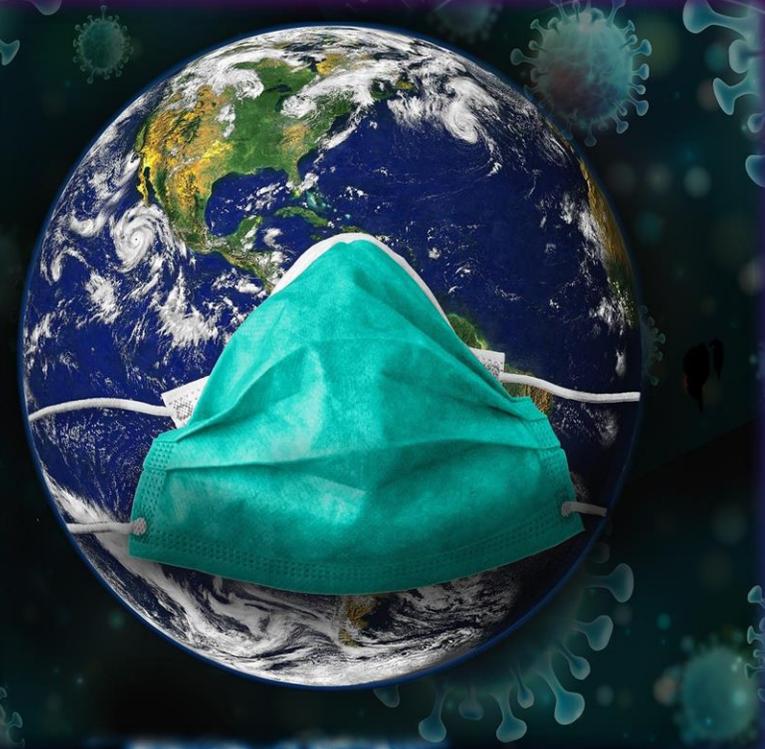
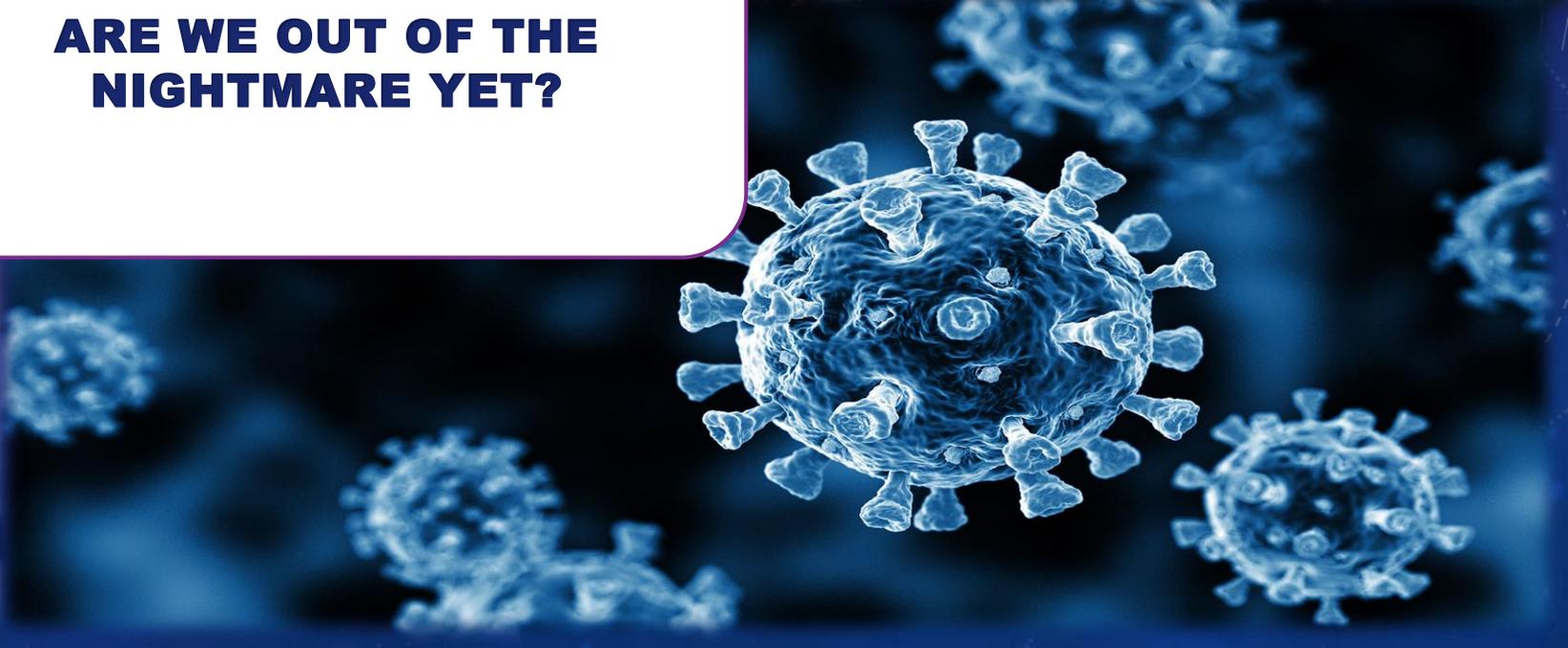


# Unravelling the link between COVID-19 and Periodontitis



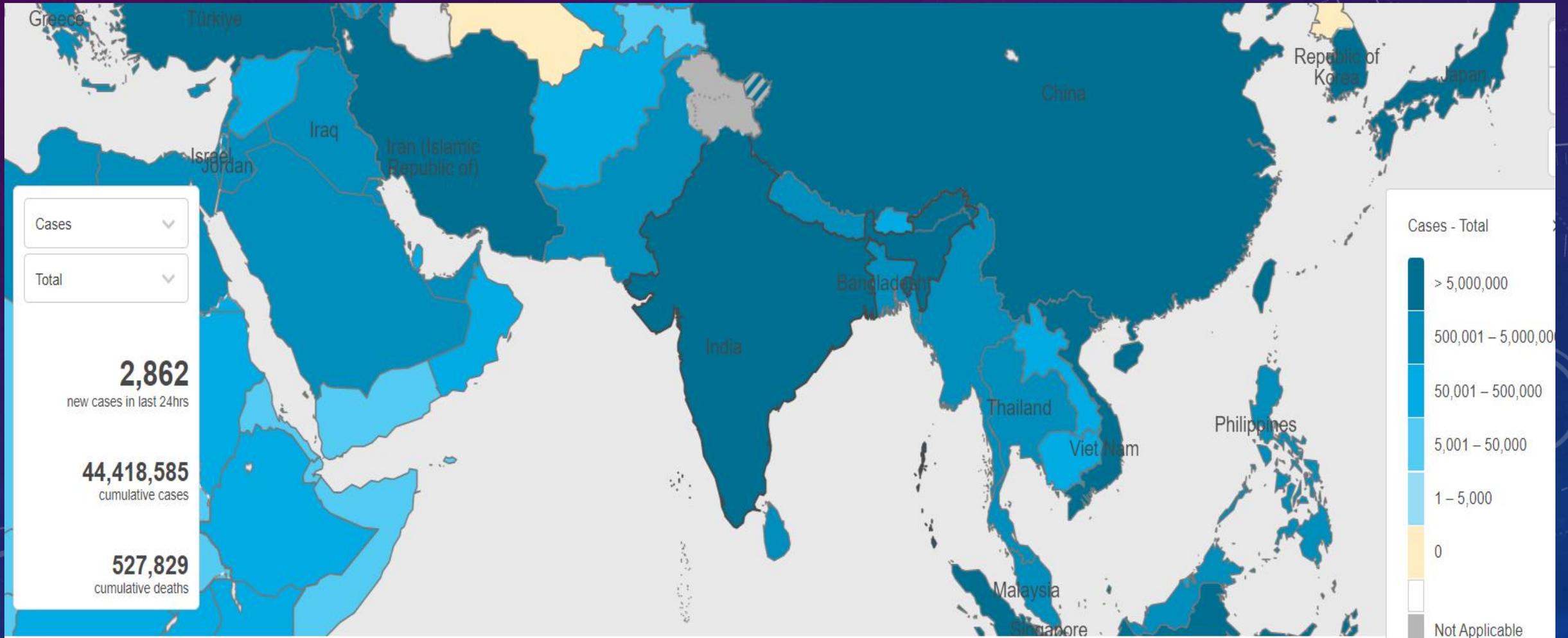


**ARE WE OUT OF THE NIGHTMARE YET?**





In **India**, from **3 January 2020** to **4:12pm CEST, 30 August 2022**, there have been **44,418,585 confirmed cases** of COVID-19 with **527,829 deaths**, reported to WHO. As of **16 August 2022**, a total of **2,085,387,344 vaccine doses** have been administered.





011-2378646, ncov2019[at]gov[dot]in



HELPLINE NUMBERS

- 1075** Health Ministry
- 1098** Child
- 08046110007** Mental Health
- 14567** Senior Citizens
- 14443** Ayush Covid-19 Counselling
- 9013151515** MyGov Whatsapp Helpdesk

Vaccination Registration

**CO-WIN**

**Aarogya Setu**

**UMANG** THE SPIRIT OF NEW INDIA

Download Certificate / Vaccination status

As on : 29 Aug 2022, 08:00 IST (GMT+5:30)

VACCINATION DOSE STATUS Statewise

**20,38,412**  
VACCINATION TODAY

24,70,330  
VACCINATION DOSES DAY BEFORE

2,11,91,05,738  
TOTAL VACCINATION DOSES

SARS-COV-2 TESTING STATUS UP TO AUG 28, 2022

**1,65,751**  
SAMPLES TESTED ON AUG 28, 2022

**88,52,08,552**  
TOTAL SAMPLES TESTED

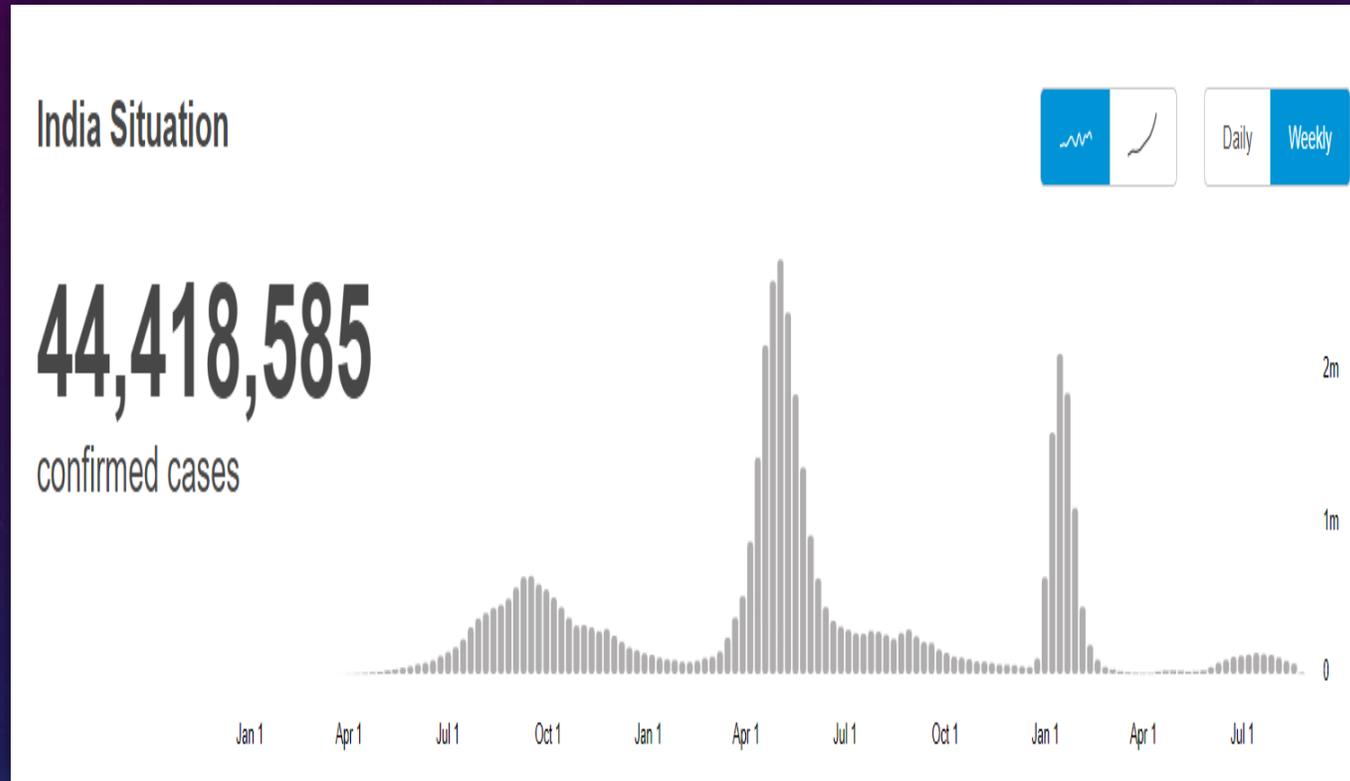
CASES ACROSS INDIA Statewise

**84,931** 1,660 ↓  
ACTIVE CASES (0.19%)

<b>TOTAL CASES</b> 4,44,15,723 7,591 ↑	<b>DISCHARGED</b> (98.62%) 4,38,02,993 9,206 ↑	<b>DEATHS</b> (1.19%) 5,27,799 45 ↑
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Dadra and Nagar Haveli and Daman and Diu	11,574	Delhi	19,98,644	Goa	2,55,896	Gujarat	12,69,687	Haryana	10,51,297	Himachal Pradesh	3,1
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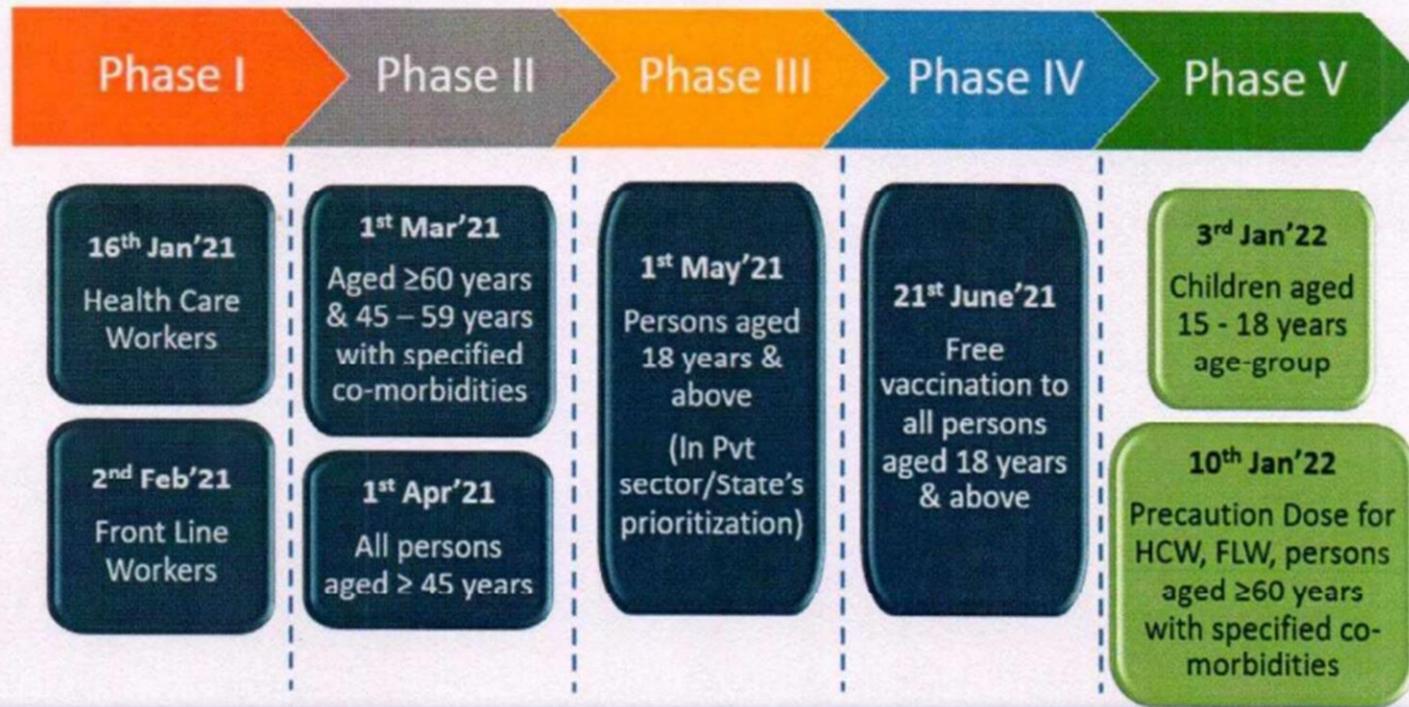
# Daily trends in the number of reported cases as given by WHO



August 29, 2022

10,453 Confirmed Cases

# National COVID-19 Vaccination Policy



Keeping in mind the evolving situation of the Covid-19 pandemic and the emerging evidence, the expert group has decided to expand Covid-19 vaccination program to children aged 12 to 14 years from March 2022. Only CorBEvax would be used for these beneficiaries in the age group of 12 to 13 years & 13-14 years in government CVCs in view of vaccine security issues and limited availability of other Covid-19 vaccines approved for this age group.

## EVEN AFTER GETTING VACCINATED, WHY IS IT IMPORTANT TO:



1. IT TAKES SEVERAL WEEKS TO DEVELOP MAXIMUM PROTECTION

2. NO VACCINE IS 100% EFFECTIVE - THERE IS STILL A CHANCE OF GETTING COVID-19

3. PROTECT YOURSELF AGAINST OTHER DISEASES, LIKE FLU

### DO IT ALL TO PROTECT YOURSELF AND STOP COVID-19.



## GET THE FACTS Available Outpatient COVID-19 Treatments

### Sick with COVID-19 symptoms?

Treatments are now available for nonhospitalized adults and some children with COVID-19.

These prescription treatments:

- ✓ are FDA approved or authorized.
- ✓ decrease serious disease and hospitalizations.
- ✓ work best when used early.



**NIRMATRELVIR/RITONAVIR (PAXLOVID™)**  **2x** for  **5 days**  
*2-3 pills twice a day for 5 days*

**MOLNUPIRAVIR (LAGEVRIO®)**  **2x** for  **5 days**  
*4 pills twice a day for 5 days*

### For use within 7 days of first symptoms:

**REMDESIVIR (VEKLURY®)**  **1x** for  **3 days**  
*1 IV infusion (i.e., delivered through the vein) per day for 3 days*

**BEBTELOVIMAB (MONOCLONAL ANTIBODY)**  **1x** for  **30 sec**  
*Single IV infusion over 30 seconds (followed by 1 hour of monitoring)*

### For use within 8 days of first symptoms:

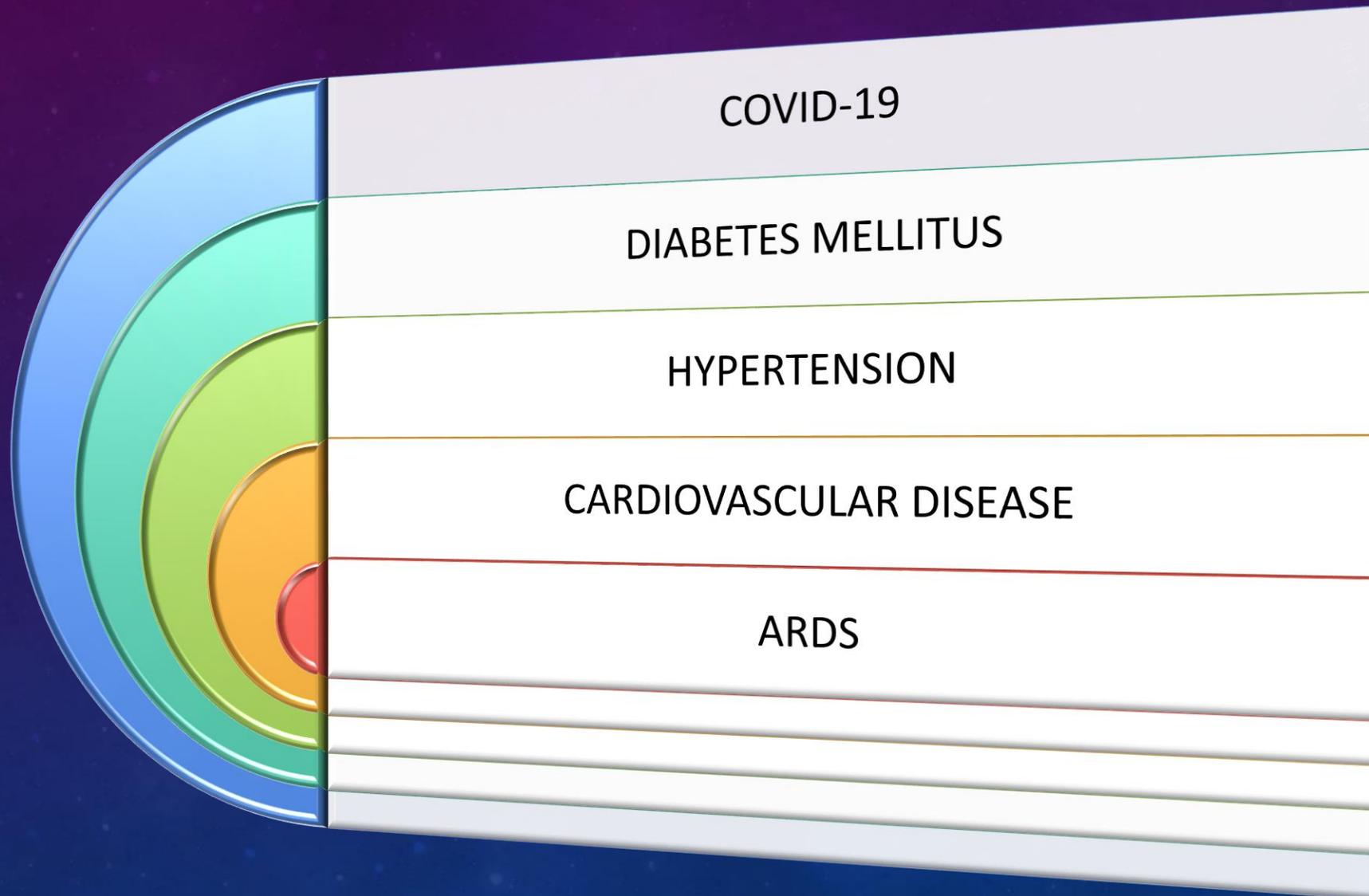
**HIGH-TITER CONVALESCENT PLASMA**  **1x** for  **60 min**  
*Single IV transfusion over 60 minutes*



For more information on therapeutics, visit: [COVID19LearningNetwork.org](https://COVID19LearningNetwork.org)



# ASSOCIATION OF SEVERITY OF COVID-19 INFECTION WITH COMORBIDITIES

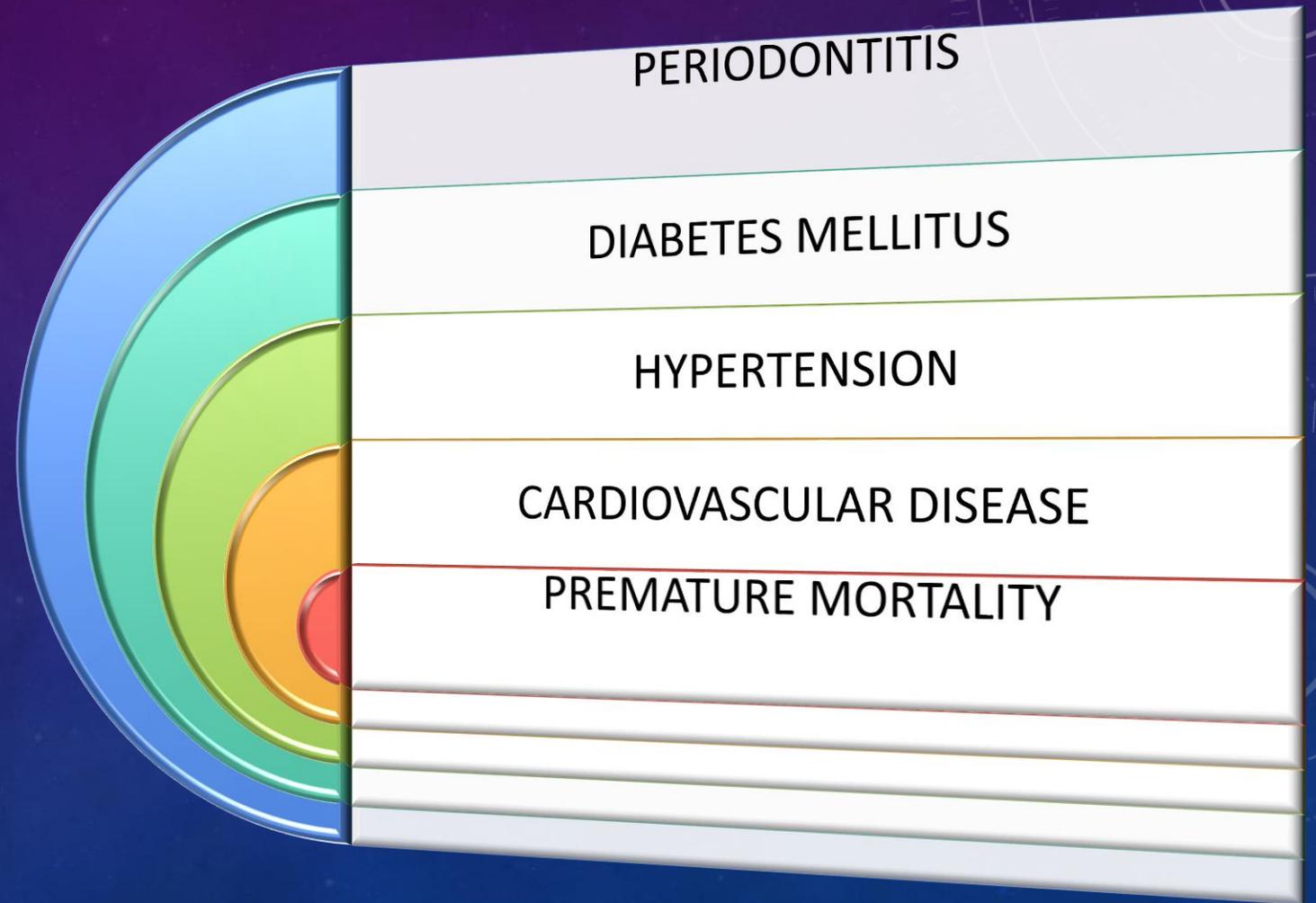


# ROLE OF ORAL CAVITY IN COVID-19

Xu et al., 2020 suggested relevant role of oral mucosa in the transmission and pathogenicity of SARS-CoV-2

Periodontitis is one of the most prevalent chronic inflammatory noncommunicable diseases (NCDs) (Eke et al., [2015](#)).

The Global Burden of Disease (GBD) Study have reported that 50% of adults are affected by mild-to-moderate periodontitis, and 10% by the severe form of the disease, rendering it the sixth most prevalent condition affecting mankind (Petersen & Ogawa, [2012](#)).



# NEXUS BETWEEN COVID-19 AND PERIODONTAL DISEASE

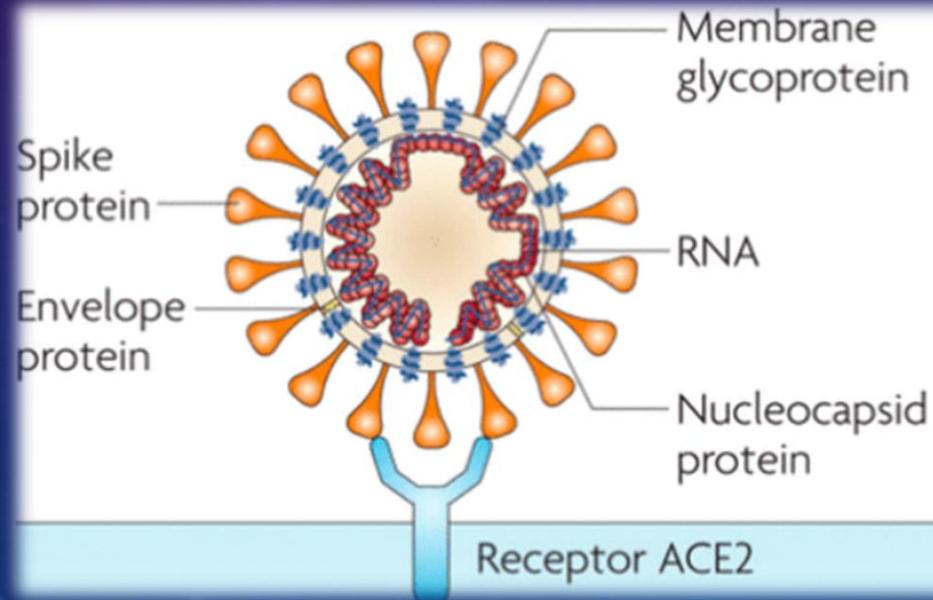
SARS CoV-2: Single stranded RNA virus with S-protein

S-protein binds to ACE-2 expressed in lungs, kidneys and Myocardial cells

Where else do we find ACE-2?

Oral epithelial cells, Salivary glands, tongue, buccal mucosa, gingival tissues, periodontal pockets, gingival crevices

Periodontopathogens can also produce such proteases that may help activate the S-protein and further increase SARS-CoV-2 infectivity.



Periodontium associated viruses can infect immune cells that continuously infiltrate the periodontal pocket.



→ STRATUM CORNEUM

→ KERATOHYALINE GRAN

→ STRATUM GRANULOS

→ STRATUM SPINOSUM

→ STRATUM BASALE

→ DESMOSOMES

→ NUCLEUS

→ HEMIDESMOSOMES



Macrophages



APC



Neutrophils



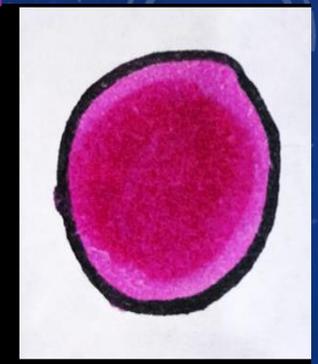
B-cell



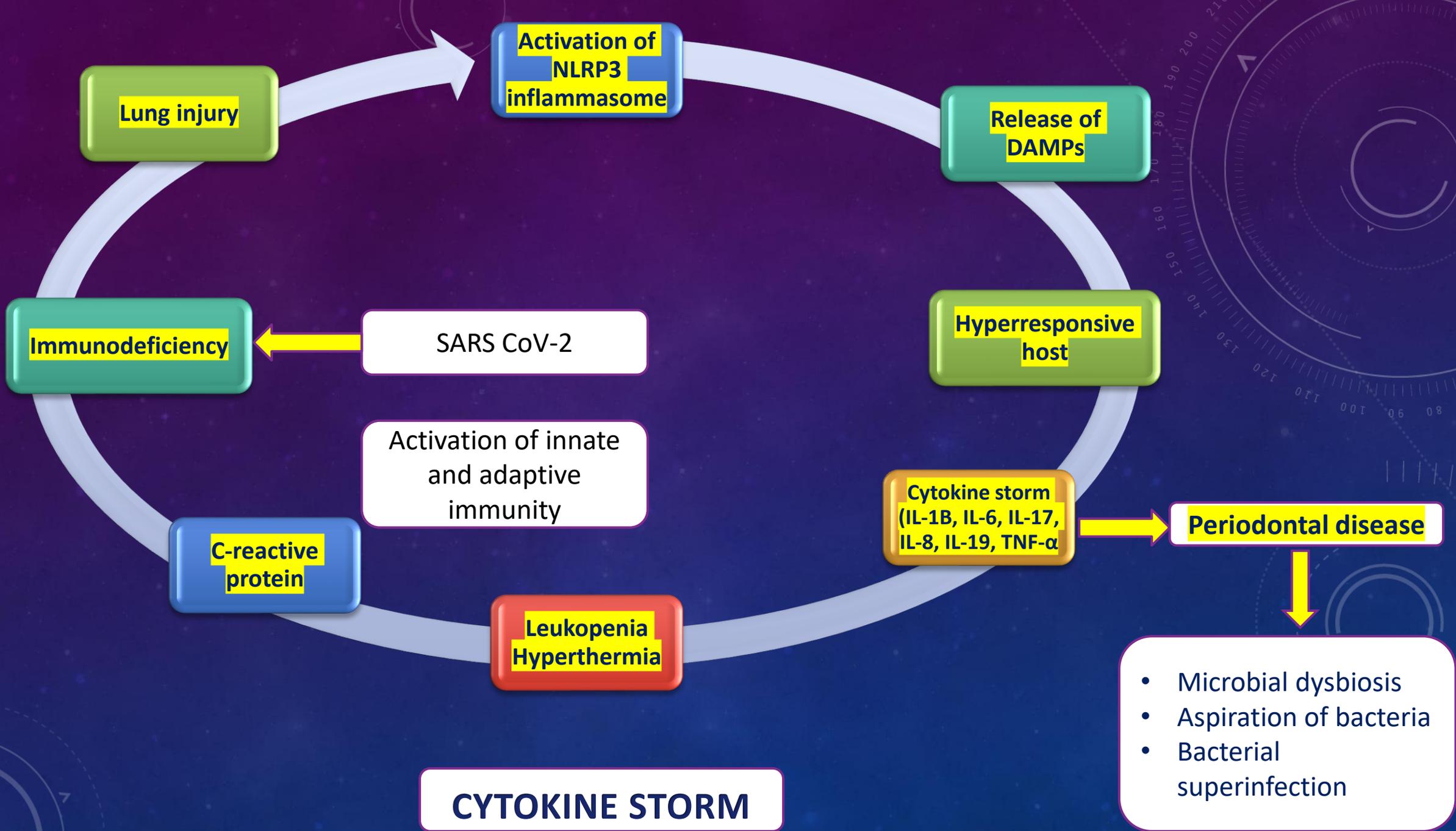
T-cell



Large granular Lymphocyte



Small lymphocyte



Lung injury

Activation of  
NLRP3  
inflammasome

Release of  
DAMPs

Hyperresponsive  
host

Cytokine storm  
(IL-1B, IL-6, IL-17,  
IL-8, IL-19, TNF- $\alpha$ )

Periodontal disease

- Microbial dysbiosis
- Aspiration of bacteria
- Bacterial superinfection

Immunodeficiency

SARS CoV-2

Activation of innate  
and adaptive  
immunity

C-reactive  
protein

Leukopenia  
Hyperthermia

**CYTOKINE STORM**

Hypercytokinemia

Acute lung injury

***CONSEQUENCES***

Systemic  
inflammation

Sepsis

Enhanced vascular  
permeability

Long Covid/ Post-  
acute Covid 19  
syndrome

# POSSIBLE LINK BETWEEN COVID-19 AND PERIODONTITIS

## COVID-19 & Periodontitis: The cytokine connection

V Sahni, S Gupta

Medical hypotheses 144, 109908

## SARS-CoV-2 detection in gingival crevicular fluid

S Gupta, R Mohindra, PK Chauhan, V Singla, K Goyal, V Sahni, R Gaur,

Journal of dental research 100 (2), 187-193

## The intriguing commonality of NETosis between COVID-19 & Periodontal disease

S Gupta, V Sahni

Medical Hypotheses 144, 109968

## Active matrix metalloproteinase-8 (aMMP-8) point-of-care test (POCT) in the COVID-19 pandemic

T Sorsa, V Sahni, N Buduneli, S Gupta... - Expert Review of ..., 2021 - Taylor & Francis

Introduction Active matrix metalloproteinase (aMMP)-8 utilized in point-of-care testing (POCT)

is regarded as a potential biomarker for periodontal and peri-implant diseases. Various ...

## Validation of a noninvasive aMMP-8 point-of-care diagnostic methodology in COVID-19 patients with periodontal disease

S Gupta, R Mohindra, M Singla, S Khera... - Clinical and ..., 2022 - Wiley Online Library

Objectives The aim of this study was to validate an active matrix metalloproteinase (MMP-8) point-of-care diagnostic tool in COVID-19 patients with periodontal disease. Subjects, ...

☆ Save 📄 Cite All 7 versions

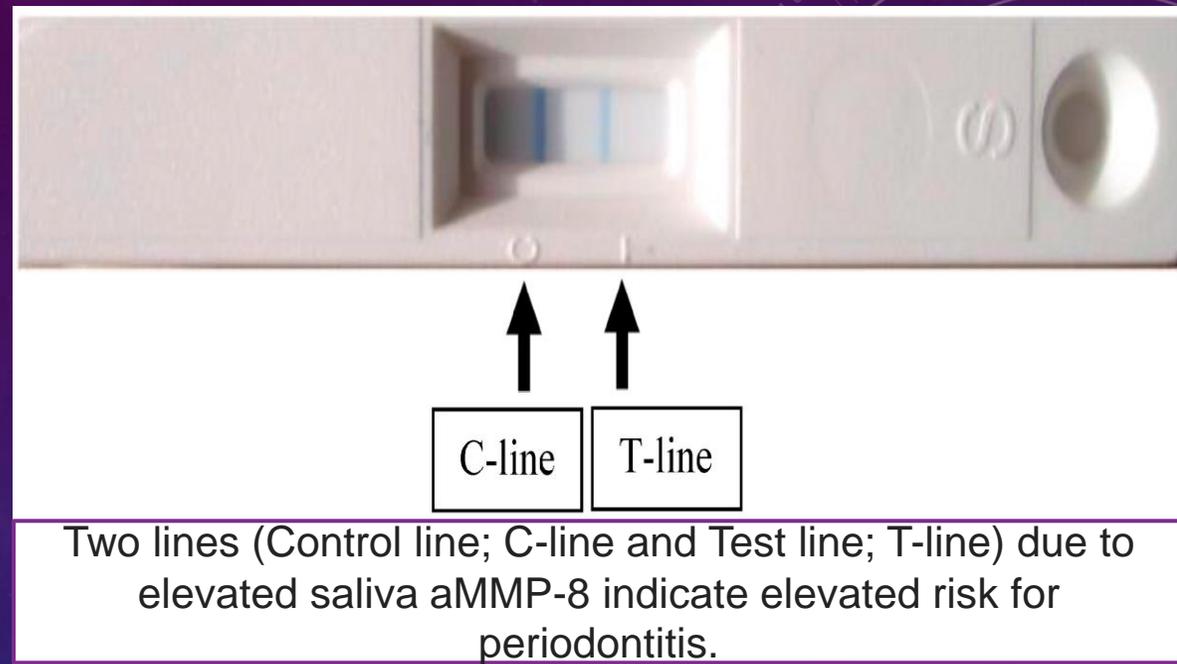


Salivary test kit used to detect the presence of aMMP-8 in periodontitis patients



ImplantSafe aMMP-8 (also a rapid lateral flow chromatography immunotest)

**D  
I  
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S**



Two lines (Control line; C-line and Test line; T-line) due to elevated saliva aMMP-8 indicate elevated risk for periodontitis.



Hirschmann microcapillary pipettes

Gupta et al. assessed the presence of SARS-CoV-2 in GCF samples from 33 patients with COVID-19. The virus was detected only in asymptomatic carriers and patients who were mildly symptomatic, whereas individuals with poor oral hygiene had elevated inflammatory exudate levels.

The authors concluded that periodontal pockets may aid in virus replication; as the viral load in GCF increases, the virus gains entry via saliva to the systemic circulation. Therefore, GCF could represent a potential mode of transmission

## SUPPORTING LITERATURE

Zheng et al., 2020 reported high neutrophil counts and lower lymphocyte counts in patients with severe COVID-19 compared with those with mild symptoms. Increased neutrophil counts are commonly associated with bacterial infections but more rarely observed in viral infections. Zheng et al. suggested that bacterial superinfection may be widespread in severe COVID-19 cases, and that bacterial infections could supersede the original viral infection

Larvin et al, 2020 assessed the impact of periodontal disease on COVID19 outcomes. The authors found a higher risk of mortality in COVID-19 individuals with bleeding gums and concluded that mortality risk was higher in patients with periodontal disease. Hence, it is essential to assess oral health status in patients with COVID-19 to prevent adverse outcomes.

## Periodontal maintenance to limit systemic cytokine levels

The American Dental Association recommends using 0.2% to 0.5% povidone solutions or 1% hydrogen peroxide to reduce viral transmission.

In hospitalized individuals, oral hygiene measures and reducing plaque build-up can minimize bacterial loads, prevent aspiration of oral pathogens, and reduce the risk of pneumonia or respiratory illness.

Administration of ACE inhibitors might increase ACE2 levels and enhance the anti-inflammatory response.

Combinations of periodontal therapy and ACE inhibitors might reduce periodontal disease progression and thereby minimize the risk of adverse COVID-19 outcomes

Non-surgical periodontal therapy along with treatment using anti-cytokine inhibitors may have beneficial effects in patients infected with SARS-CoV-2.

# CONCLUSION

The current evidence suggests that increased production of pro-inflammatory cytokines is the foremost cause of the adverse events related to COVID-19.

Poor oral hygiene could exaggerate SARS CoV-2 infection,  
it is essential to maintain good oral hygiene and periodontal health to preserve overall health

Periodontal disease could further enhance cytokine release via altered microflora, expression of multiple viral receptors, bacterial superinfection, and aspiration of periodontal pathogens

Early detection and treatment of periodontal disease, as well as identification of hyperresponsive individuals through cytokine profiling, may assist in selection of appropriate treatment modalities.

## TAKE HOME MESSAGE

Another source of the fallacy is the vicious circle of illusions which consists on the one hand of believing what we see, and on the other of seeing what we believe.

**Sir Thomas Clifford Allbutt**