



PENDEKATAN PEMERIKSAAN LABORATORIUM DALAM PENATALAKSANAAN --- INFEKSI COVID 19

OLEH : DIAH HERMAYANTI

* STAF PENGAJAR DEPARTEMEN PATOLOGI KLINIK

FAKULTAS KEDOKTERAN UNIVERSITAS MUHAMMADIYAH MALANG

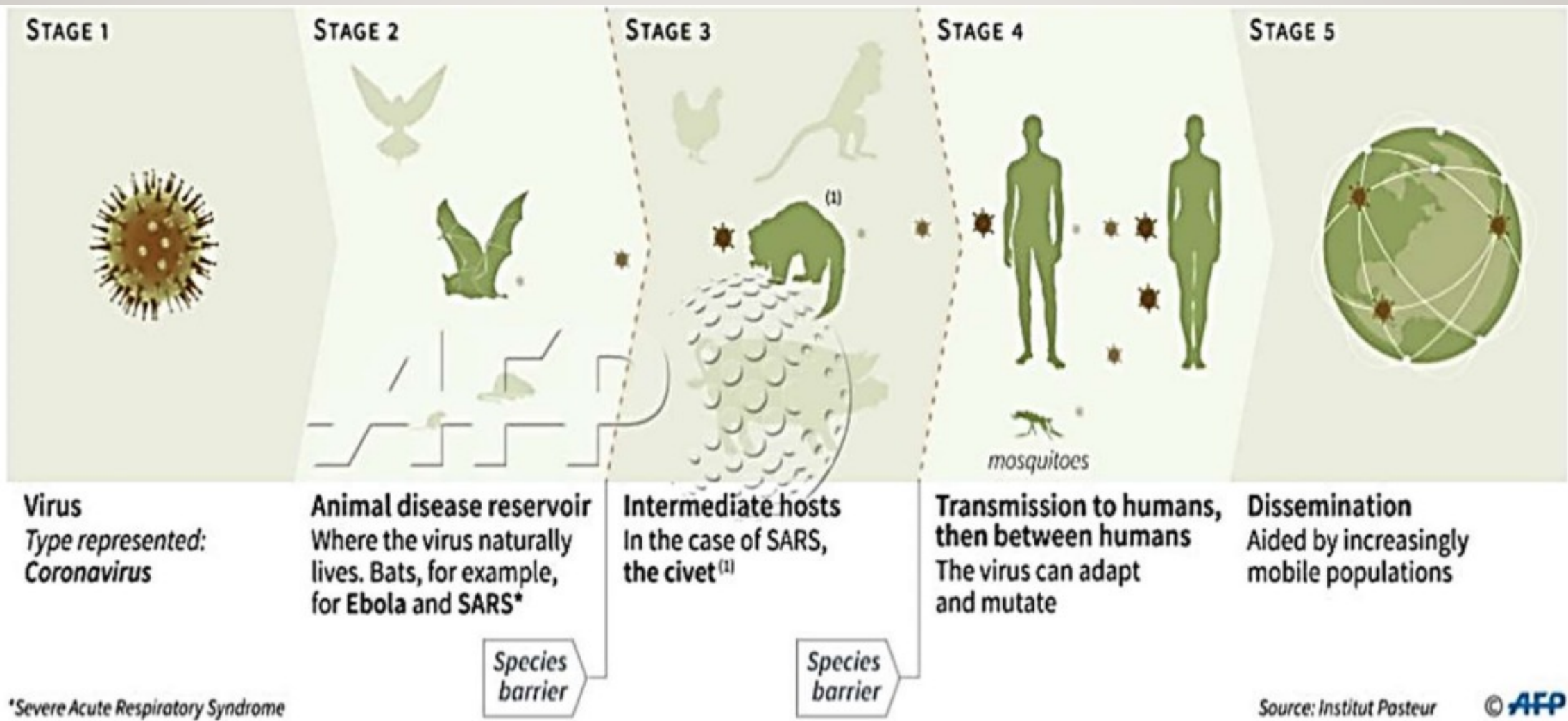


- A pneumonia of unknown cause detected in Wuhan, China was first reported to the WHO Country Office in China on 31 December 2019.

- WHO is working 24/7 to analyse data, provide advice, coordinate with partners, help countries prepare, increase supplies and manage expert networks.

- The outbreak was declared a Public Health Emergency of International Concern on 30 January 2020.

- On 11 February 2020, WHO announced a name for the new coronavirus disease: COVID-19.



Gambar 2. Ilustrasi transmisi *Coronavirus*¹⁹

Kasus baru dan kematian

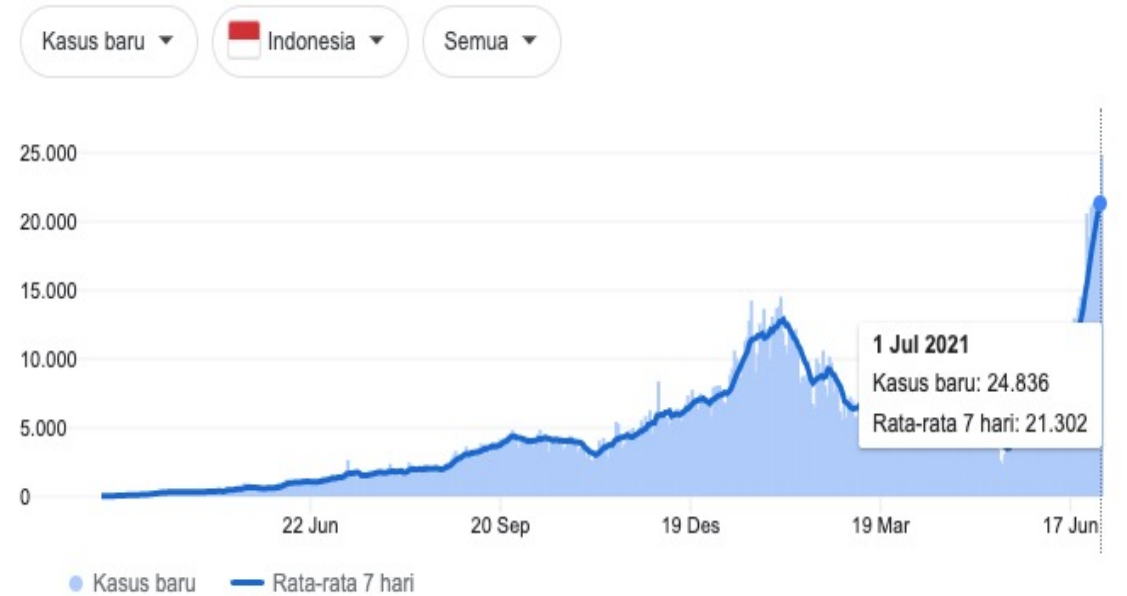
Dari [JHU CSSE COVID-19 Data](#) · Terakhir diperbarui: 2 hari yang lalu



Setiap hari menampilkan jumlah kasus baru yang dilaporkan sejak hari sebelumnya · [Tentang data ini](#)

Kasus baru dan kematian

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Positive sense single stranded RNA
Genome ~30000 nucleotides long
Pleomorphic viruses
80 x 160 nm diameter, with 12-24 nm surface projections (spikes) that cause the corona (Latin: crown) appearance
Major proteins:
S – spike
E – envelope
M – membrane
N – nucleocapsid

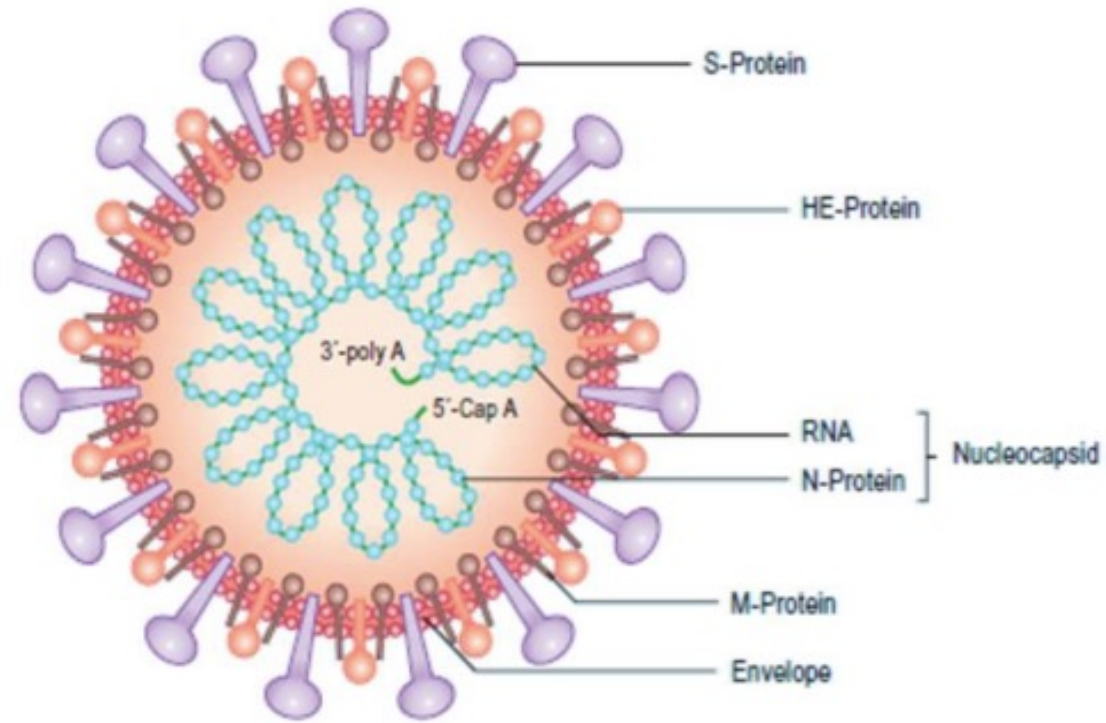
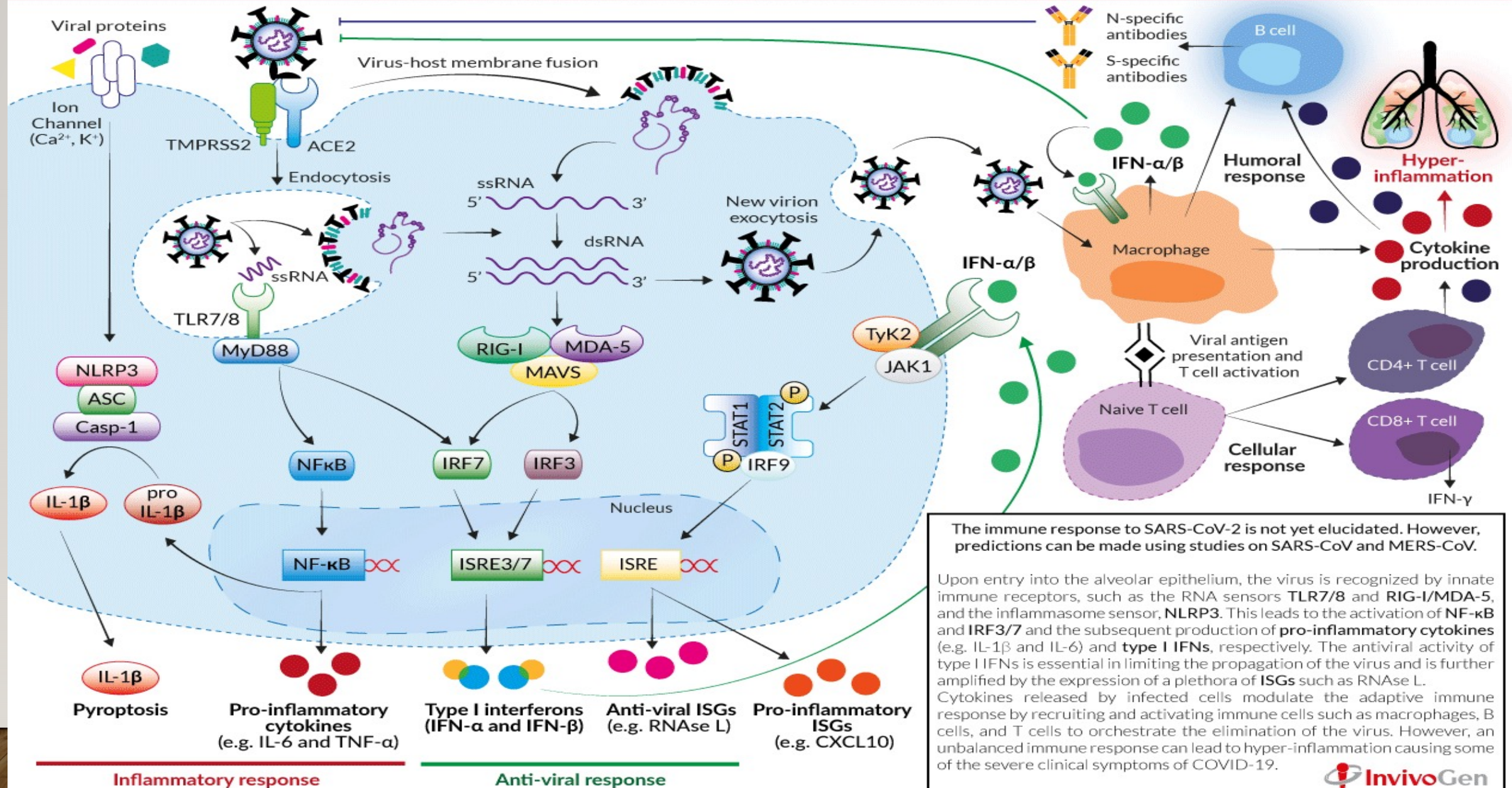


Fig. 1 Coronavirus.

Gambar 1. Struktur *Coronavirus*¹³

Predicted host immune responses to SARS-CoV-2



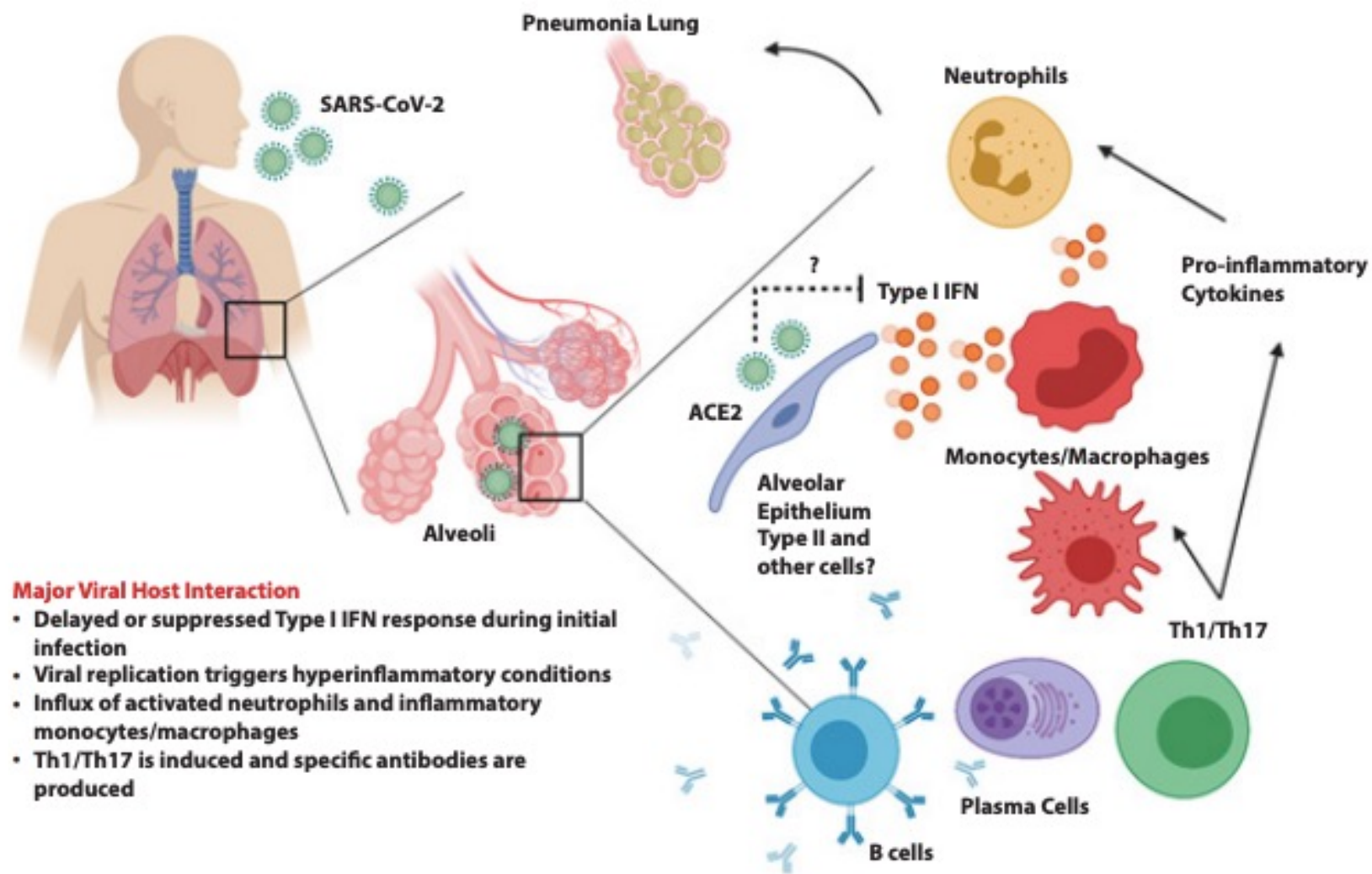
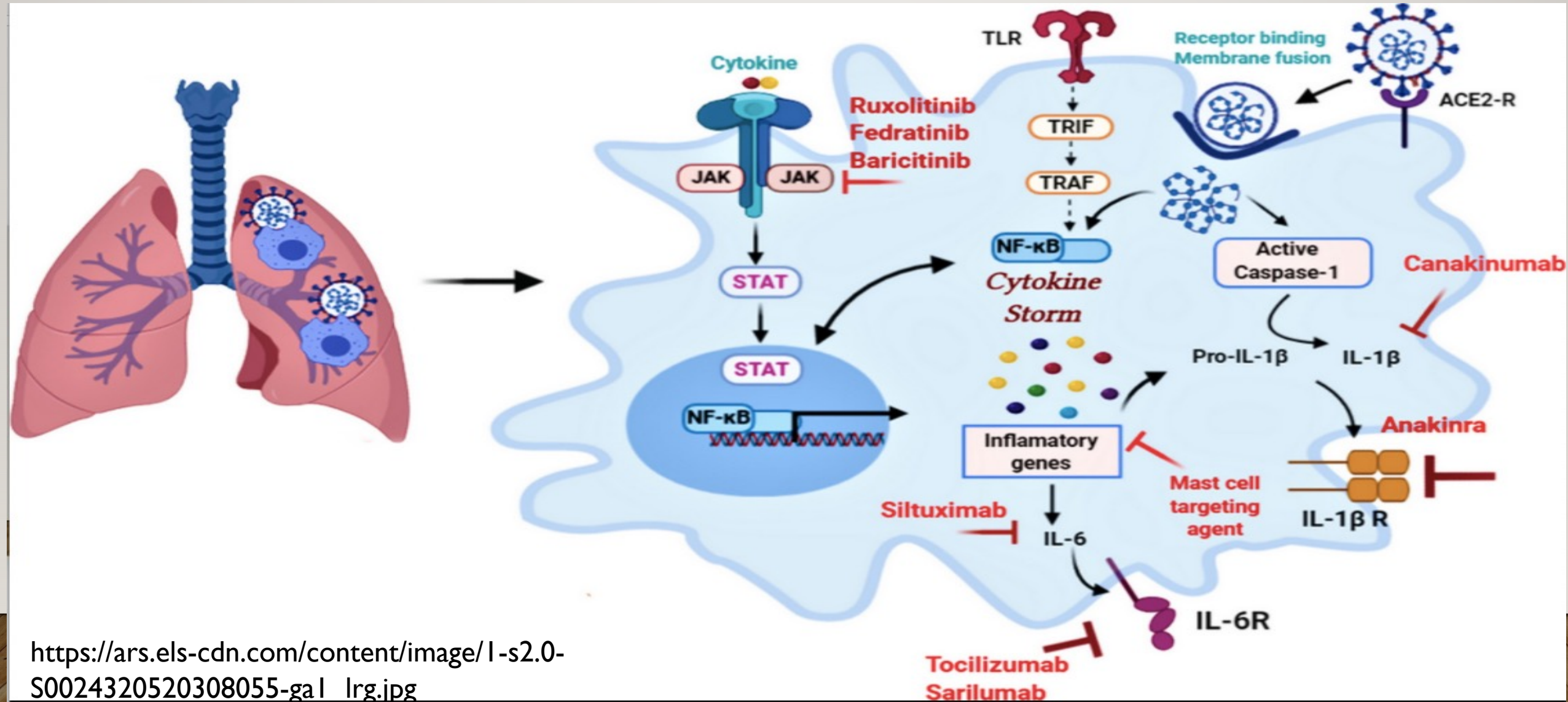


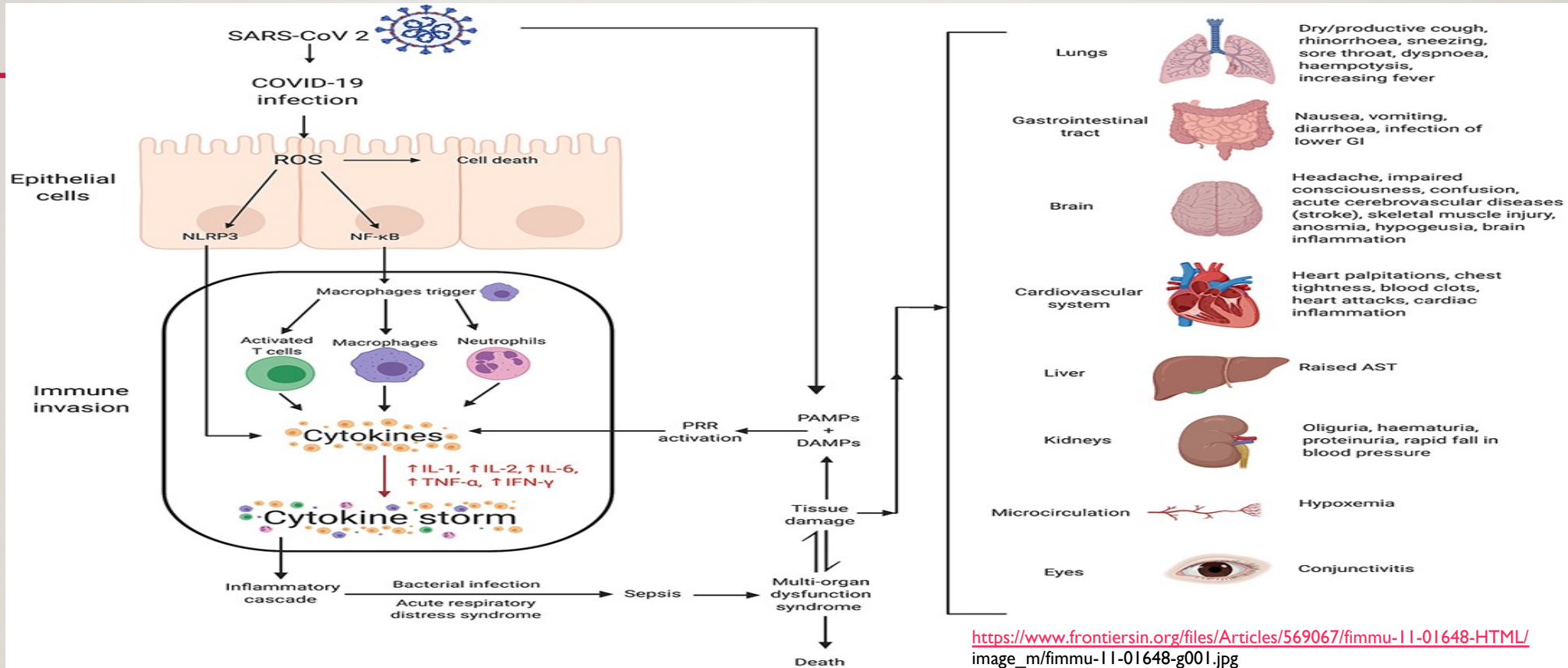
Figure 2. Proposed host immune responses during SARS-CoV-2 infection

Aerosolized uptake of SARS-CoV-2 leads to infection of ACE2 expressing target cells such as alveolar type 2 cells or other unknown target cells. Virus may dampen anti-viral IFN responses resulting in uncontrolled viral replication. The influx of neutrophils and monocytes/macrophages results in hyperproduction of pro-inflammatory cytokines. The immunopathology of lung may be the result of the “cytokine storms”. Specific Th1/Th17 may be activated and contributes to exacerbate inflammatory responses. B cells/plasma cells produce SARS-CoV-2 specific antibodies that may help neutralize viruses. The question marks indicated events that are still speculative or unknown. Figure is made with biorender (<https://biorender.com/>).

CYTOKINE STORM

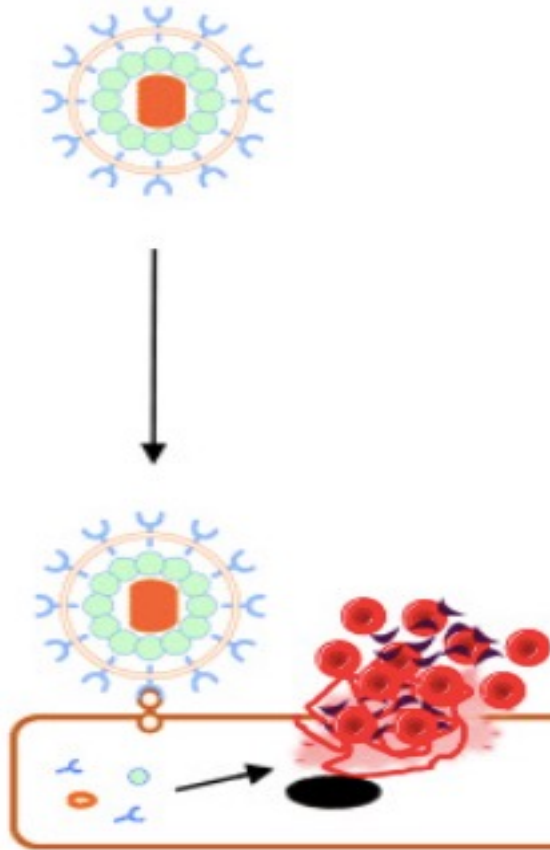


MULTI ORGAN DYSFUNCTION

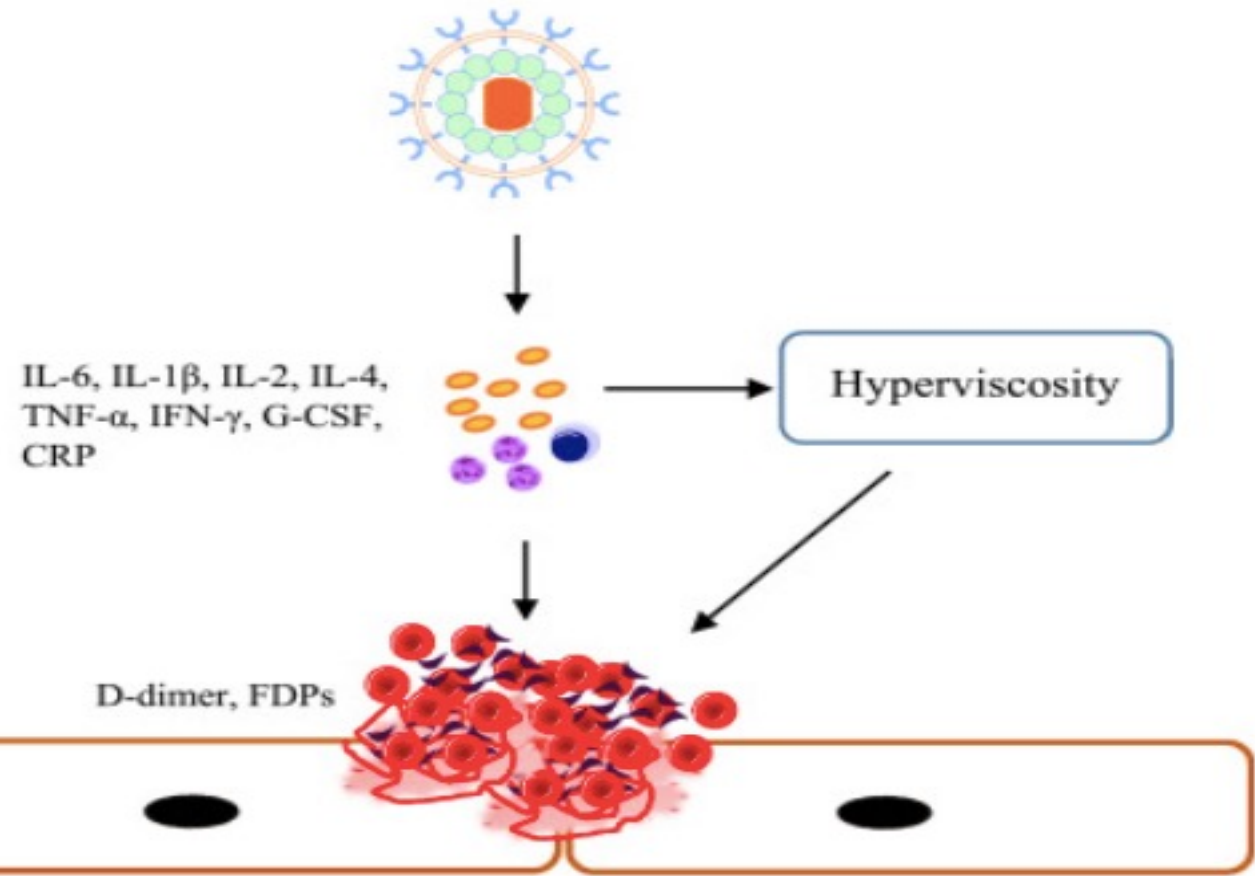


PATOPHYSIOLOGY HYPERVISICOSITY IN COVID 19

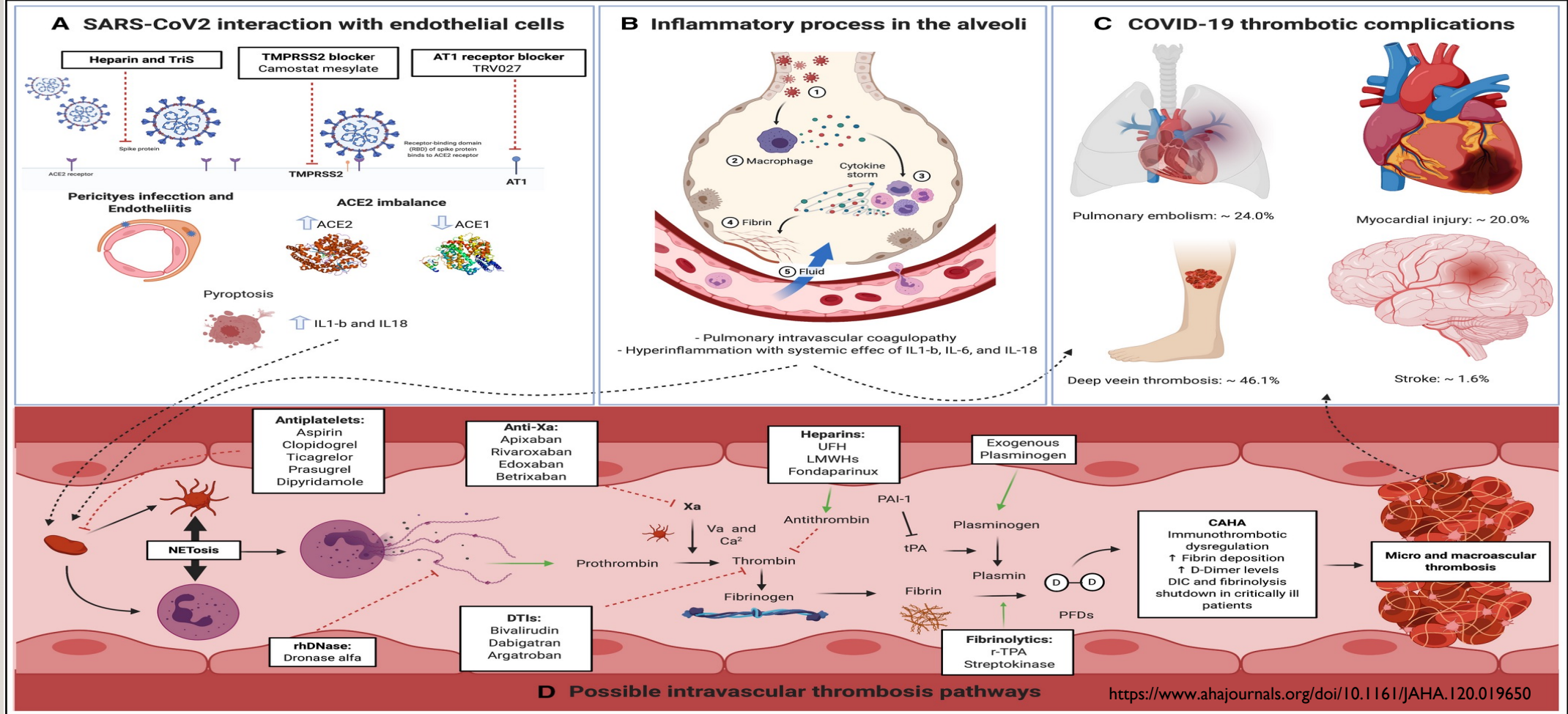
Direct cytotoxic effect



Inflammation, hyperproteinemia, Hyperviscosity



PATOPHYSIOLOGY INTRAVASDULAR THROMBOSIS IN COVID -19



PEMERIKSAAN LABORATORIUM SPESIFIK COVID-19

- TES VIRAL

(Hasil menunjukkan +/- infeksi saat ini)

- ❖ rt-PCR (reverse transcriptase polymerase chain reaction),
- ❖ TCM (tes cepat molekuler)
- ❖ Antigen-rapid test

- TES ANTIBODI

(Hasil menunjukkan +/- infeksi sebelumnya)

Tes sulit untuk menunjukkan adanya infeksi saat ini, karena antibody terbentuk 1-3 minggu setelah infeksi.

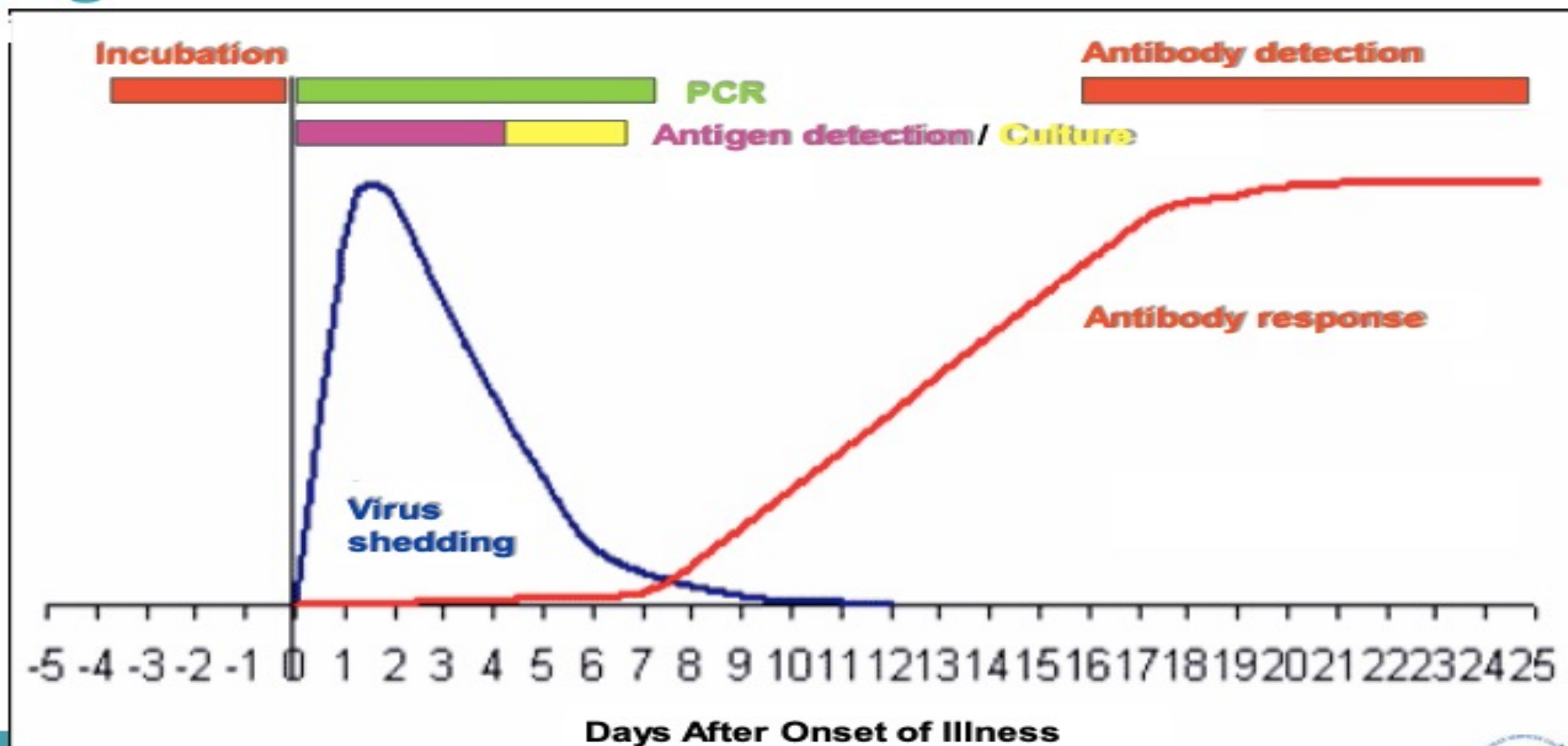
- ❖ Antibodi total
- ❖ IgM & IgG

- PEDOMAN PEMERIKSAAN SESUAI DENGAN KEBIJAKAN DEPARTEMEN KESEHATAN NEGARA SETEMPAT

<https://www.cdc.gov/coronavirus/2019-ncov/symptoms-testing/testing.html>

Specimen Collection

Timing



PEMERIKSAAN LABORATORIUM PENAPIS

1. HEMATOLOGI (DARAH LENGKAP) :

- JUMLAH LEUKOSIT : < 4.000/ul
- NEUTROFIL : > 2.500 /ul
- HITUNG LIMFOSIT ABSOLUT/ALC : < 1.500 /ul

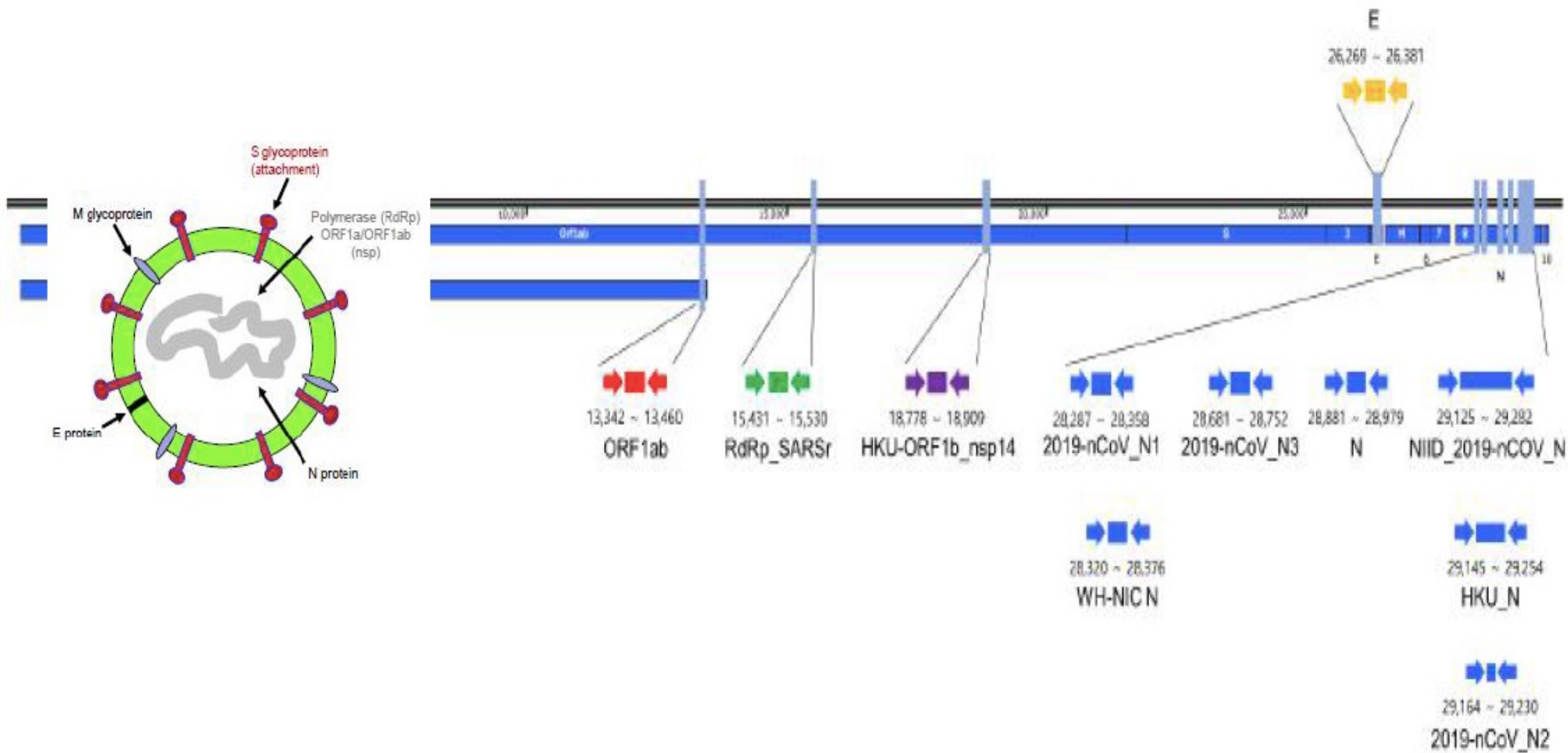
2. NEUTROPHYL LYMPHOCYTE RATIO/ NLR : > 3,13

3. C- REACTIVE PROTEIN (CRP) > 10 mg/L

4. PEMERIKSAAN MOLEKULER : ANTIGEN RAPID TEST, rt-PCR, TCM

REVERSE TRANSCRIPTION POLYMERASE CHAIN REACTION (RT-PCR)

- Nucleic acid amplification test yang mendeteksi sekuens khas dari virus RNA dengan konfirmasi sekuensing nucleic acid.
- Teknik :
 1. Reverse transcription, untuk mengubah RNA menjadi DNA
 2. PCR digunakan untuk mengamplifikasi DNA, sehingga dapat terdeteksi



VARIAN VIRUS

USA :

B.1.1.7 (Alpha)

B.1.351 (Beta)

P.1 (Gamma)

B.1.427 (Epsilon)

B.1.429 (Epsilon)

B.1.617.2 (Delta)

INDONESIA :

Sedang berjalan gene sequencing

sudah ditemukan varian alfa dan delta

DAMPAK ADANYA VARIAN/MUTASI VIRUS

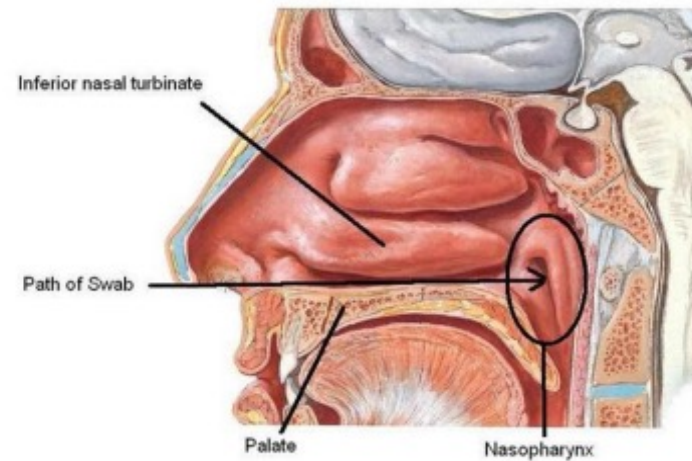
- Perubahan tempat/reseptor binding
- Pengurangan kemampuan netralisasi antibody dari vaksinasi sebelumnya
- Penurunan efikasi pengobatan
- Dampak potensi diagnostic
- Diperkirakan peningkatan transmisi dan derajat keparahan

<https://www.cdc.gov/coronavirus/2019-ncov/variants/variant-info.html>

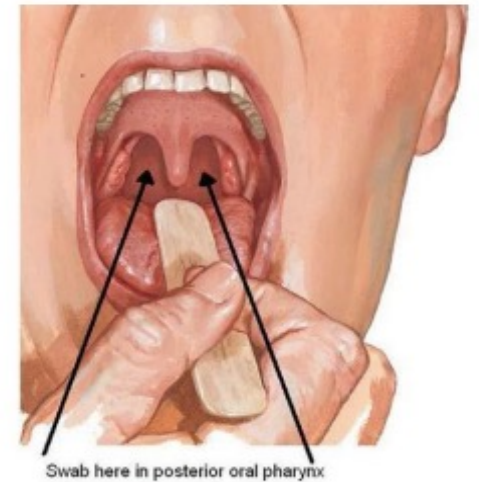
SAMPEL UNTUK PCR : SWAB NASO&ORO PHARINX



Specimen Collection Swab Specimen Collection



Nasopharyngeal Swab



Oropharyngeal (Throat) Swab

INTERPRETASI TES PCR

1. Positif :

- ✓ indikasi adanya infeksi aktif Covid-19
- ✓ tidak menyingkirkan adanya infeksi sekunder bakteri , atau koinfeksi dengan virus lain

2. Negatif :

- tidak menyingkirkan infeksi Covid 19
- Penggunaan data lainnya: klinis, riwayat pasien, dan informasi idemiologi

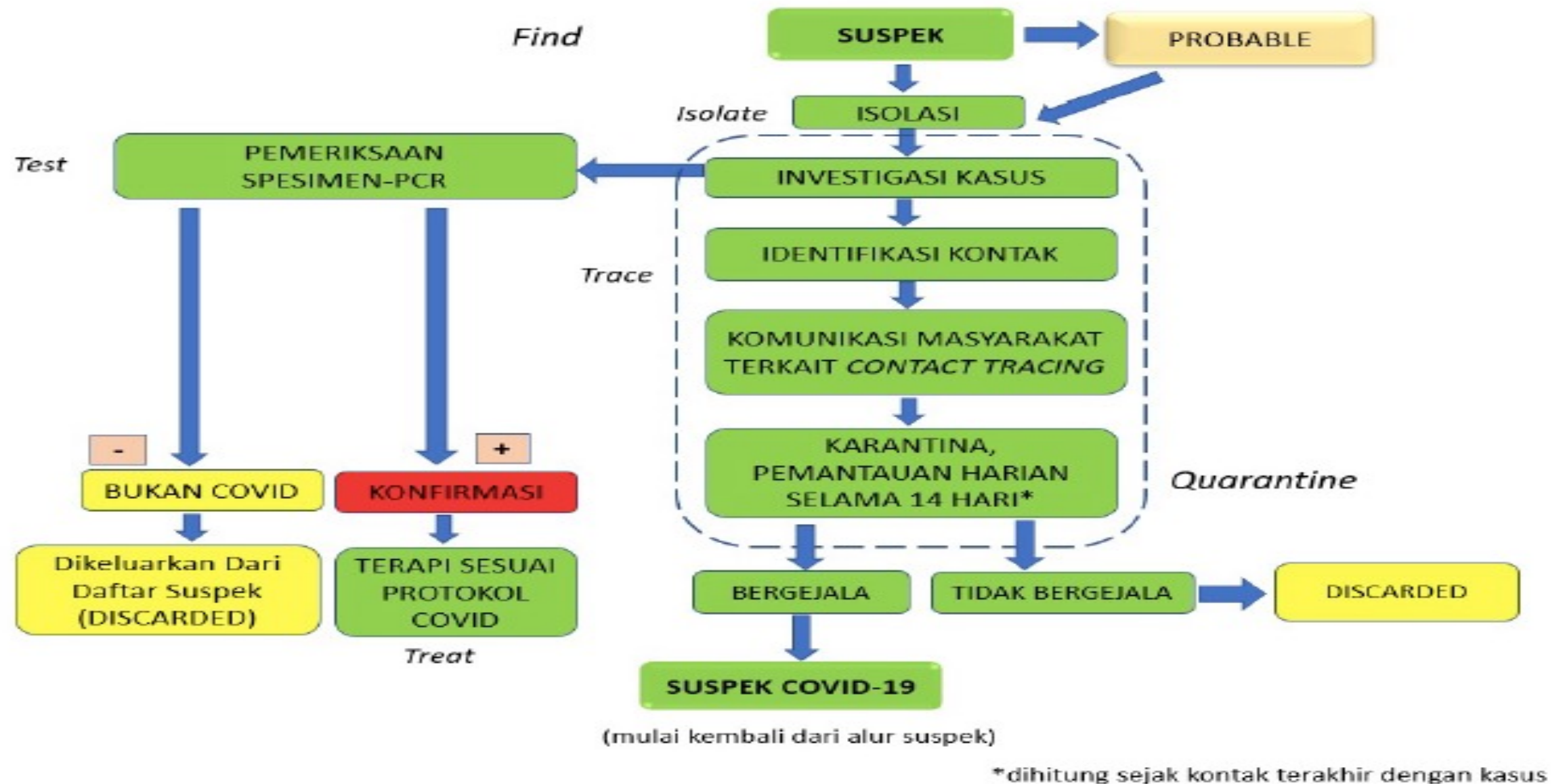
3. Satu atau lebih hasil PCR negative, tetap waspada karena ada kemungkinan

karena :

- ✓ specimen dengan kualitas jelek (sedikit mengandung material pasien)
- ✓ pengambilan dalam waktu yang terlambat atau terlalu awal dari infeksi
- ✓ pengiriman sampel buruk
- ✓ adanya mutasi viral

ISTILAH

- KASUS KONFIRMASI
- KASUS SUSPEK
- KASUS PROBABLE
- KONTAK ERAT



Gambar 3. 1. Alur Manajemen Kesehatan Masyarakat

ANTIBODY RAPID TEST

TUJUAN :

- ❖ Deteksi antibody SARS-CoV-2 untuk melihat apakah pernah terinfeksi
- ❖ Skrining untuk survailans
- ❖ Terbentuk 1-3 minggu setelah terinfeksi

SENSITIVITAS & SPESIFISITAS TES ANTIBODI

- CDC's test : Spesifisitas > 99%, sensitivitas 96%
-

- Lassauniere, 2020 :

Sensitivitas 83-93%

H 7-13 : 40-86%

H 14-20: 67-100%

H >21 : 78-89%

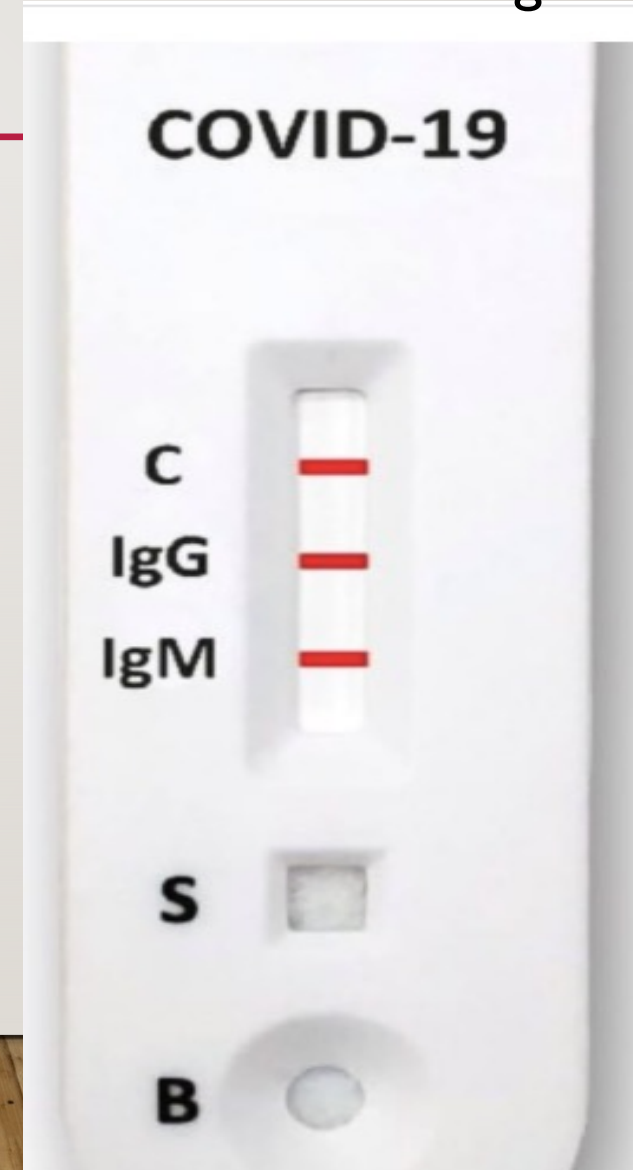
Spesivisitas 80-100%

Positive predictive value : 57-100%

JENIS TES ANTIBODI RAPID

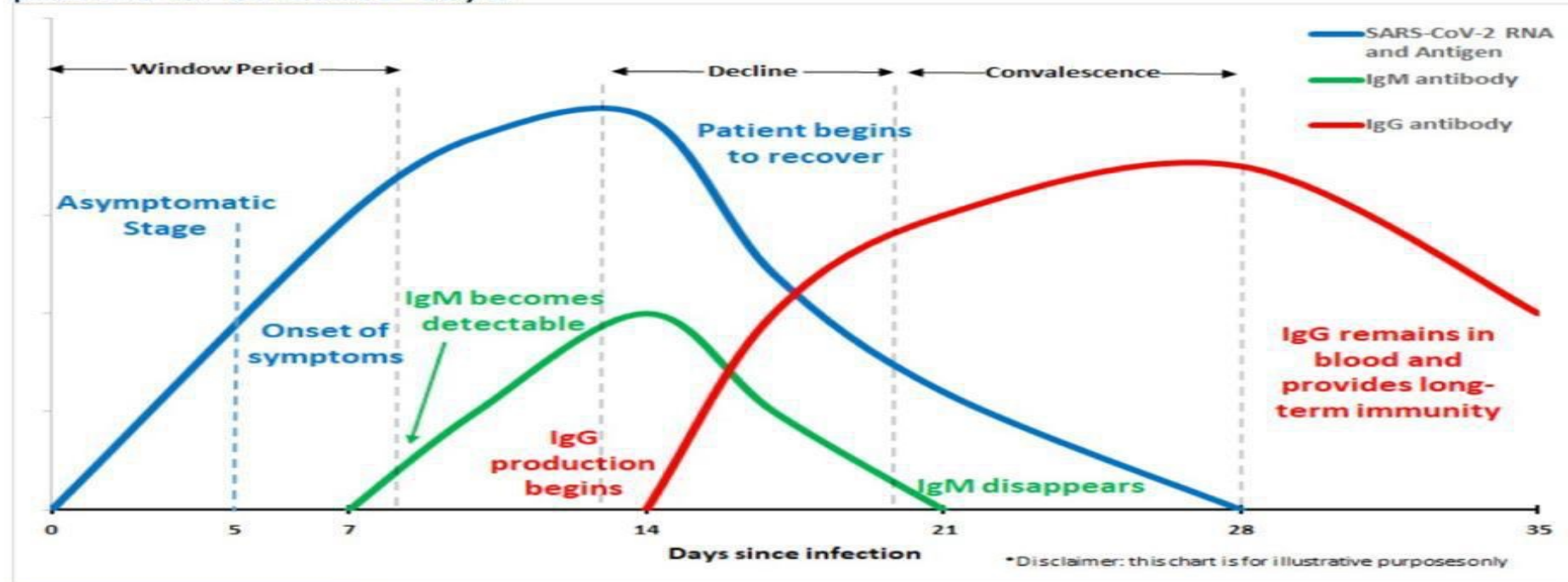
2. DETEKSI ANTIBODI IgM & IgG

I. DETEKSI TOTAL ANTIBODI



INTERPRETASI PEMERIKSAAN COVID-19

Therefore, this COVID-19 Rapid Test should not be used until symptoms have been present for at least 3 days.



Test results			Clinical Significance
PCR	IgM	IgG	
+	-	-	Patient may be in the window period of infection.
+	+	-	Patient may be in the early stage of infection.
+	+	+	Patient is in the active phase of infection.
+	-	+	Patient may be in the late or recurrent stage of infection.
-	+	-	Patient may be in the early stage of infection. PCR result may be false-negative.
-	-	+	Patient may have had a past infection, and has recovered.
-	+	+	Patient may be in the recovery stage of an infection, or the PCR result may be false-negative.

Infeksi COVID-19

Puncak pada hari ke-13:
WBC, Neutrofil, NLR, CRP
paling ↑.
Limfosit abs (ALC) sangat ↓

Progress

- Limf abs (ALC) ↓
- NLR ↑
- CRP ↑

Setelah Pengobatan

- WBC, Neutrofil, NLR dan CRP ↓
- **Limfosit absolut ↑**

INDIKASI BAIK

Early Stage

WBC dan
limfosit
normal

MONITORING

- PEMERIKSAAN LABORATORIUM :

HEMATOLOGI :

jumlah leukosit

NLR

jumlah netrofil

jumlah trombosit

hitung limfosit absolut

CRP, atau procalcitonin, ferritin (protein fase akut)

Analisa gas darah

IL-6

elektrolit

hemostasis : PT,APTT, D-Dimer

fungsi renal : ureum kreatinin

Fungsi hati : SGOT, SGPT, LDH

PCR

SURVEILANS

- Untuk contact tracing
- Pemeriksaan kombinasi rapid antigen test dan PCR

RESUME

