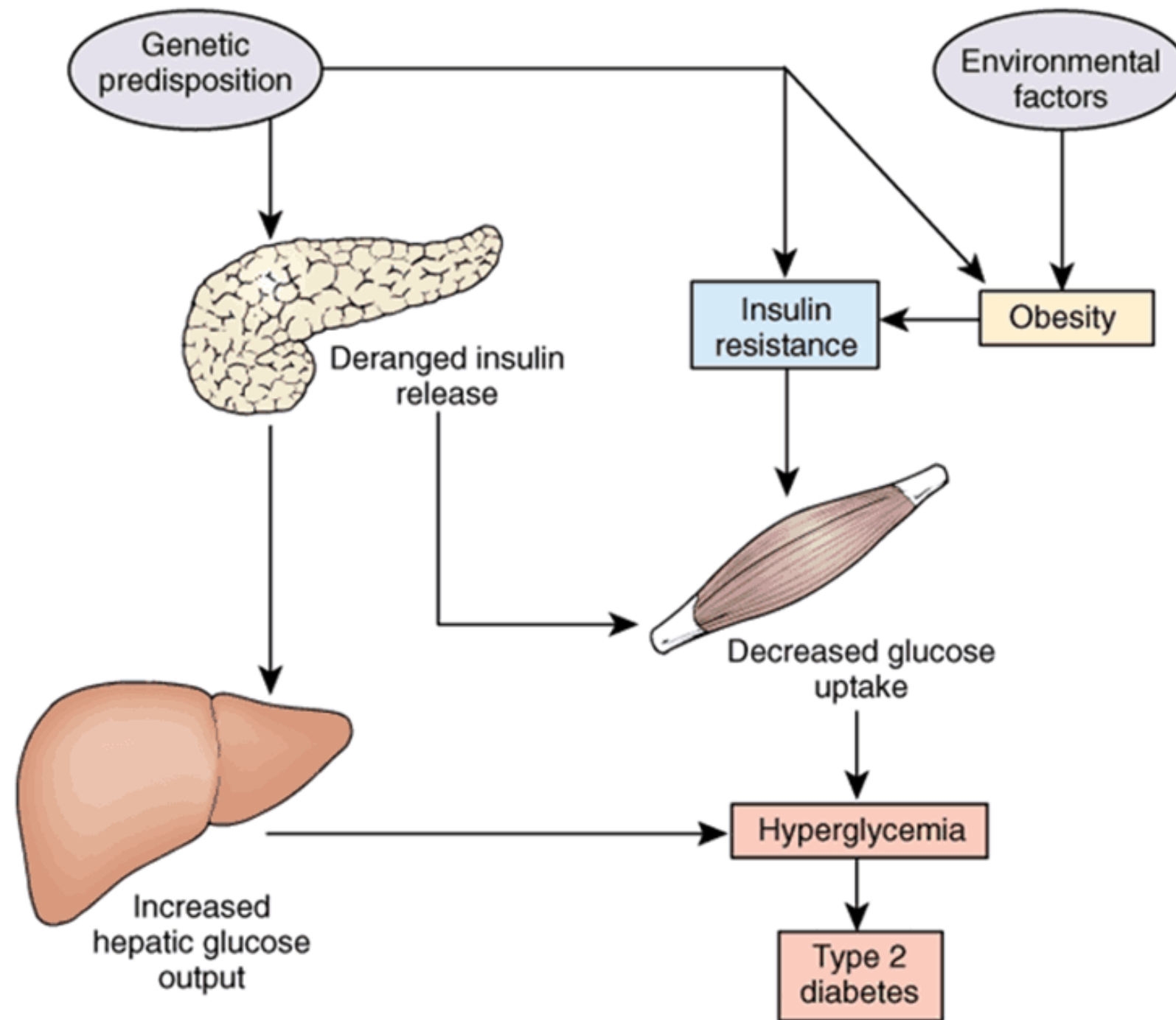
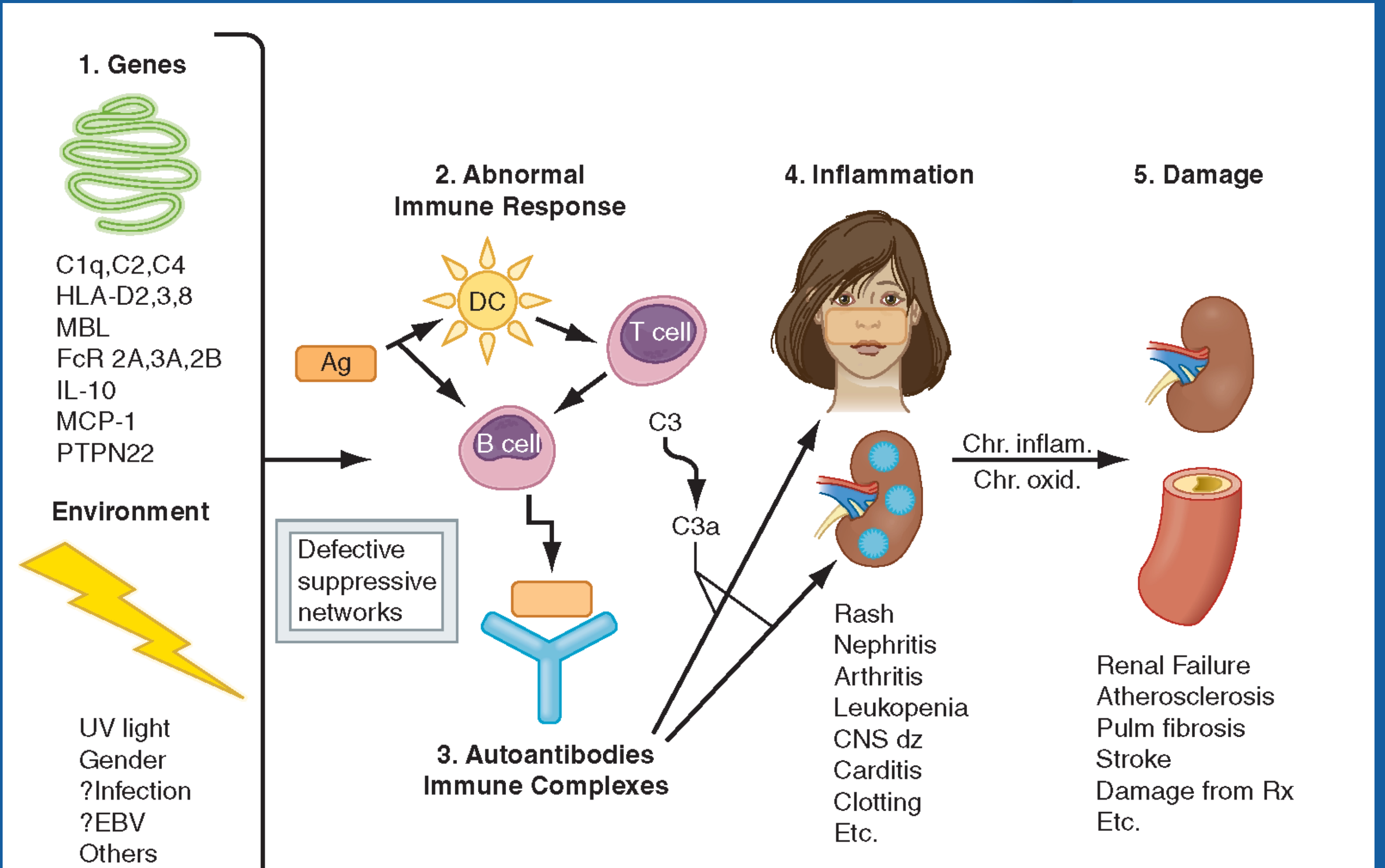


Image via: proprofs.com

# SLE



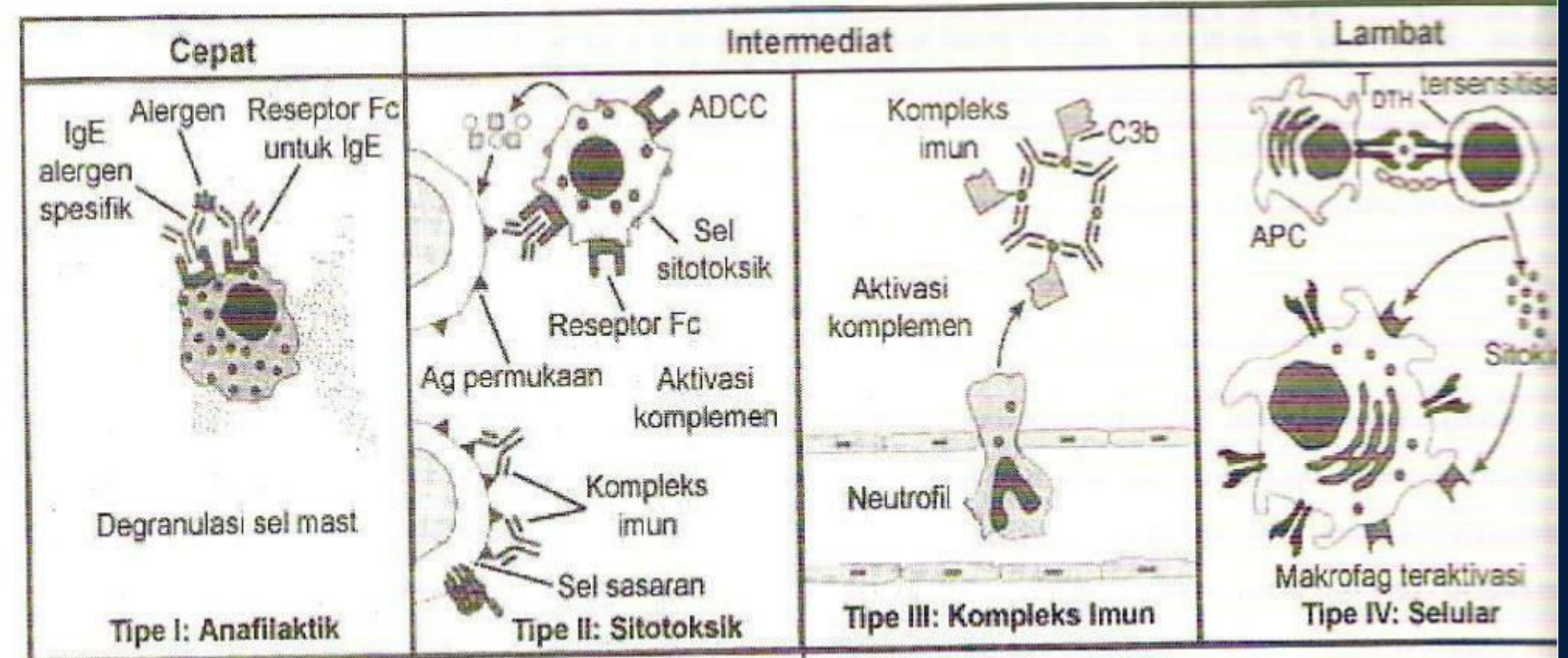
# HIPERSENSITIFITAS

Hipersensitivitas :  
Reaksi imun yang patologik, terjadi akibat respons imun yang berlebihan menimbulkan kerusakan jaringan tubuh.

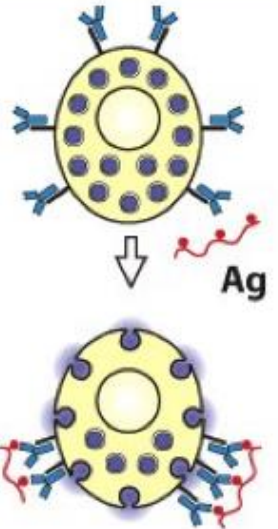
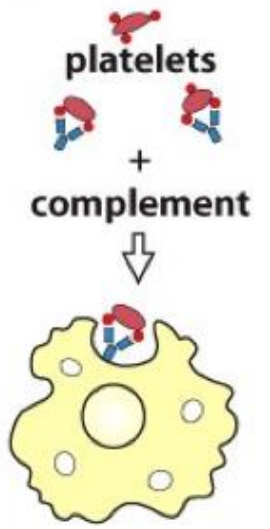
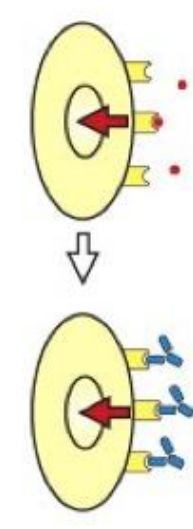
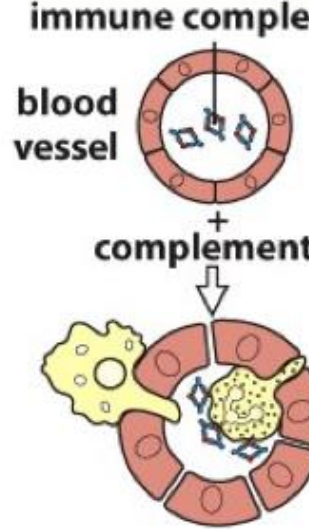
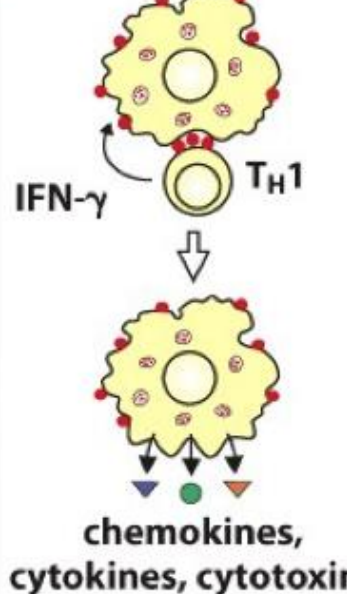
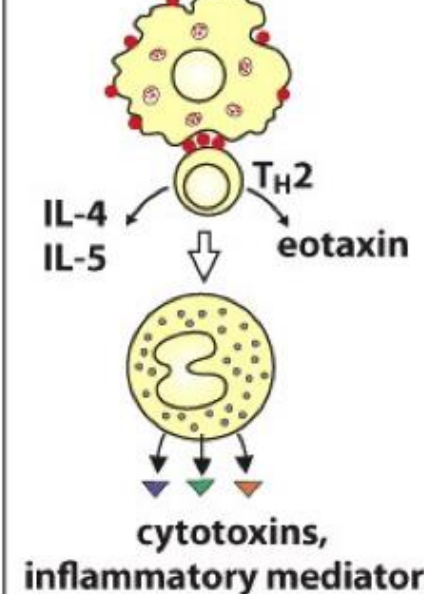
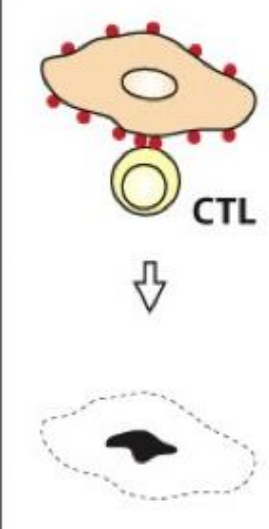
Gell dan Coombs :

- Membagi dalam tipe I, II, III & IV berdasarkan kecepatan dan mekanisme imun yang terjadi.

## I. PEMBAGIAN REAKSI HIPERSENSITIFITAS MENURUT WAKTU

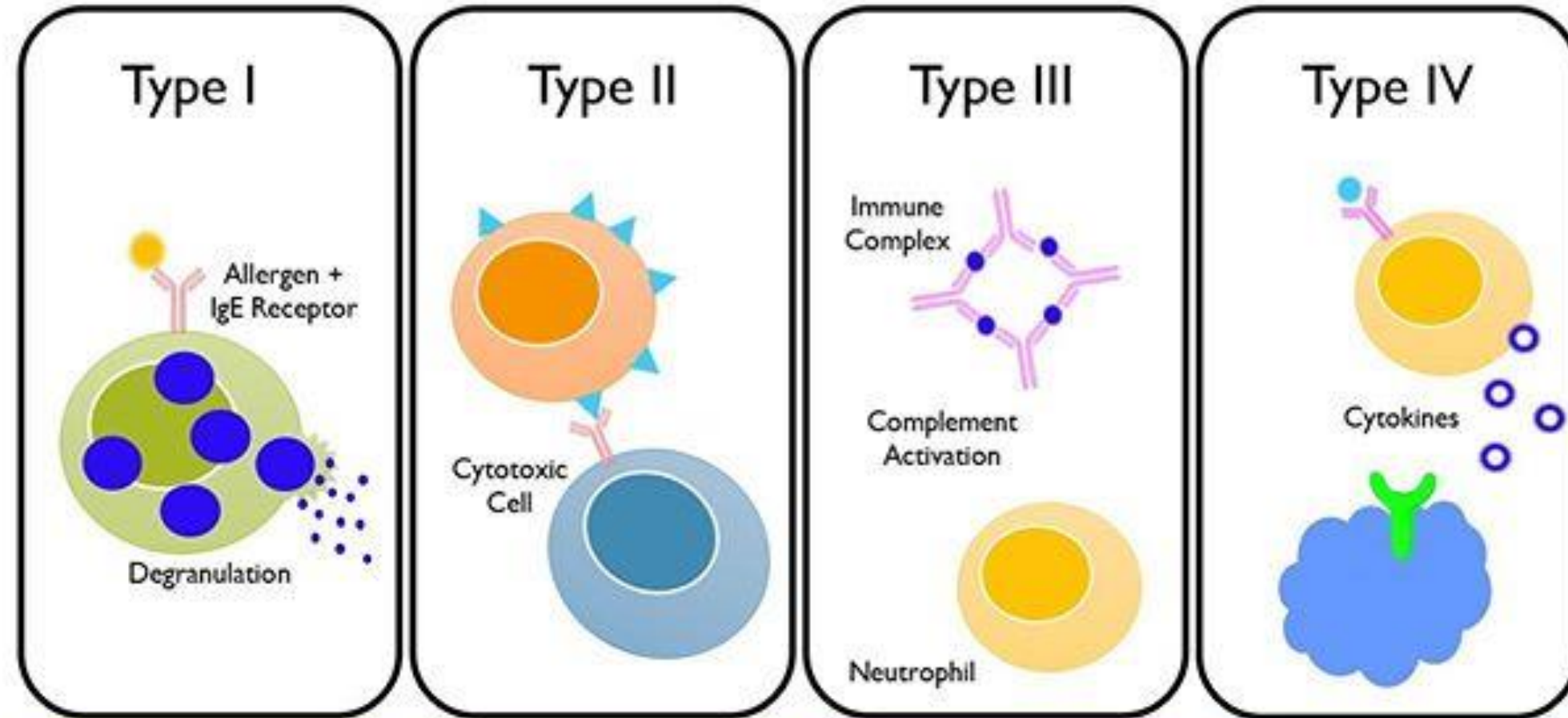


Gambar 115. Berbagai jenis respons hipersensitivitas: cepat, intermediat dan lambat

	Type I	Type II		Type III	Type IV		
<b>Immune reactant</b>	IgE	IgG		IgG	T <sub>H</sub> 1 cells	T <sub>H</sub> 2 cells	CTL
<b>Antigen</b>	Soluble antigen	Cell- or matrix-associated antigen	Cell-surface receptor	Soluble antigen	Soluble antigen	Soluble antigen	Cell-associated antigen
<b>Effector mechanism</b>	Mast-cell activation	Complement, FcR <sup>+</sup> cells (phagocytes, NK cells)	Antibody alters signaling	Complement, phagocytes	Macrophage activation	IgE production, eosinophil activation, mastocytosis	Cytotoxicity
							
<b>Example of hypersensitivity reaction</b>	Allergic rhinitis, allergic asthma, atopic eczema, systemic anaphylaxis, some drug allergies	Some drug allergies (e.g. penicillin)	Chronic urticaria (antibody against FcεRI alpha chain)	Serum sickness, Arthus reaction	Allergic contact dermatitis, tuberculin reaction	Chronic asthma, chronic allergic rhinitis	Graft rejection, allergic contact dermatitis to poison ivy



# Types of Hypersensitivity Reactions



Mediators	IgE-Mediated	IgG or IgM Cytotoxic	Immune Complex-Mediated	T-Cell-Mediated
Onset	Within 1 Hour	Hours to Days	1-3 Weeks	Days to Weeks
Examples	Anaphylaxis	Hemolytic Anemia	Serum Sickness SLE	Rash SJS

**THANK  
YOU!**

