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TTL : Surabaya, 30 Mei 1983

Riwayat Pendidikan :

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PRESTASI :

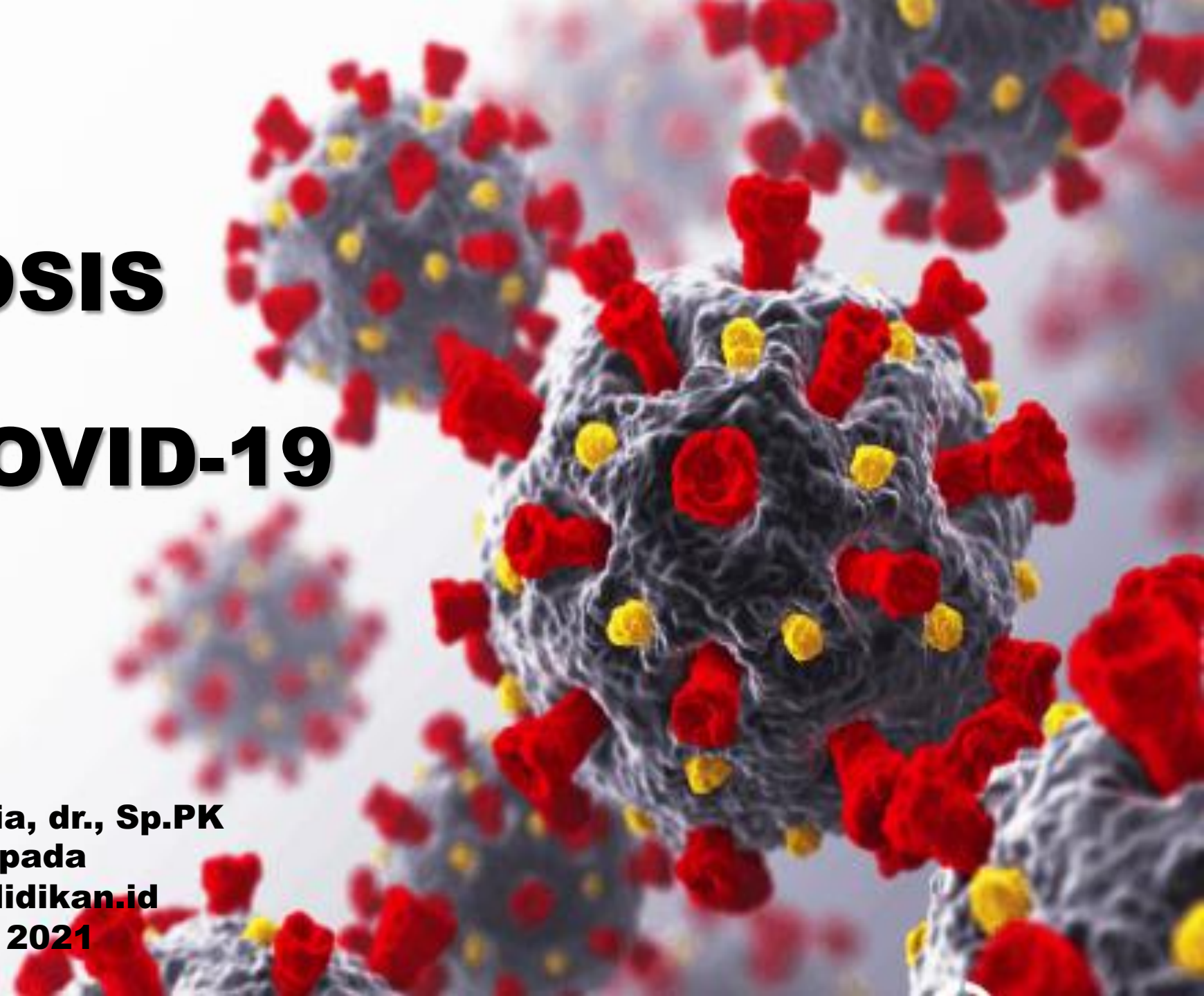
- Juara 2 Lomba Poster Kongres Nasional Himpunan Kimia Klinik Indonesia XIV (Laporan Kasus : Krisis Hipertiroid dalam Kehamilan) (Hotel Bumi Surabaya)
- Juara I Lomba Artikel Populer dalam rangka *Antibiotic Awareness Week Indonesia* 2015, diselenggarakan oleh Dinas Kesehatan Provinsi Jawa Timur bekerjasama dengan PPRA RSUD Dr. Soetomo – FK UNAIR Surabaya
- dan berbagai prestasi akademik dan non akademik lain

PUBLIKASI ILMIAH / NON ILMIAH :

- International Journal of Pharmaceutical Research Oct-Dec 2020. Vol 12. Issue 4. Comparative Diagnostic Value of Anti Dengue IgG, Anti Dengue IgM of Two Rapid Test in Dengue Virus Infection
- Viruses 2019, 12, 913. Dengue Virus Serotype 4 Is Responsible for The Outbreak of Dengue in East Java City of Jember, Indonesia
- Lung India Journal March – April 2020. Vol 37. Issue 2. Changes of Serum Adenosine Deaminase Level in New Cases of Pulmonary Tuberculosis Before and After Intensive Phase Treatment
- Paeditrica Indonesiana 2017. Vol. 57. No. 3. p.138-43. DOI:<http://dx.doi.org/10.14238/p57.3.2017.138-43>. Original Article : CD4+ T-cell, CD8+ T-cell, CD4+/CD8+ Ratio, and Apoptosis As A Response to Induction Phase Chemotherapy in Pediatric Acute Lymphoblastic Leukemia
- Majalah Mimbar RSUD Dr. Soetomo Surabaya 2016/Vol.20/No.1. Artikel : Laktat Penanda Awal Sepsis dan Asidosis
- Beberapa artikel pada Semijurnal Kedokteran dan Farmasi Ethical Digest, dan lain-lain

DIAGNOSIS & DETEKSI COVID-19

May Fanny Tanzilia, dr., Sp.PK
Disajikan pada
Webinar pendidikan.id
6 Februari 2021





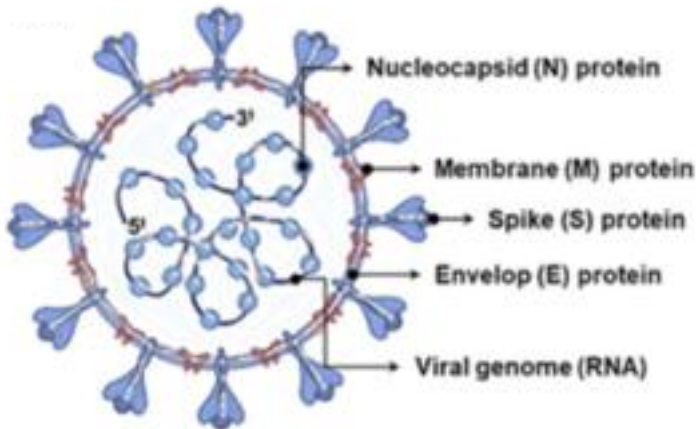
PENDAHULUAN



- Penyakit COVID-19
- Virus SARS CoV-2
- ssRNA
- Famili *Coronavirus*



Desember 2019 : Wuhan,
provinsi Hubei, Cina →
→ 2019-nCoV

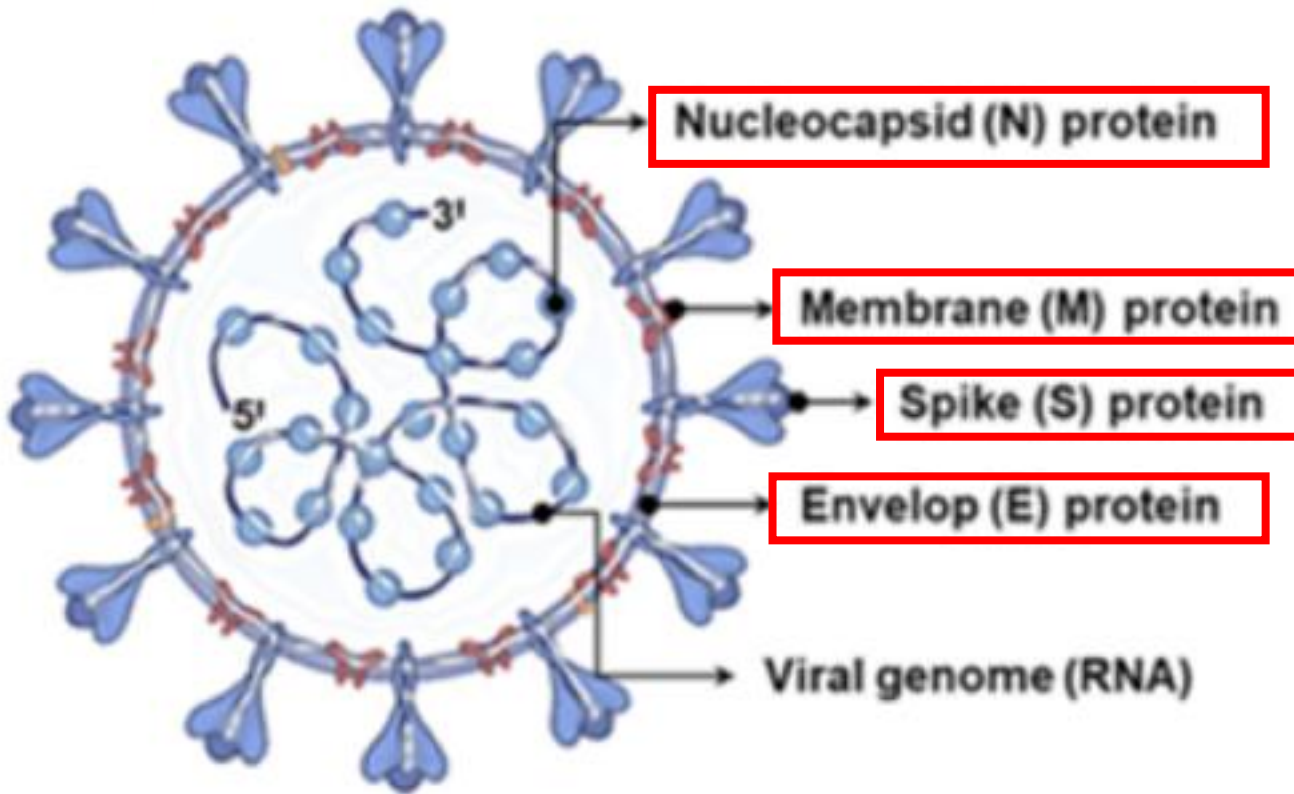


<https://www.biophysics.org>

- Transmisi sangat cepat
- **11 Maret 2020 : Pandemi**



STRUKTUR PROTEIN VIRUS SARS CoV-2



- Famili : *Coronavirus*
- Genus : *Betacoronavirus*
- Diameter 65-125nm
- Berkapsul, tidak bersegmen
- Bentuk khas seperti mahkota

MANIFESTASI KLINIS



Lesu, nafsu makan
menurun



Demam



Nyeri kepala



Nyeri sendi dan
otot

- Masa inkubasi :
5 – 6 hari, bisa hingga 14 hari



Pilek



Batuk, radang
tenggorok



Mual, muntah



Diare



DIAGNOSIS



Gejala & tanda



Cek fisik



Hematologi



Rapid Ag, Ab



Kimia Klinik



RT-PCR

**CEPAT
AKURAT**



**Baku emas
(gold standard)**



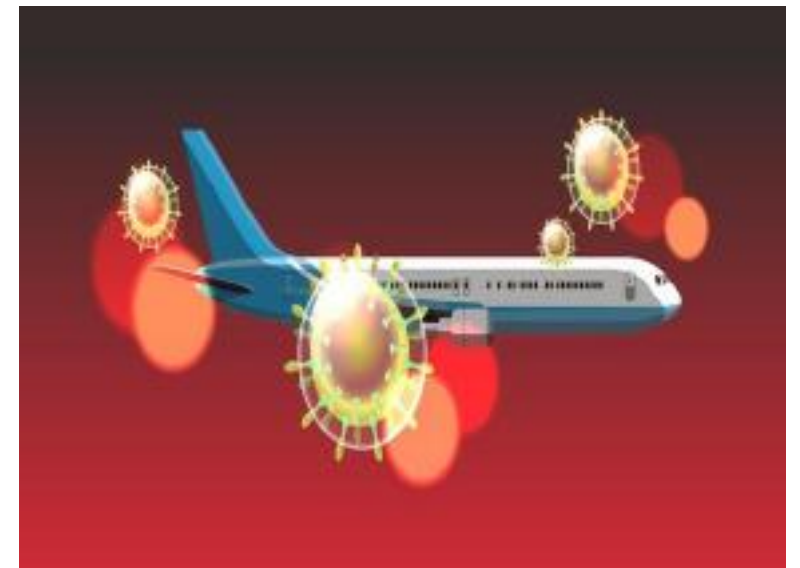
**Cegah transmisi
dan komplikasi**



Gejala dan tanda



Kontak erat



Travelling



**Pemeriksaan
oleh dokter**



**Pemeriksaan
laboratorium**

PEMERIKSAAN LABORATORIUM



Rutin

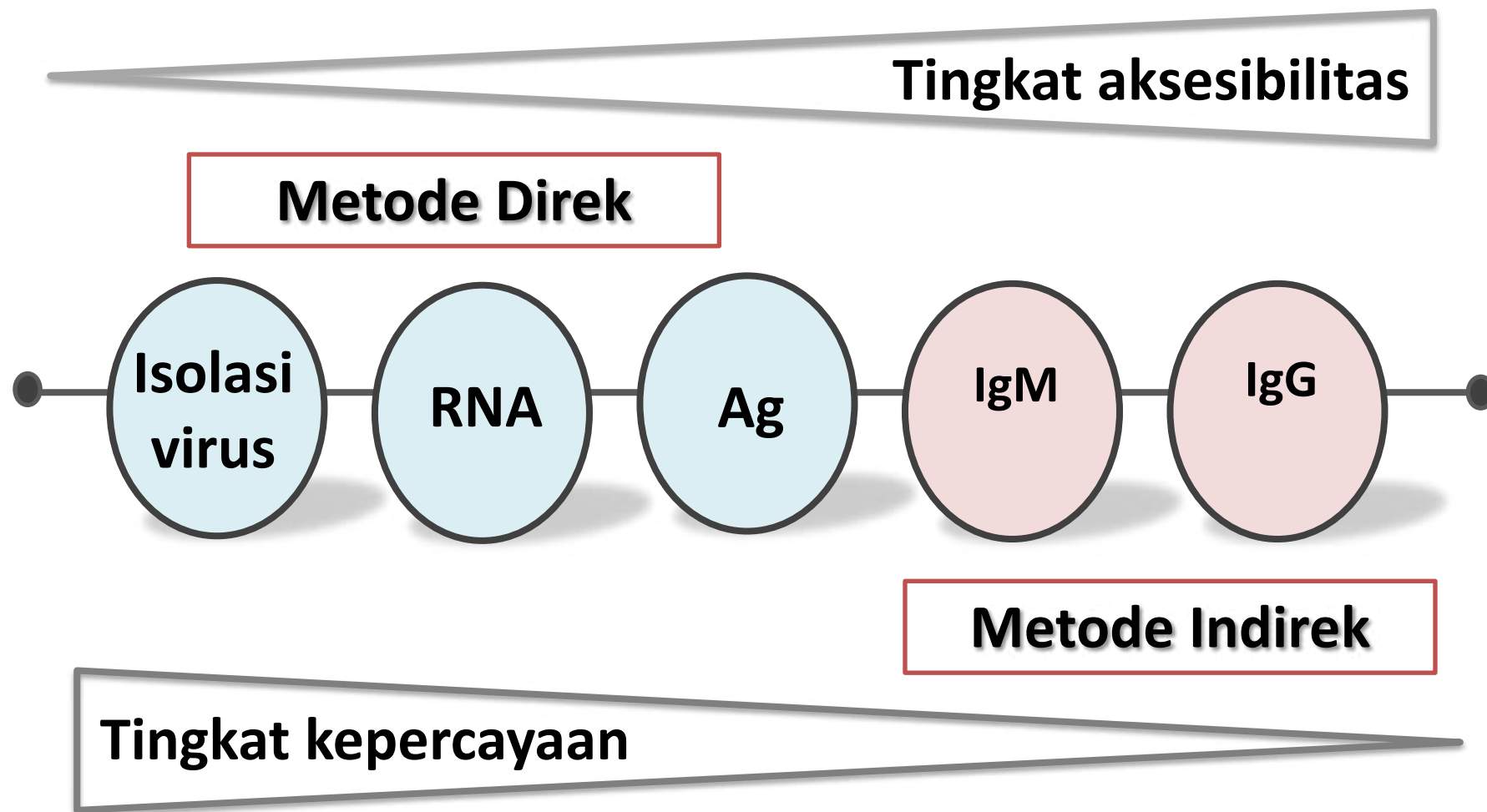


- ☐ Darah lengkap
- ☐ Kimia Klinik
- ☐ dll

Spesifik



- ☐ Antibodi SARS CoV-2
- ☐ Antigen SARS CoV-2
- ☐ PCR



Isolasi virus = Kultur virus

RNA = Ribonucleic acid

Ag = Antigen

Ig M = Immunoglobulin M

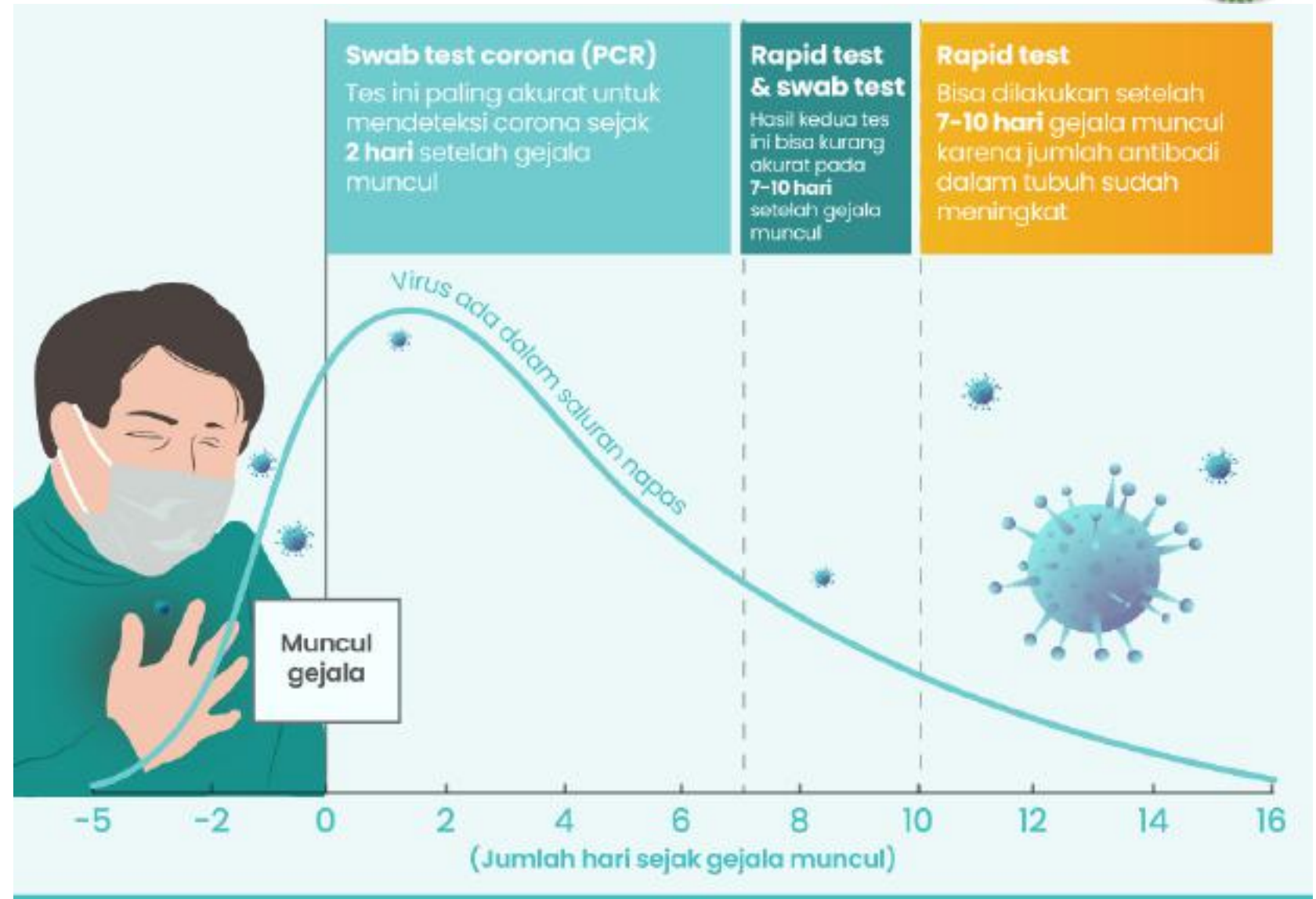
Ig G = Immunoglobulin G

KAPAN HARUS TES COVID-19 ???

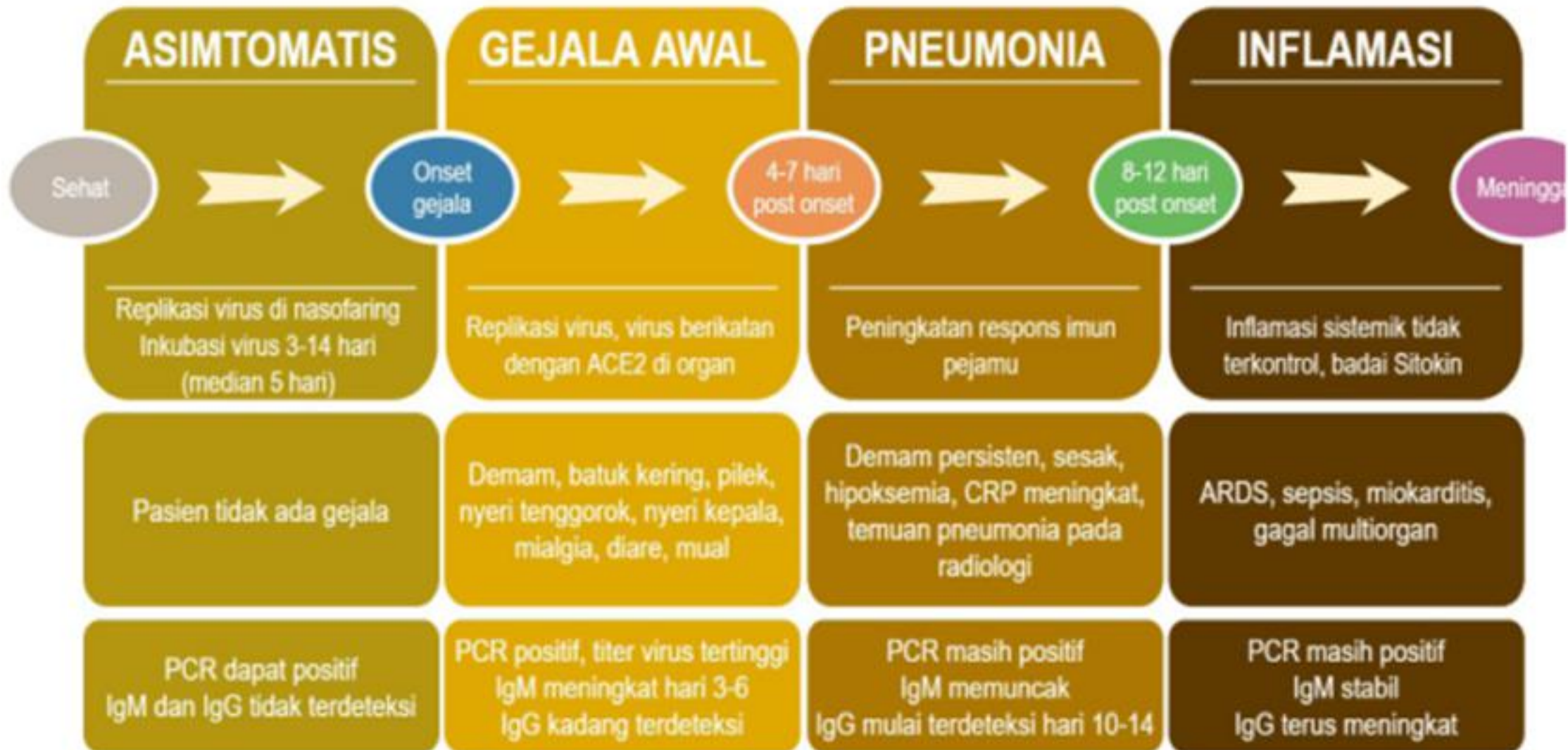


“ Berbeda jenis tes,
berbeda waktu yang
efektif untuk
mendeteksi Covid-19 “

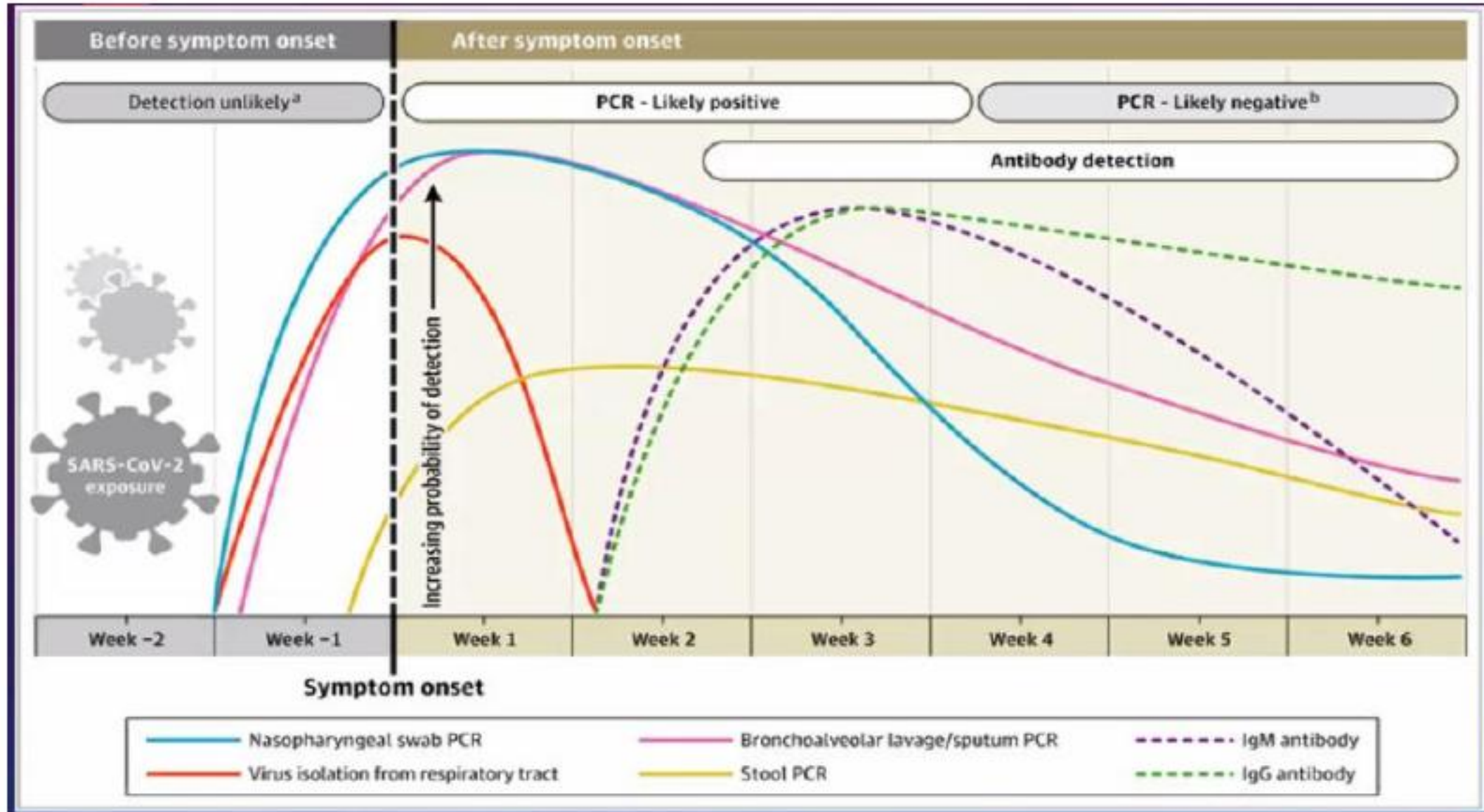
“ Hasil tes dipengaruhi
tahapan perjalanan
penyakit “



PERJALANAN PENYAKIT COVID-19



WAKTU EFEKTIF TES COVID-19



SEROLOGI VS RAPID ANTIBODI



Serologi (ELISA, ECLIA, CLIA)



Rapid test (imunokromatografik)



Mendeteksi antibodi total atau IgG, IgM

CARA KERJA RAPID ANTIBODI



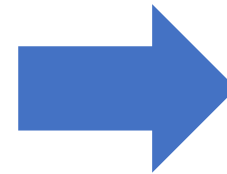
Sumber: Center for Disease Control and Prevention

MAKNA HASIL TES ANTIBODI



POSITIF

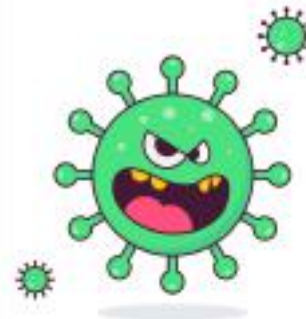
- Sudah terpapar virus SARS CoV-2
- Sistem imun tubuh sudah “melawan”



**KONFIRMASI
PCR**

NEGATIF

- Belum terpapar virus SARS CoV-2, belum memiliki kekebalan tubuh
- Sudah terpapar virus SARS CoV-2 tetapi belum terbentuk antibodi (tahap awal)



KELEMAHAN TES ANTIBODI



***False
positive***

- Kemungkinan *cross reactive antibody* dengan virus lain (coronavirus, dengue)
- Infeksi lampau dengan coronavirus



***False
negative***

- Antibodi belum terbentuk (tahap awal)
- Pasien *immunocompromised* (gangguan pembentukan antibodi)

“ Tes antibodi harus disupervisi dan diinterpretasi Dokter “

INTERPRETASI HASIL ANTIBODI VS RT-PCR



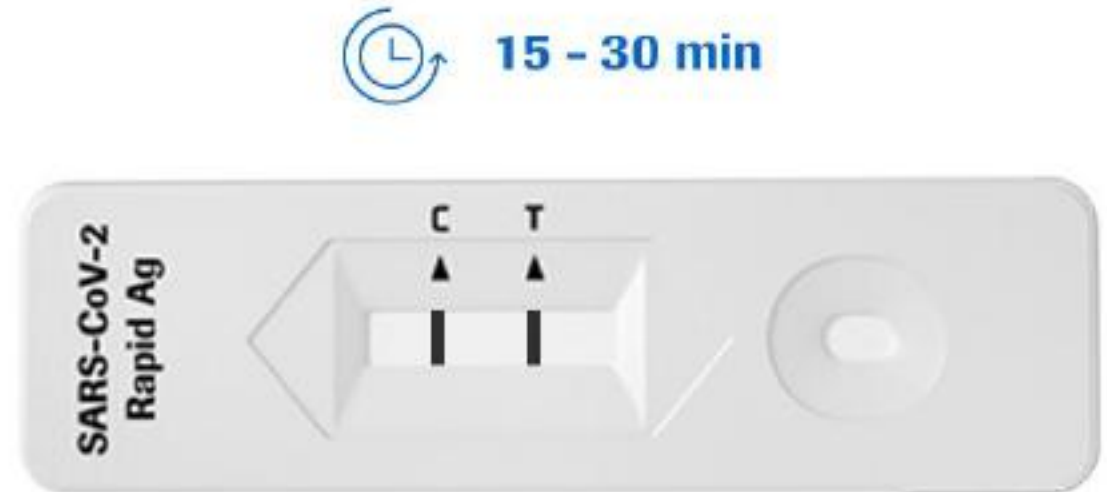
Table 2

Clinical interpretation of microbiological diagnostic results

Symptoms	rRT-PCR	IgM	IgG anti-S	IgG anti-N	Interpretation
+/-	+	-/+	-/+	+/-	Acute infection
+	—	+	+	+	Recent infection
+	—	+	+	+	Late onset infection
—	—	—	+	+/-	Old infection
—	—	—	—	—	Absence of infection

rRT-PCR, real-time reverse transcription polymerase chain reaction. +/-: often positive. -/+: possible to be positive.

RAPID ANTIGEN = SWAB ANTIGEN



“ Rapid antigen bertujuan mendeteksi antigen (protein) virus menggunakan sampel swab rongga hidung (nasofaring), dikerjakan dengan metode rapid “

MAKNA RAPID ANTIGEN



Pemeriksaan rapid antigen dipengaruhi :

- 1. Tahap perjalanan penyakit**
- 2. Tingkat akurasi alat**
- 3. Keterampilan petugas swab**

**“ Hasil POSITIF
kemungkinan terinfeksi SARS
CoV-2, perlu **KONFIRMASI PCR** “**

**“ Hasil NEGATIF
TIDAK MENYINGKIRKAN
kemungkinan terinfeksi SARS CoV-2 “**

KELEMAHAN RAPID ANTIGEN

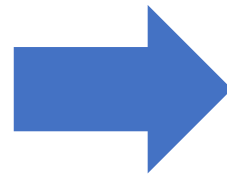


Sensitivitas bervariasi
hingga 80%

Bila sensitivitas
rendah,
kemungkinan
false negative

Spesifisitas $\geq 97\%$

Bila spesifisitas
rendah,
kemungkinan
false positive



**KONFIRMASI
PCR**

**“ Pemeriksaan rapid antigen
TIDAK DAPAT MENGGANTIKAN
pemeriksaan PCR “**

RT-PCR



- Mendeteksi **materi genetik (RNA)** virus SARS CoV-2
- **Tidak dapat membedakan** virus hidup (infeksius) dan virus mati (non infeksius) → dibedakan melalui isolasi virus / kultur virus
- Metode **baku emas** (*gold standard*) : *real time* RT-PCR

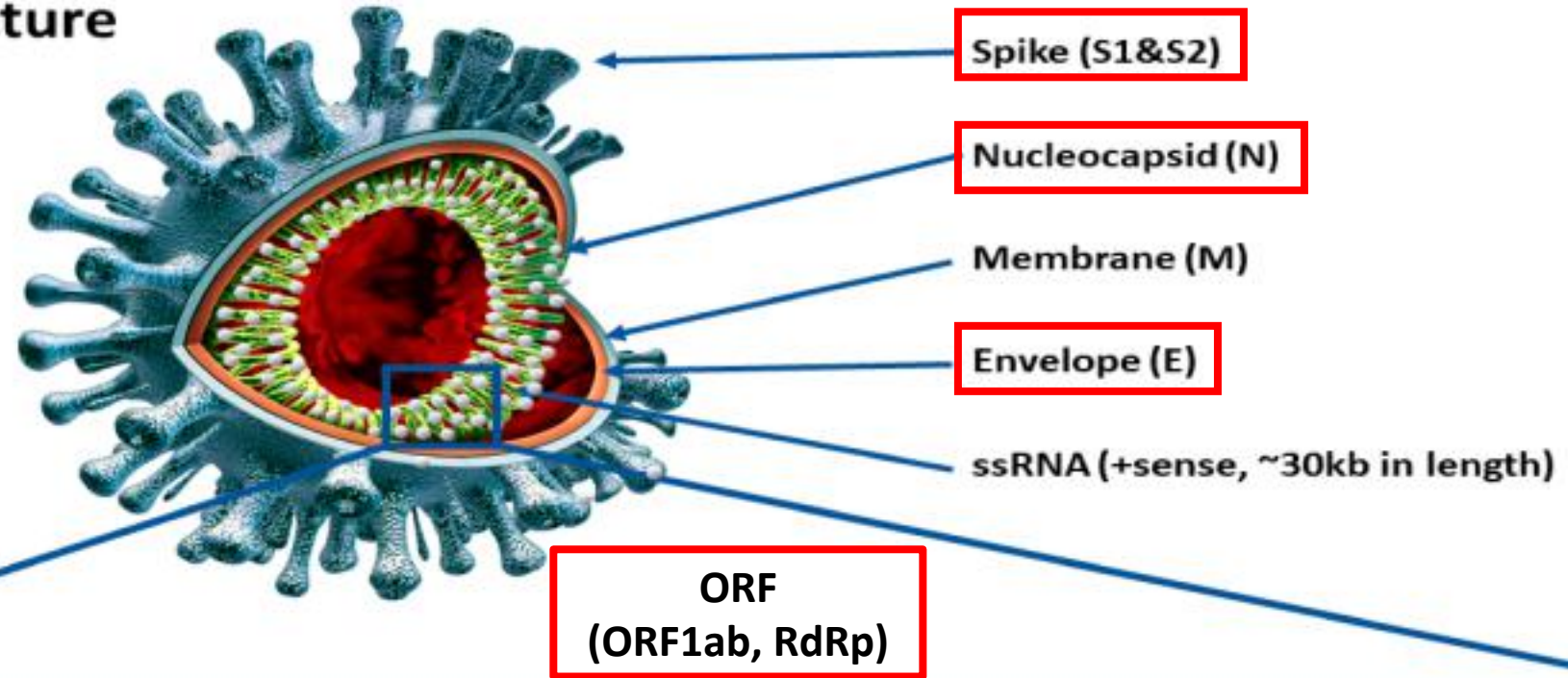
Hasil POSITIF :
TERKONFIRMASI Covid-19

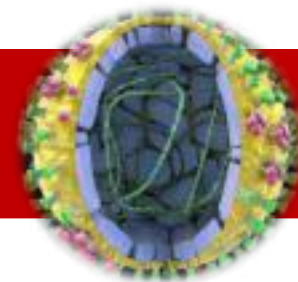
Hasil NEGATIF :
**TIDAK MENYINGKIRKAN
kemungkinan Covid-19**

TARGET GEN SARS CoV-2



SARS-CoV-2 Structure





Target gen di tiap negara berbeda

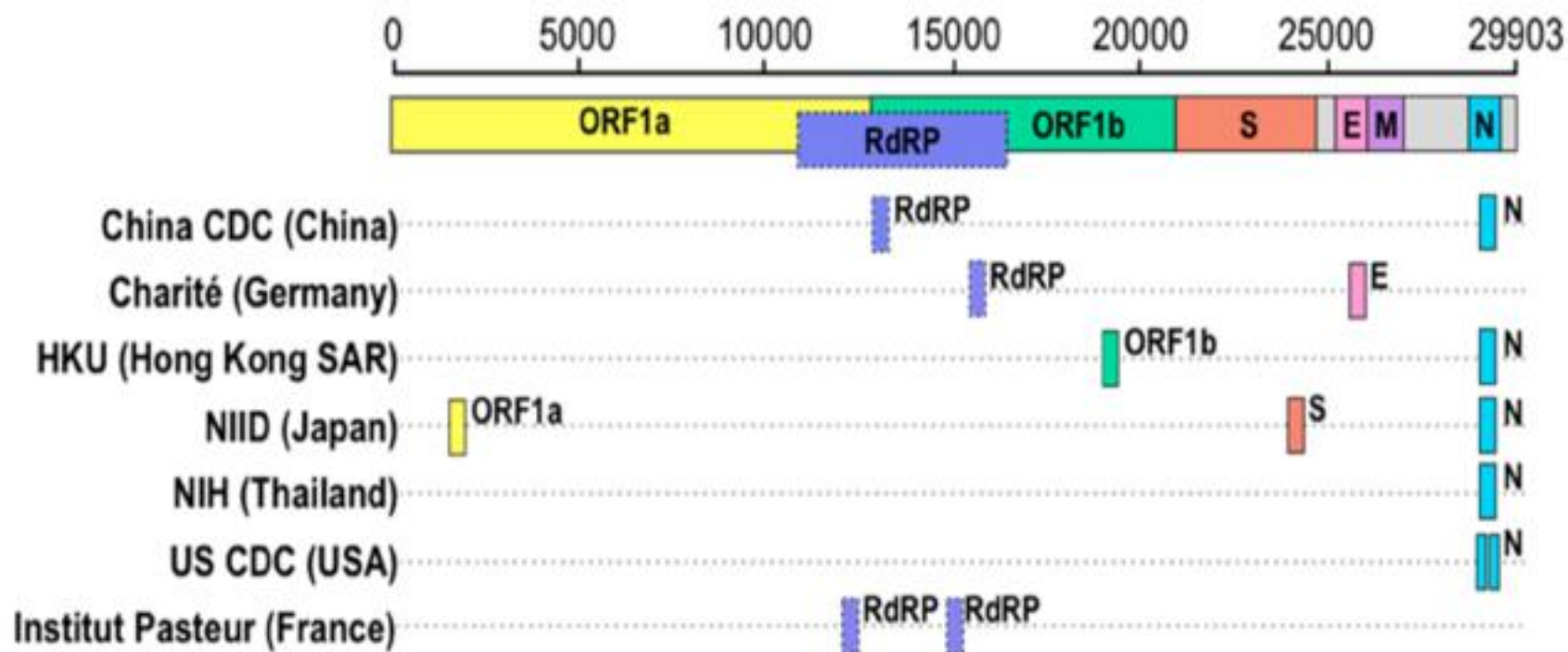
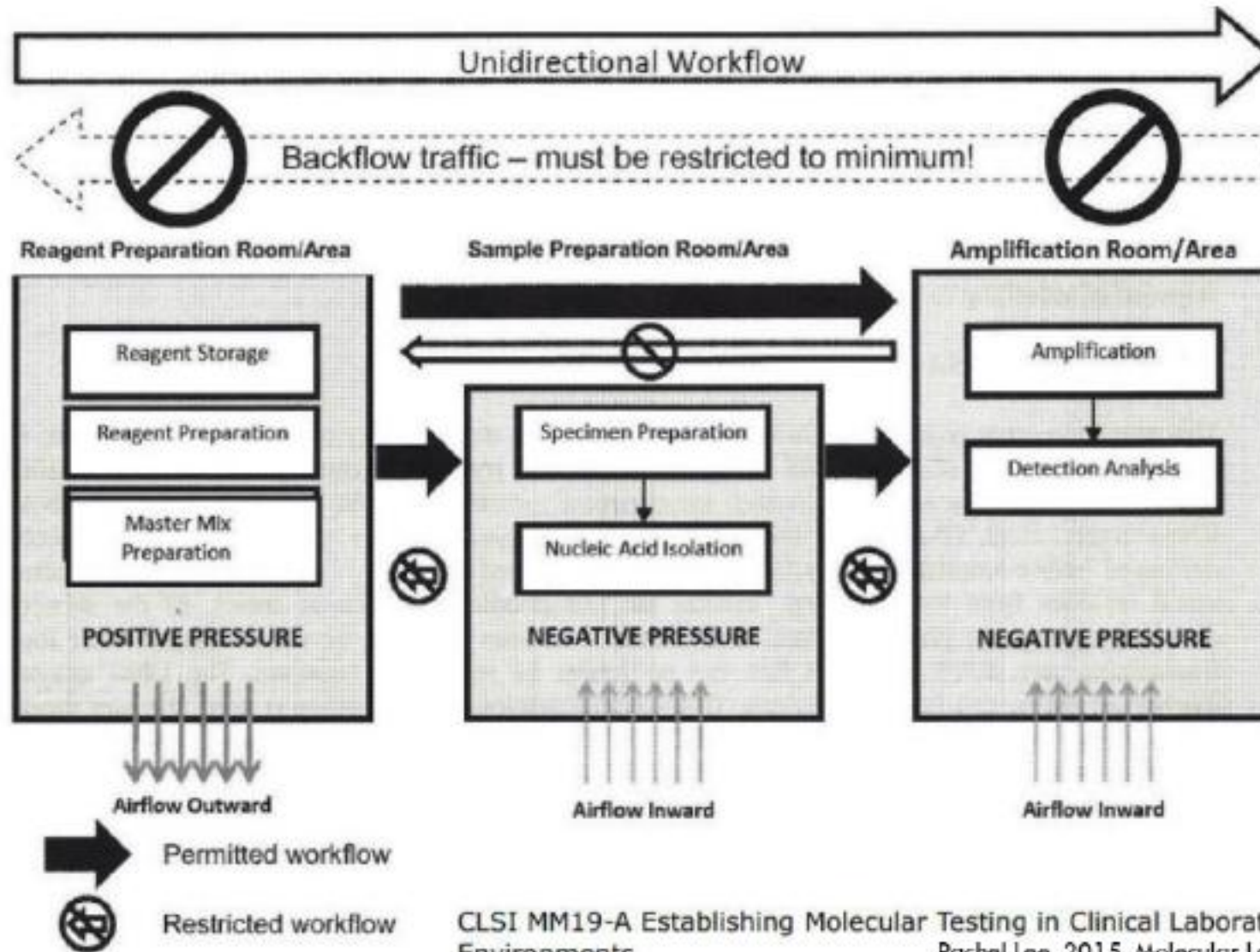


Figure 2. Genome organization of SARS-CoV-2 and the relative positions of gene targets detected using seven reverse transcription polymerase chain reaction (RT-PCR) methods shared by the World Health Organization (WHO) as its in-house assays.³⁷ ORF, open reading frame; RdRP, RNA-dependent RNA polymerase; S, spike protein; E, envelope protein; and N, nucleocapsid protein.

LABORATORIUM BSL-2



BSL 2

JADWAL SWAB RT-PCR



Tabel 5. 2 Jadwal Pengambilan Swab Untuk Pemeriksaan RT-PCR

HARI KE -									
1	2	3	4	5	6	7	8	9	...
									(sesuai klinis)
X	X					X			X

Keterangan :

- Pengambilan swab di hari ke-1 dan 2 untuk penegakan diagnosis
- Bila terjadi perbaikan klinis, maka untuk *follow-up* pasien dengan gejala berat/kritis, dilakukan pengambilan swab 1 kali yaitu pada hari ke-7 untuk menilai kesembuhan

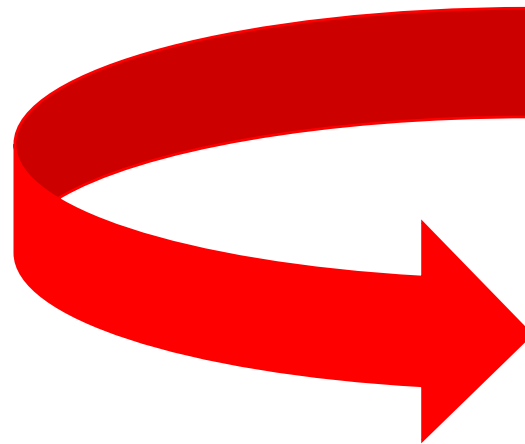
PERBEDAAN HASIL RT-PCR



Apakah hasil **POSITIF SALAH**, hasil **NEGATIF BENAR** ???

Apakah hasil **POSITIF BENAR**, hasil **NEGATIF SALAH** ???

Ataukah hasil **POSITIF DAN NEGATIF SAMA BENAR** ???



3 TAHAPAN LABORATORIUM



- **3 tahapan laboratorium :**
 - Pre-analitik
 - Analitik
 - Post- analitik
- **Ketiganya memiliki pengaruh terhadap hasil laboratorium yang akurat / valid**

PENGAMBILAN SWAB RT-PCR



Swab Nasofaring



Swab Orofaring

FAKTOR PRE ANALITIK



Nasopharynx

Tingkat positif PCR lebih dari 90% pada hari pertama sampai ke-3 setelah mulai gejala, kemudian berkurang menjadi dibawah 80% pada hari ke-6 dan <50% pada 14 hari setelah muncul gejala.⁵¹ Medica Hospitalia | Vol. 7, No. 1A, Agustus 2020 - Edisi Khusus Covid-19





TABEL 6
Daftar Reagent Kit Pemeriksaan Molekular COVID-19

Nama kit	Spesimen	Gen target	Limit deteksi (LoD)
Alinity m SARS-CoV-2 assay	Swab nasal, nasofaring, dan orofaring, atau BAL	RdRP, N	100–200 kopi/mL
LabCorp COVID-19 RT-PCR Test	Spesimen saluran napas atas dan bawah seperti swab nasal, nasofaring, dan orofaring, sputum, aspirat saluran napas bawah, aspirat/bilas nasofaring, aspirat nasal, atau BAL	2 target pada gen N dan human RNase P	6,25 kopi/ μ L untuk swab nasofaring dan 12,5 kopi/ μ L untuk BAL
SansureBioTech Inc. Novel Coronavirus (2019-nCoV) Nucleic Acid Diagnostic Kit	Swab nasofaring, orofaring, tenggorok, nasal anterior, dan <i>mid-turbinate</i> , bilas nasal, dan aspirat nasal ⁴³	ORF1ab dan N	200 kopi/mL
Abbot ID NOW COVID-19	Swab tenggorok, nasofaring, atau nasal direk	RdRp	2000 kopi/mL ⁴⁴
Cepheid Xpert Xpress SARS-CoV-2 test	Swab nasofaring, orofaring, nasal, atau <i>mid-turbinate</i> , dan aspirat/bilas nasal	N2 dan E	8,26–100 kopi/mL ⁴⁵

False positives in reverse transcription PCR testing for SARS-CoV-2

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¹ Center for Research on Aquatic Bioinvasions, Richmond CA, USA.

² John A. Burns School of Medicine, University of Hawai'i, Honolulu HI, USA.

* Correspondence: acohen@bioinvasions.com

<https://www.researchgate.net/publication/341091306>

External quality assessments (EQAs) test the implementation of medical diagnostic assays by providing participating laboratories with blind panels of positive and negative samples. The laboratories assay these panels using their normal procedures and report the results to the EQA manager, who compiles and analyzes the results. Since external quality assessments have not yet

False positives also affect the interpretation of individual test results. Statements from health agencies and officials suggest that positive results from SARS-CoV-2 tests are more trustworthy than negative results (3, 4). However, over a wide range of likely scenarios, the opposite is true

Frekuensi & Implikasi Hasil *False Positive*

The current rate of operational false-positive swab tests in the UK is unknown; preliminary estimates show it could be somewhere between 0.8% and 4.0%.^{2,6} This

Technical problems including contamination during sampling (eg, a swab accidentally touches a contaminated glove or surface), contamination by PCR amplicons, contamination of reagents, sample cross-contamination, and cross-reactions with other viruses or genetic material could also be responsible for false-positive results.² These problems are not only theoretical;

Panel: Potential consequences of false-positive COVID-19 swab test results

Individual perspective

Health-related

- For swab tests taken for screening purposes before elective procedures or surgeries: unnecessary treatment cancellation or postponement
- For swab tests taken for screening purposes during urgent hospital admissions: potential exposure to infection following a wrong pathway in hospital settings as an in-patient

Financial

- Financial losses related to self-isolation, income losses, and cancelled travel, among other factors

Psychological

- Psychological damage due to misdiagnosis or fear of infecting others, isolation, or stigmatisation

Global perspective

Financial

- Misspent funding (often originating from taxpayers) and human resources for test and trace
- Unnecessary testing
- Funding replacements in the workplace
- Various business losses

Epidemiological and diagnostic performance

- Overestimating COVID-19 incidence and the extent of asymptomatic infection
- Misleading diagnostic performance, potentially leading to mistaken purchasing or investment decisions if a new test shows high performance by identification of negative reference samples as positive (ie, is it a false positive or does the test show higher sensitivity than the other comparator tests used to establish the negativity of the test sample?)

Societal

- Misdirection of policies regarding lockdowns and school closures
- Increased depression and domestic violence (eg, due to lockdown, isolation, and loss of earnings after a positive test).

SHORT REPORT

Open Access

False negative rate of COVID-19 PCR testing: a discordant testing analysis



Jamil N. Kanji^{1,2*} , Nathan Zelyas^{1,3}, Clayton MacDonald⁴, Kanti Pabbaraju⁵, Muhammad Naeem Khan⁶, Abhaya Prasad⁶, Jia Hu^{7,8}, Mathew Diggle^{1,3}, Byron M. Berenger^{5,9} and Graham Tipples^{1,10,11}

Abstract

Background: COVID-19 is diagnosed via detection of SARS-CoV-2 RNA using real time reverse-transcriptase polymerase chain reaction (rtRT-PCR). Performance of many SARS-CoV-2 rtRT-PCR assays is not entirely known due to the lack of a gold standard. We sought to evaluate the false negative rate (FNR) and sensitivity of our laboratory-developed SARS-CoV-2 rtRT-PCR targeting the envelope (E) and RNA-dependent RNA-polymerase (RdRp) genes.

Methods: SARS-CoV-2 rtRT-PCR results at the Public Health Laboratory (Alberta, Canada) from January 21 to April 18, 2020 were reviewed to identify patients with an initial negative rtRT-PCR followed by a positive result on repeat testing within 14 days (defined as discordant results). Negative samples from these discordant specimens were re-tested using three alternate rtRT-PCR assays (targeting the E gene and N1/N2 regions of the nucleocapsid genes) to assess for false negative (FN) results.

Results: During the time period specified, 95,919 patients (100,001 samples) were tested for SARS-CoV-2. Of these, 49 patients were found to have discordant results including 49 positive and 52 negative swabs. Repeat testing of 52 negative swabs found five FNs (from five separate patients). Assuming 100% specificity of the diagnostic assay, the FNR and sensitivity in this group of patients with discordant testing was 9.3% (95% CI 1.5–17.0%) and 90.7% (95% CI 82.6–98.9%) respectively.

Conclusions: Studies to understand the FNR of routinely used assays are important to confirm adequate clinical performance. In this study, most FN results were due to low amounts of SARS-CoV-2 virus concentrations in patients with multiple specimens collected during different stages of infection. Post-test clinical evaluation of each patient is advised to ensure that rtRT-PCR results are not the only factor in excluding COVID-19.

Keywords: SARS-CoV-2, COVID-19, Discordant testing, False negative rate

Studies of false-negative (FN) results from respiratory samples for SARS-CoV-2 are variable demonstrating FN rates (FNRs) ranging from 1 to 30% [1, 2]. FN results can occur for numerous reasons including suboptimal specimen collection, testing too early in the disease process, low analytic sensitivity, inappropriate specimen type, low viral load, or variability in viral shedding [3–9].

Implications of FN results can be significant, potentially leading to positive case clusters and negative outcomes [10]. Current guidance from the World Health Organization (WHO) and others calls for repeat testing (including sampling of the lower respiratory tract) in individuals

Frekuensi & Implikasi Hasil *False Negative*

BMJ 2020;369:m1808 doi: 10.1136/bmj.m1808 (Published 12 May 2020)

How accurate are test results?

No test gives a 100% accurate result; tests need to be evaluated to determine their sensitivity and specificity, ideally by comparison with a “gold standard.” The lack of such a clear-cut “gold-standard” for covid-19 testing makes evaluation of test accuracy challenging.

A systematic review of the accuracy of covid-19 tests reported false negative rates of between 2% and 29% (equating to sensitivity of 71-98%), based on negative RT-PCR tests which were positive on repeat testing.⁶ The use of repeat RT-PCR testing as gold standard is likely to underestimate the true rate of false negatives, as not all patients in the included studies received repeat testing and those with clinically diagnosed covid-19 were not considered as actually having covid-19.⁶

Accuracy of viral RNA swabs in clinical practice varies depending on the site and quality of sampling. In one study, sensitivity of RT-PCR in 205 patients varied, at 93% for broncho-alveolar lavage, 72% for sputum, 63% for nasal swabs, and only 32% for throat swabs.⁷ Accuracy is also likely to vary depending on stage of disease⁸ and degree of viral multiplication or clearance.⁹ Higher sensitivities are reported depending on which gene targets are used, and whether multiple gene tests are used in combination.^{3 10} Reported accuracies are much higher for in vitro studies, which measure performance of primers using coronavirus cell culture in carefully controlled conditions.²

The lack of a clear-cut “gold-standard” is a challenge for evaluating covid-19 tests; pragmatically, clinical adjudication may be the best available “gold standard,” based on repeat swabs, history, and contact with patients known to have covid-19, chest radiographs, and computed tomography scans. Inevitably this introduces some incorporation bias, where the test being evaluated forms part of the reference standard, and this would tend to inflate the measured sensitivity of these tests.¹¹

What do clinicians need to know to understand a test result?

BMJ 2020;369:m1808 doi: 10.1136/bmj.m1808 (Published 12 May 2020)

Sensitivity and specificity can be confusing terms that may be misunderstood¹⁴ (see supplementary file 'Definitions and formulae for calculating measures of test accuracy'). Sensitivity is the proportion of patients with disease who have a positive test, or the true positive rate. Specificity is the proportion of patients without disease who have a negative test, or true negative rate. These terms describe the operating characteristics

Satu atau lebih hasil PCR negatif tidak menyingkirkan infeksi virus COVID-19 karena dapat terjadi negatif palsu yang dapat disebabkan oleh:

- Kualitas spesimen buruk, mengandung sedikit material pasien,
- Pengumpulan spesimen yang terlambat atau terlalu dini,
- Penanganan dan transportasi spesimen yang tidak sesuai,
- Alasan teknis, contohnya mutasi virus atau hambatan reaksi PCR.

Jika pasien sangat mungkin terinfeksi virus COVID-19 namun hasil tes negatif, terutama jika yang diambil hanya sampel saluran napas atas, diperlukan pemeriksaan dengan spesimen tambahan, jika memungkinkan dari saluran napas bawah.³⁶

Contoh Laporan Kasus

What else should clinicians consider when interpreting test results?

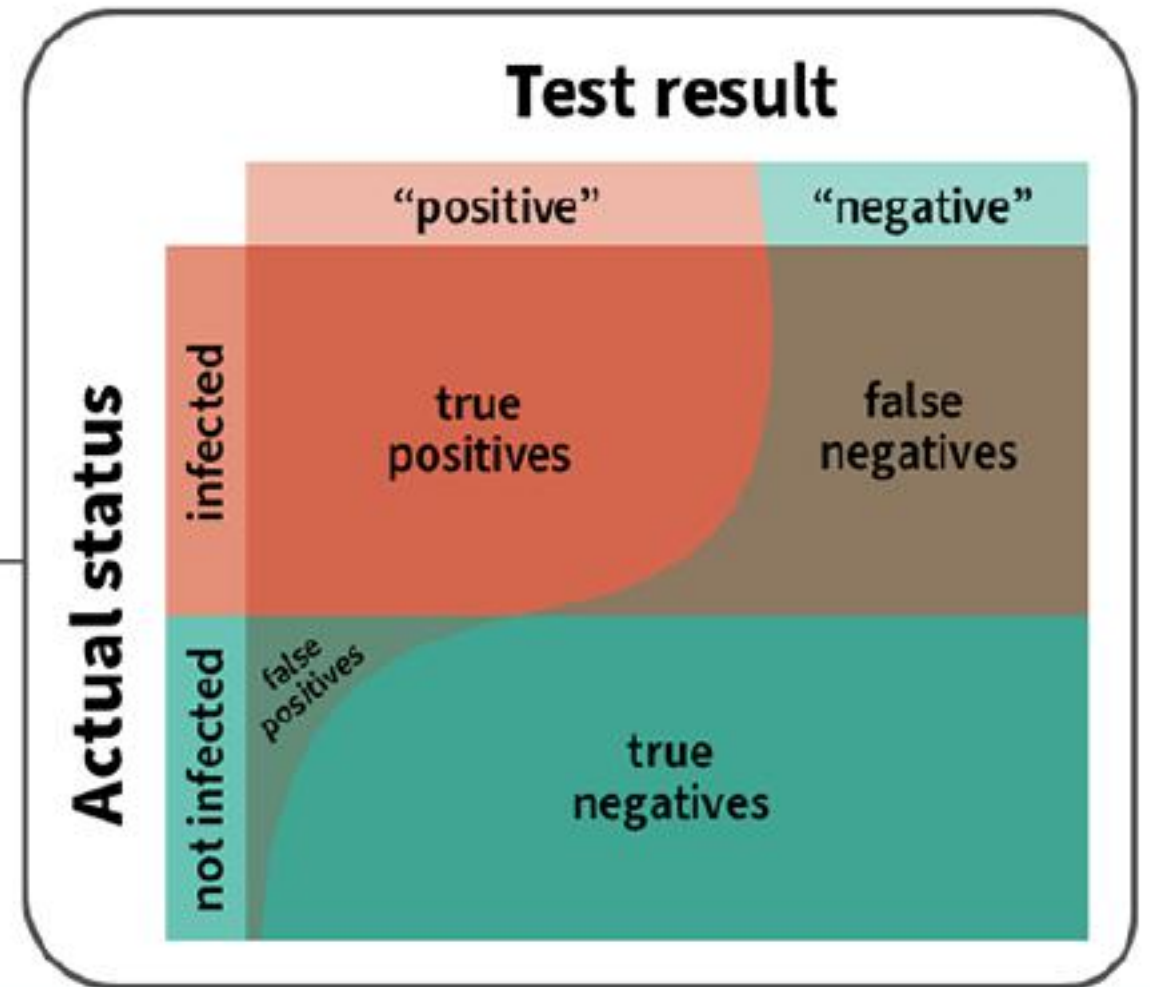
A single negative test result may not be informative if the pre-test probability is high

A 52 year old general practitioner in London develops a cough, intermittent fever, and malaise. On day 2 of his illness he receives a nasopharyngeal swab test for covid-19, which is reported as negative. His cough and low-grade fever persist but he feels systemically well enough to return to work. What should he do?

Pre-test probability is high in someone with typical symptoms of covid-19, an occupational risk of exposure, and working in a high prevalence region, and negative test results can therefore be misleading. Table 1 shows that for a pre-test probability of 90%, someone with a negative test has a 74% chance of having covid-19; with two negative tests this risk is still around 47%. If this doctor were to return to work and subsequently the test was confirmed as a false negative, then the decision to work would potentially have significant consequences for his patients, colleagues, and everyone with whom he came into contact. It is therefore safest for this GP with strongly suggestive symptoms to self-isolate in line with guidelines for covid-19, even though his test results are negative. This case illustrates the fallacy of base-rate neglect; it can be tempting to trust the results of an “objective” test more than one’s own “subjective” clinical judgement. In general, during this pandemic, pre-test probabilities of covid-19 will be high, particularly in high prevalence secondary care settings.

The COVID-19 swab test is highly **specific** but not as **sensitive**.

That means a positive result is almost always true, but a negative result is sometimes false.



$$\text{Sensitivity} = \frac{\text{number of true positives}}{\text{number of those tested who really are infected}} = \text{"how many of the infections did we find?"}$$

$$\text{Specificity} = \frac{\text{number of true negatives}}{\text{number of those tested who really are not infected}} = \text{"how many of the healthy people did we clear?"}$$

Pre test probability

The likelihood a person has Covid-19 based on their characteristics

80 %

Test sensitivity

The proportion of patients with Covid-19 who have a positive test

70 %

Test specificity

The proportion of patients without Covid-19 who have a negative test

95 %

If 100 people were tested with these values

Have Covid-19

Do not have Covid-19

True positive

56 people who test positive have Covid-19. They are appropriately told to self isolate

False positive

1 person who tests positive does not have Covid-19. They are told to self isolate when they would be safe to go out

98 %

Probability of having Covid-19 if test is positive

False negative

24 people who test negative have Covid-19. They are told do not need to self isolate so they go out and infect more people

True negative

19 people who test negative do not have Covid-19. They are told they do not need to self isolate and are safe to go out

56 %

Probability of having Covid-19 if test is negative

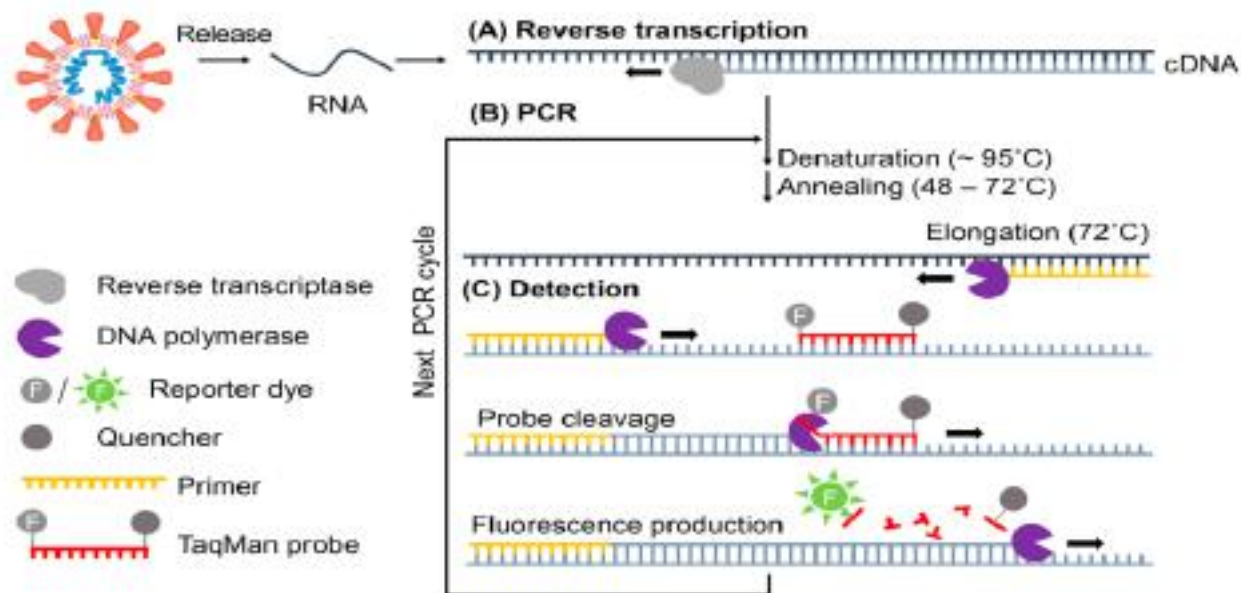
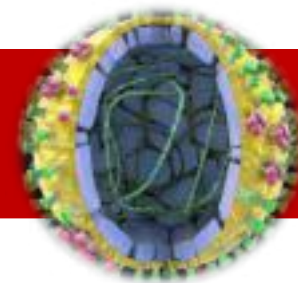
+

Test Positive

-

Test Negative

APA ITU NILAI CT ??



- Nilai Ct (*cycle threshold*) / CN (*cycle number*) adalah jumlah siklus amplifikasi gen target pada PCR yang diperlukan untuk menghasilkan fluoresens yang melebihi angka ambang batas (*threshold*)
- Nilai Ct tiap laboratorium berbeda

MAKNA NILAI CT

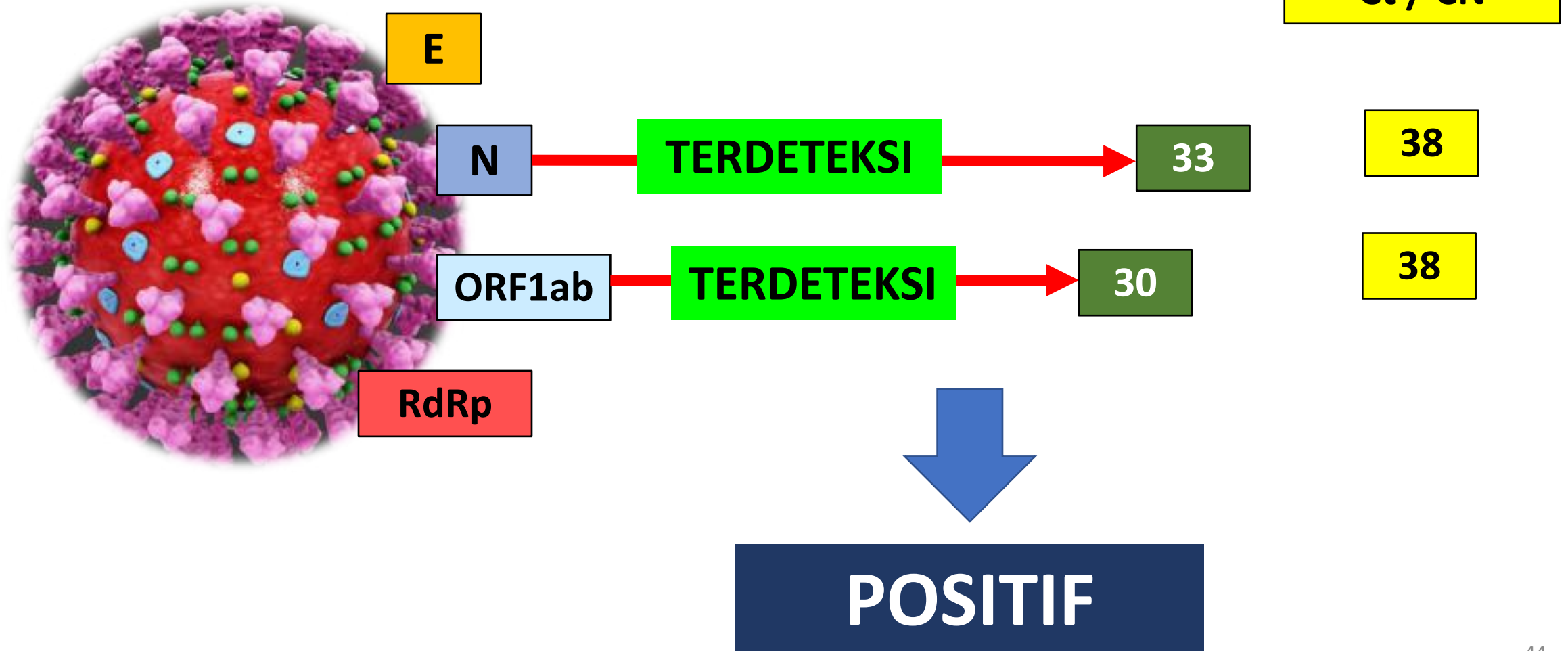


ambang (*threshold*). Nilai Ct tersebut secara proporsional berbanding terbalik dengan jumlah target asam nukleat didalam sampel, artinya semakin rendah nilai Ct maka semakin banyak jumlah asam nukleat yang terdeteksi didalam sampel. Pada umumnya batas ambang nilai Ct adalah 40 dengan interpretasi:

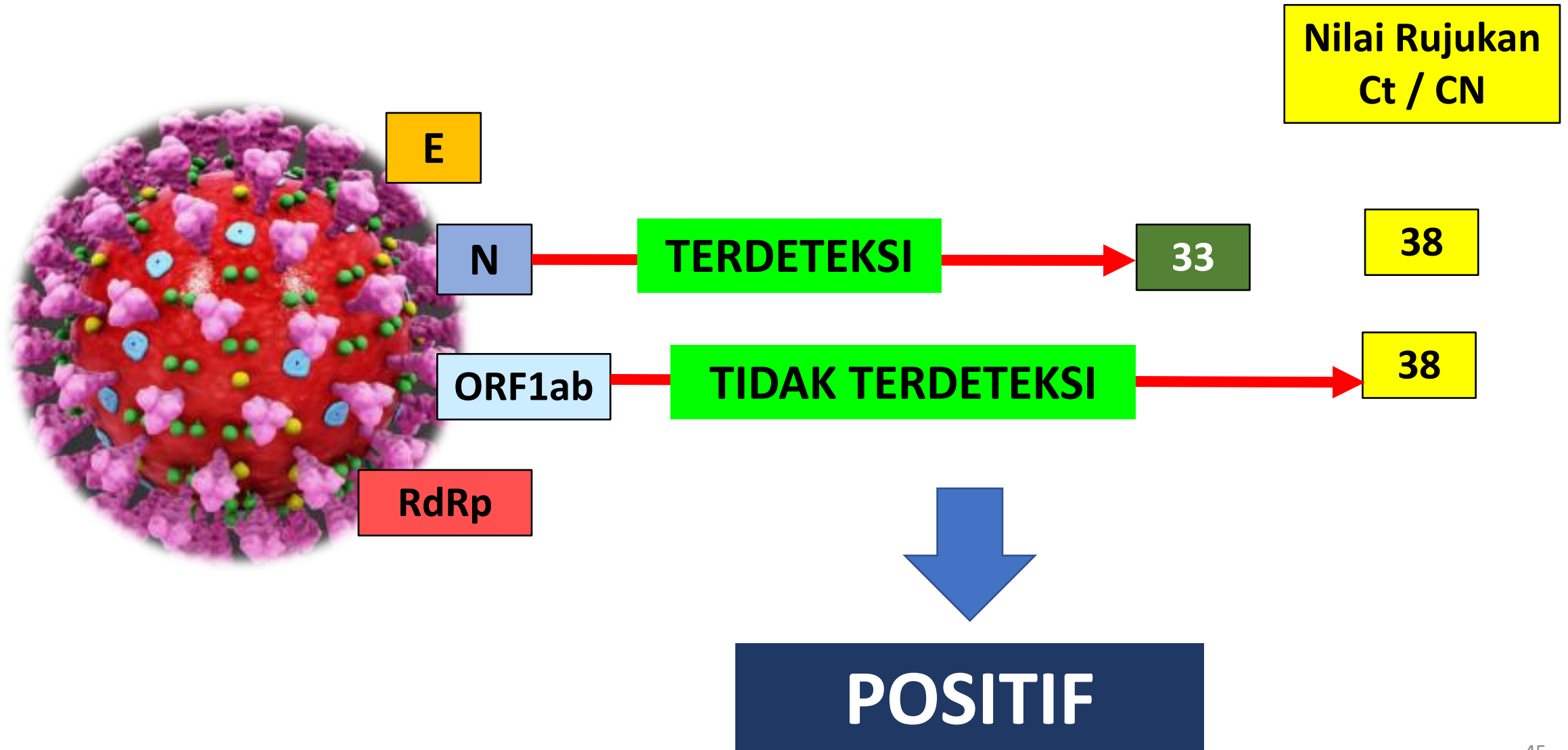
- Nilai Ct <29: positif kuat, terdapat target asam nukleat dalam jumlah banyak
- Nilai Ct antara 30-37: positif, terdapat target asam nukleat dalam jumlah sedang
- Nilai Ct antara 38-40: positif lemah, terdapat target asam nukleat dalam jumlah sedikit dan terdapat kemungkinan kontaminasi dari lingkungan

Tinggi atau rendahnya nilai Ct sangat bergantung pada teknis pengerjaan, jumlah RNA didalam sampel, metode pengambilan sampel, metode ekstraksi RNA yang digunakan, reagen dan primer yang digunakan dalam reaksi PCR. Perlu diperhatikan juga bahwa pada saat ini ketersediaan

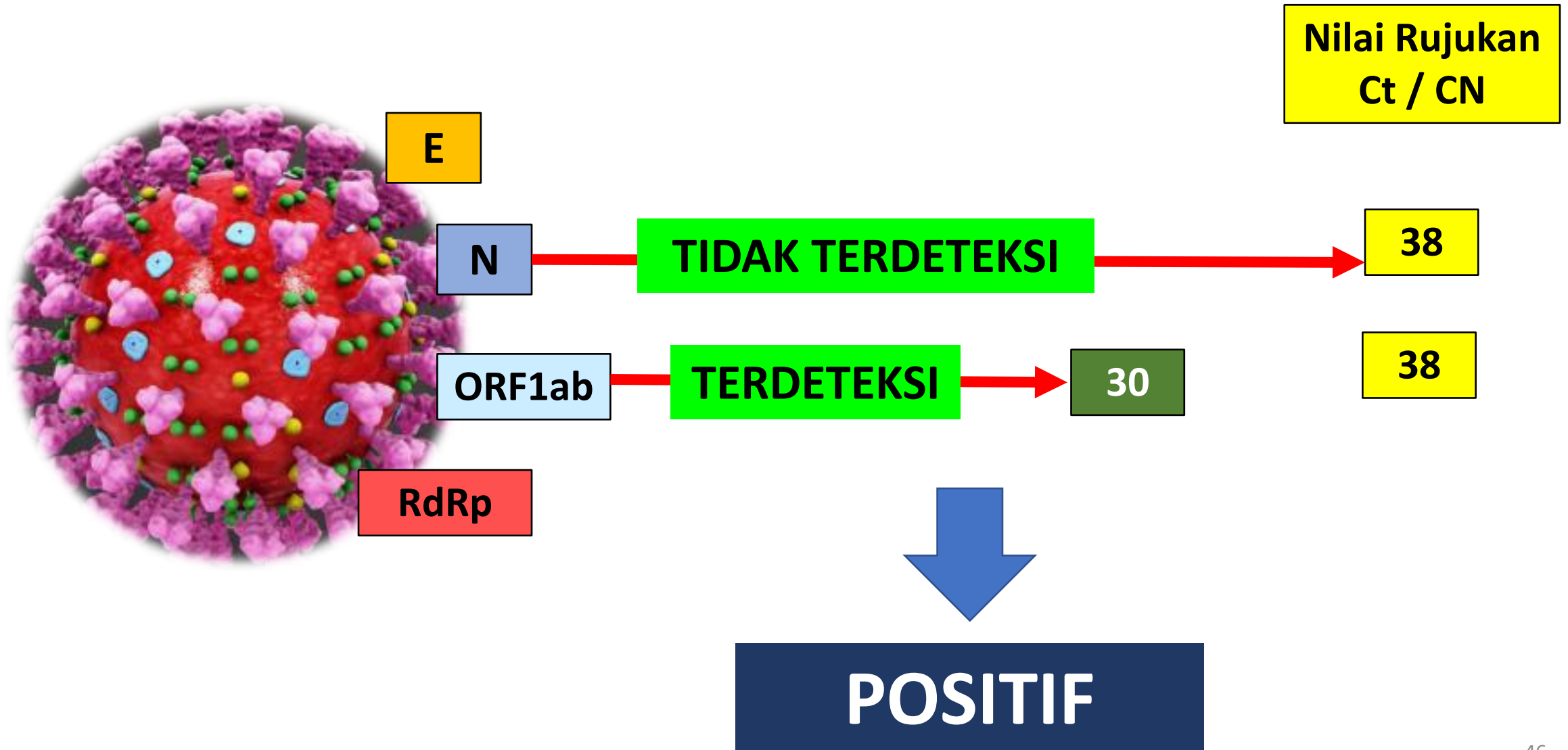
INTERPRETASI HASIL BERDASAR NILAI CT



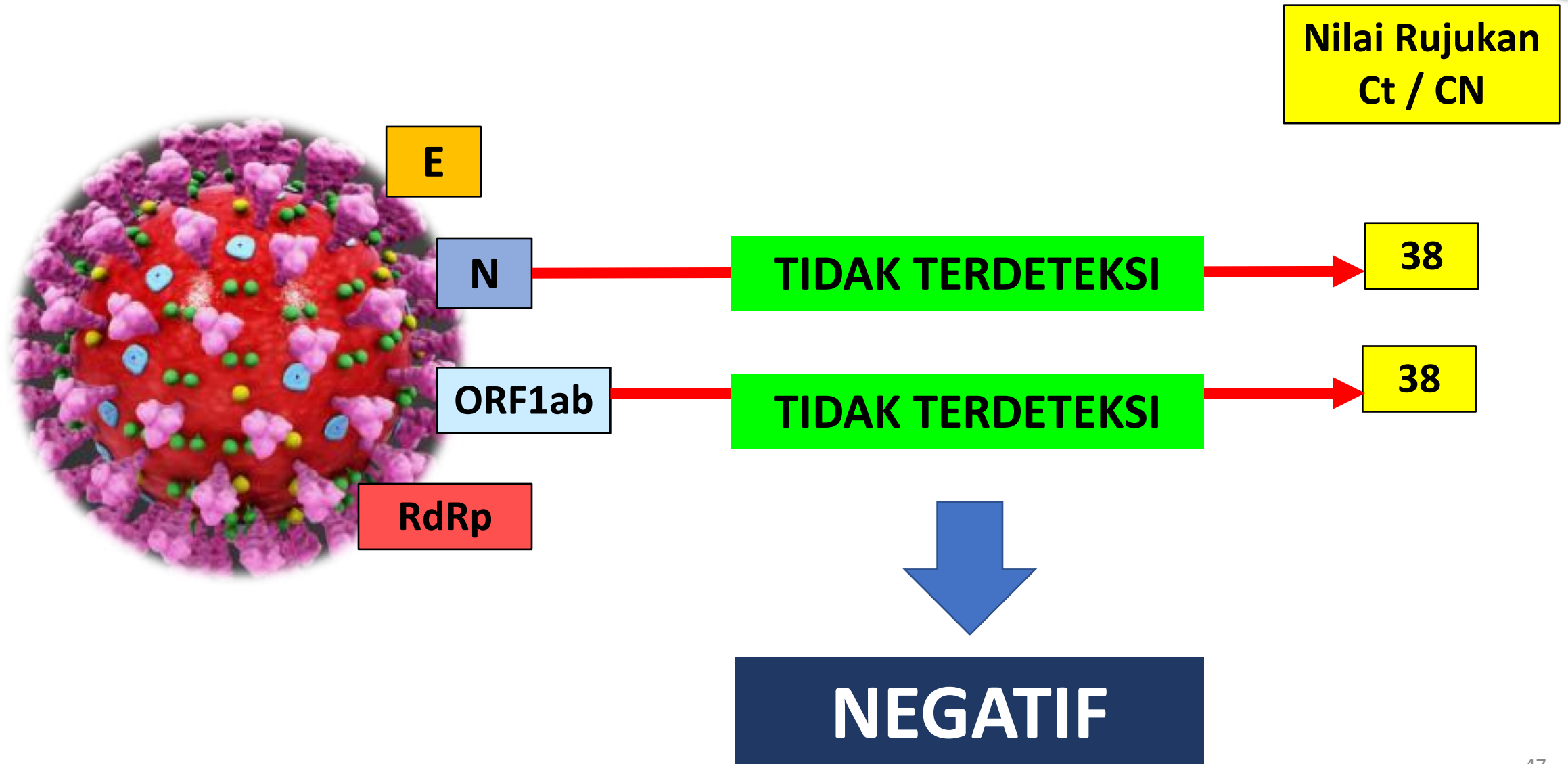
INTERPRETASI HASIL BERDASAR NILAI CT



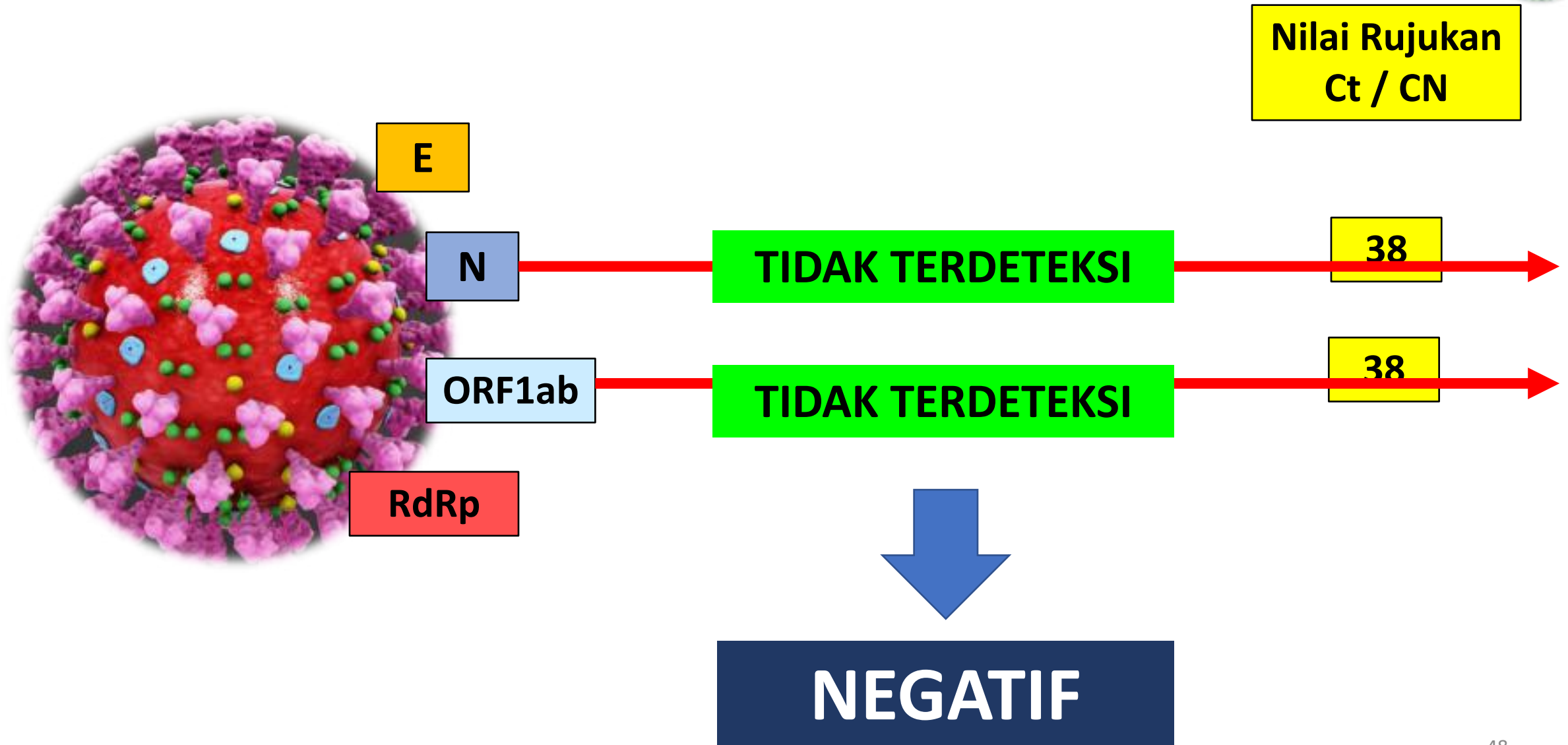
INTERPRETASI HASIL BERDASAR NILAI CT



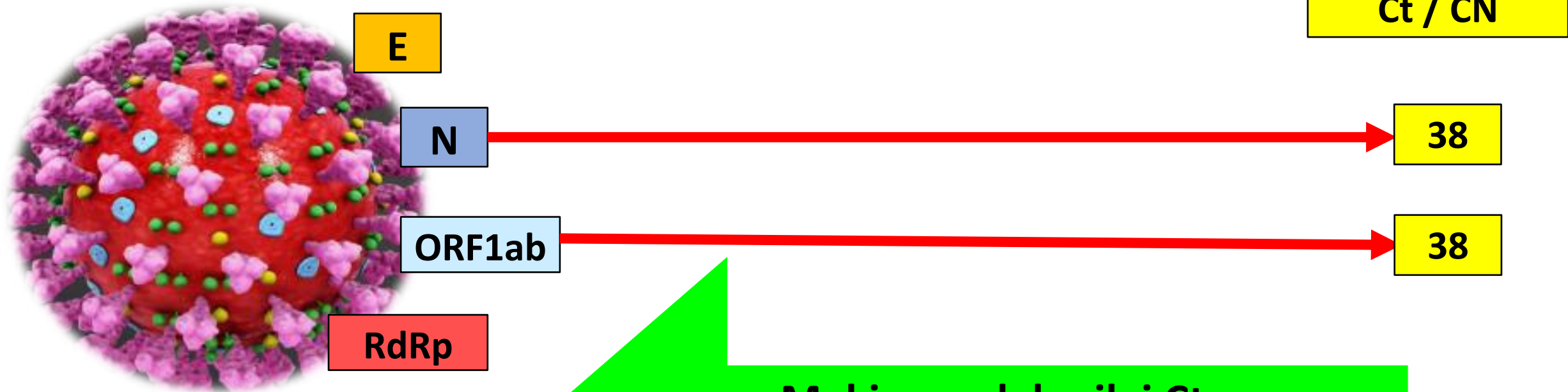
INTERPRETASI HASIL BERDASAR NILAI CT



INTERPRETASI HASIL BERDASAR NILAI CT



HUBUNGAN NILAI CT



Makin rendah nilai Ct :

- Makin tinggi jumlah virus (*viral load*)
- Makin berat penyakit
- Prognosis makin buruk

KULTUR VIRUS = ISOLASI VIRUS



- **PCR** adalah pemeriksaan yang mendeteksi materi genetik, **tidak dapat menentukan / membedakan virus dalam keadaan hidup / mati**
- Kemampuan menginfeksi hanya dimiliki oleh virus hidup → **hasil PCR tidak dapat menentukan pasien infeksius atau tidak**
- Pemeriksaan **kultur virus** adalah satu-satunya pemeriksaan yang dapat menentukan virus dalam keadaan hidup dan bersifat infeksius

STATUS PASIEN COVID-19



Suspek

Seseorang yang memiliki salah satu dari kriteria berikut:

- Orang dengan Infeksi Saluran Pernapasan Akut (ISPA)* DAN pada 14 hari terakhir sebelum timbul gejala memiliki riwayat perjalanan atau tinggal di negara/wilayah Indonesia yang melaporkan transmisi lokal**.
- Orang dengan salah satu gejala/tanda ISPA* DAN pada 14 hari terakhir sebelum timbul gejala memiliki riwayat kontak dengan kasus konfirmasi/*probable* COVID-19.
- Orang dengan ISPA berat/pneumonia berat*** yang membutuhkan perawatan di rumah sakit DAN tidak ada penyebab lain berdasarkan gambaran klinis yang meyakinkan.

Probable

Kasus *Probable*

Kasus suspek dengan ISPA Berat/ARDS***/meninggal dengan gambaran klinis yang meyakinkan COVID-19 DAN belum ada hasil pemeriksaan laboratorium RT-PCR.

Konfirmasi (*confirmed*)

Kasus Konfirmasi

Seseorang yang dinyatakan positif terinfeksi virus COVID-19 yang dibuktikan dengan pemeriksaan laboratorium RT-PCR.

Kasus konfirmasi dibagi menjadi 2:

- Kasus konfirmasi dengan gejala (simptomatik)
- Kasus konfirmasi tanpa gejala (asimptomatik)



Kontak Erat

Kontak Erat

Orang yang memiliki riwayat kontak dengan kasus *probable* atau konfirmasi COVID-19. Riwayat kontak yang dimaksud antara lain:

- Kontak tatap muka/berdekatan dengan kasus *probable* atau kasus konfirmasi dalam radius 1 meter dan dalam jangka waktu 15 menit atau lebih.
- Sentuhan fisik langsung dengan kasus *probable* atau konfirmasi (seperti bersalaman, berpegangan tangan, dan lain-lain).
- Orang yang memberikan perawatan langsung terhadap kasus *probable* atau konfirmasi tanpa menggunakan APD yang sesuai standar.
- Situasi lainnya yang mengindikasikan adanya kontak berdasarkan penilaian risiko lokal yang ditetapkan oleh tim penvalidasi epidemiologi.

Pelaku perjalanan

Pelaku Perjalanan

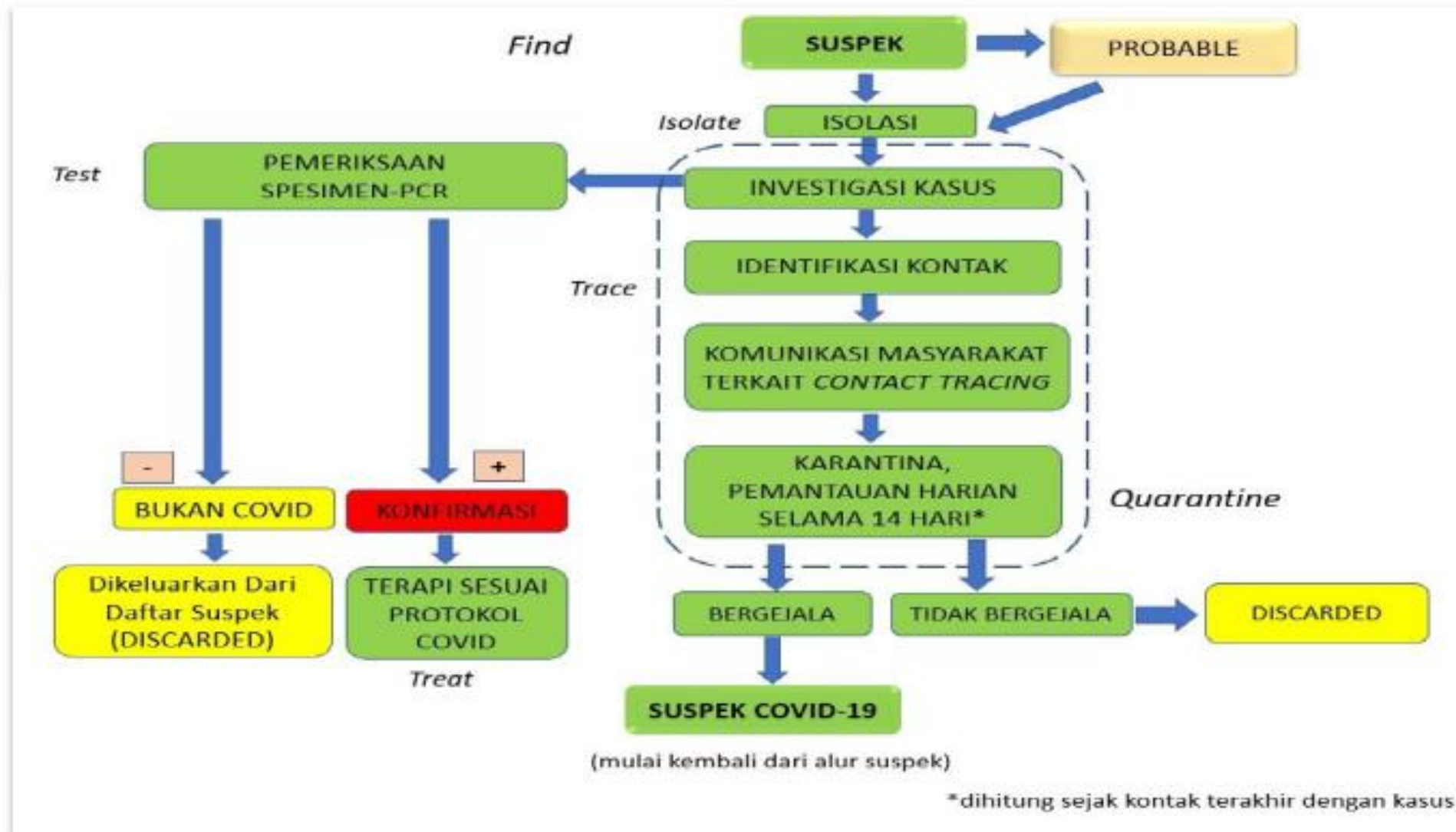
Seseorang yang melakukan perjalanan dari dalam negeri (domestik) maupun luar negeri pada 14 hari terakhir.

Discarded

Discarded apabila memenuhi salah satu kriteria berikut:

- Seseorang dengan status kasus suspek dengan hasil pemeriksaan RT-PCR 2 kali negatif selama 2 hari berturut-turut dengan selang waktu >24 jam.
- Seseorang dengan status kontak erat yang telah menyelesaikan masa karantina selama 14 hari.

ALUR MANAJEMEN KESEHATAN MASYARAKAT



TATALAKSANA KASUS SUSPEK





TATALAKSANA KONTAK ERAT & KASUS PROBABEL



TATLAKSANA KASUS KONFIRMASI



KRITERIA SEMBUH



SELESAI ISOLASI

Hasil RT-PCR dapat **persisten positif** karena pemeriksaan RT-PCR masih dapat mendeteksi RNA virus walaupun virus sudah tidak aktif lagi (tidak menularkan lagi)

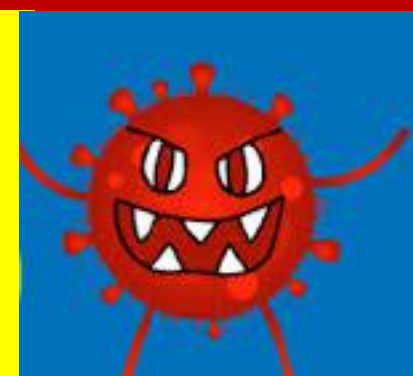
SIMPULAN



- Hasil PCR dipengaruhi berbagai faktor (pre analitik, analitik, post analitik)
- **Hasil PCR antar satu laboratorium tidak dapat dibandingkan dengan laboratorium lain** (perbedaan alat, reagen, metode, nilai Ct, waktu dan teknik pengambilan spesimen, dll)
- Hasil PCR diinterpretasi oleh tenaga ahli yang berkompeten
- Pemeriksaan PCR walaupun merupakan *gold standard* Covid-19, namun tetap merupakan penunjang diagnostik → diagnosis, tata laksana tetap harus berdasarkan pada evaluasi klinis, riwayat kontak, riwayat perjalanan penyakit, riwayat bepergian, dll yang dilakukan oleh klinisi / dokter



**KAMI DI GARDA TERDEPAN
MELAWAN VIRUS CORONA !!!**





**ANDA DAN KELUARGA
JUGA DAPAT MELAWAN VIRUS CORONA !!!**



**KITA BISA
MELAWAN
VIRUS
CORONA**

KITA PASTI MENANG !!!





Saya
PATOLOGI KLINIK

#PEDULICOVID-19

**PUTUSKAN
TRANSMISI COVID-19**

Hand hygiene

Physical distancing

Terapkan etika batuk

Gunakan masker

Jaga stamina

Perhimpunan
Dokter Spesialis Patologi Klinik
dan Kedokteran Laboratorium
Indonesia

#PDSPatKLIn



Terimakasih