

Etiology, pathogenesis, clinical picture and management of SARS-CoV-2 infection

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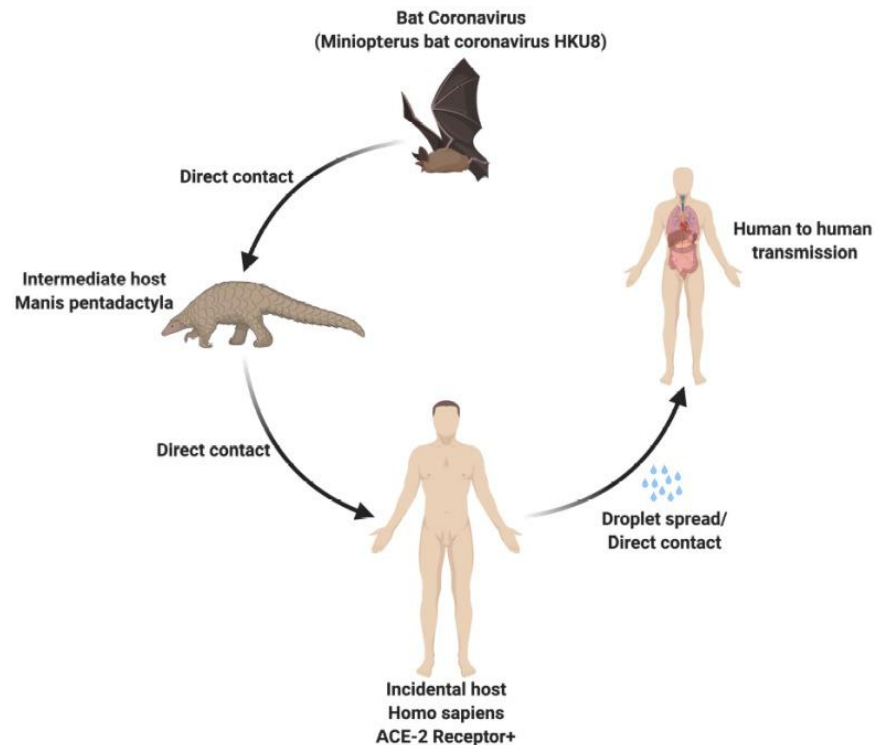
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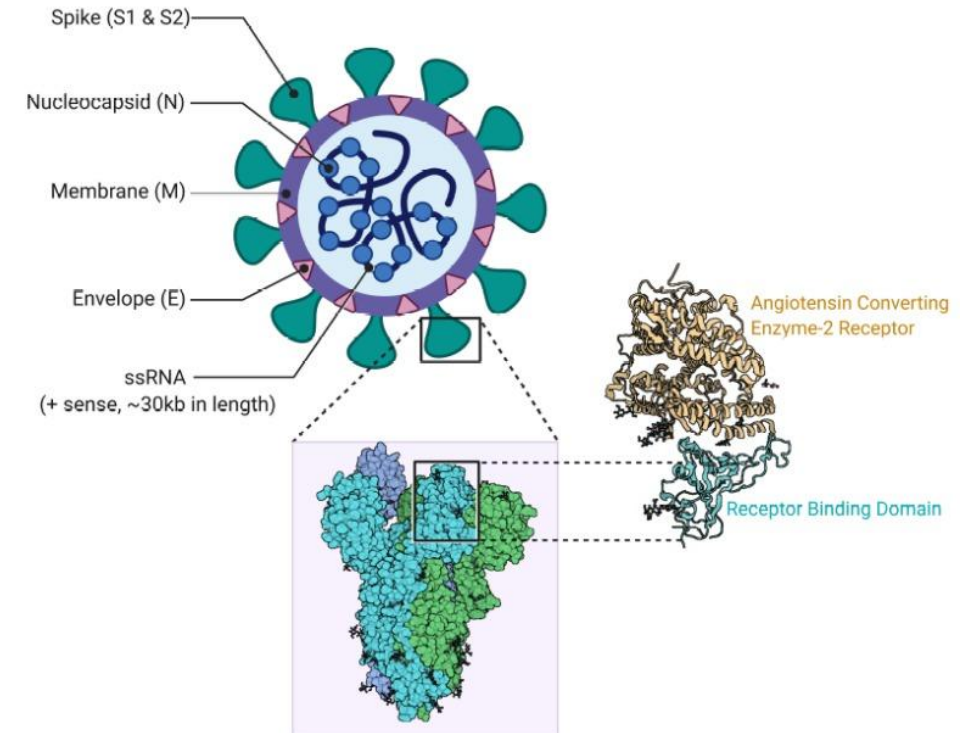


SARS-CoV-2 – structure and transmission

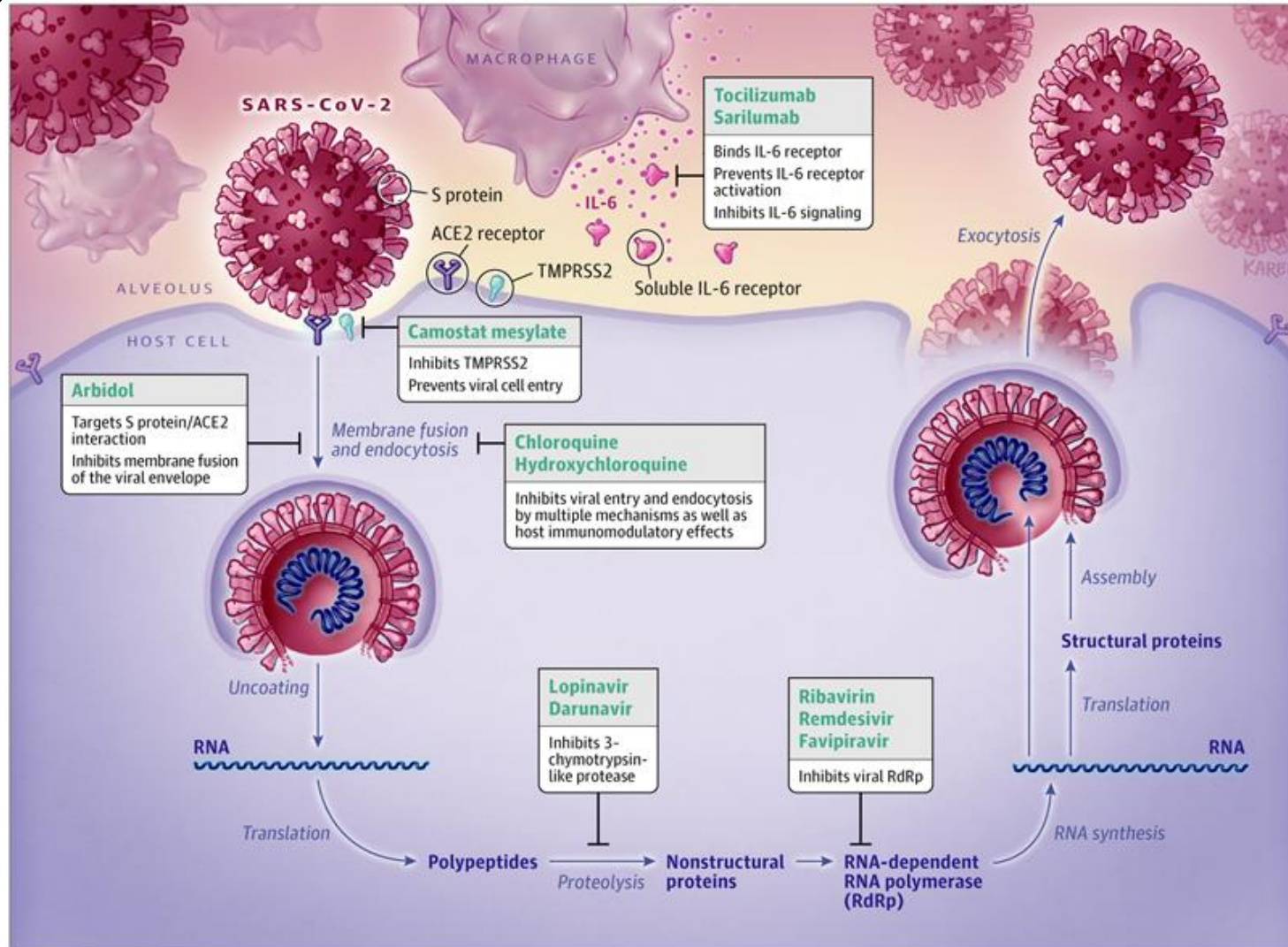
Transmission Cycle of SARS CoV 2



SARS-CoV 2 Structure

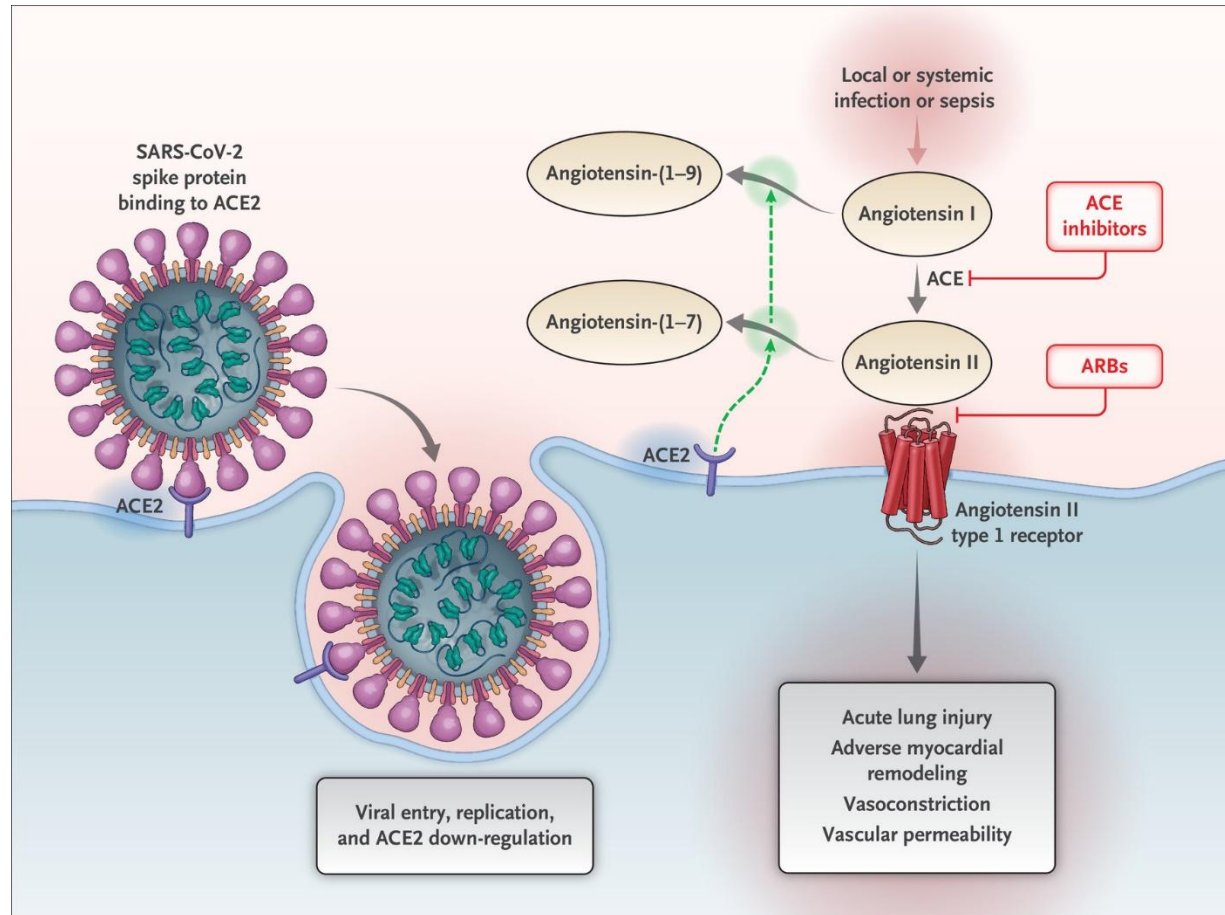


Simplified Representation of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Viral Lifecycle and Potential Drug Targets

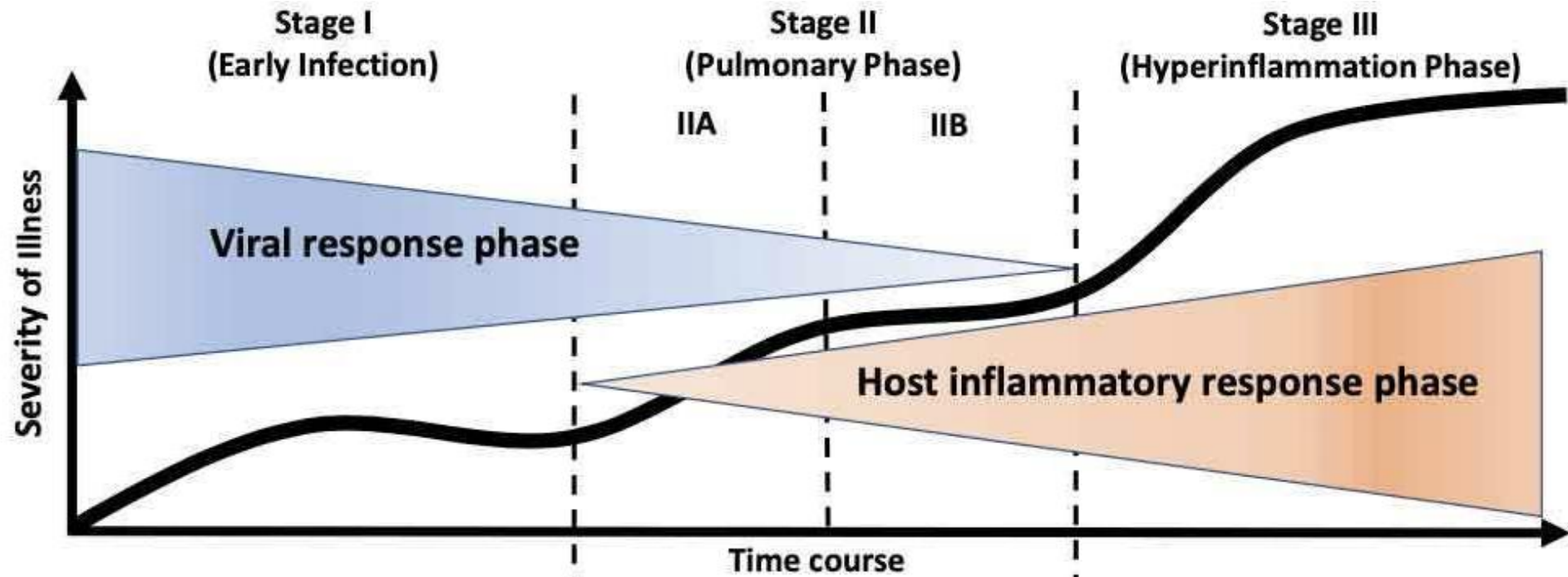


JAMA.2020;323(18):1824-1836.doi:10.1001/jama.2020.6019

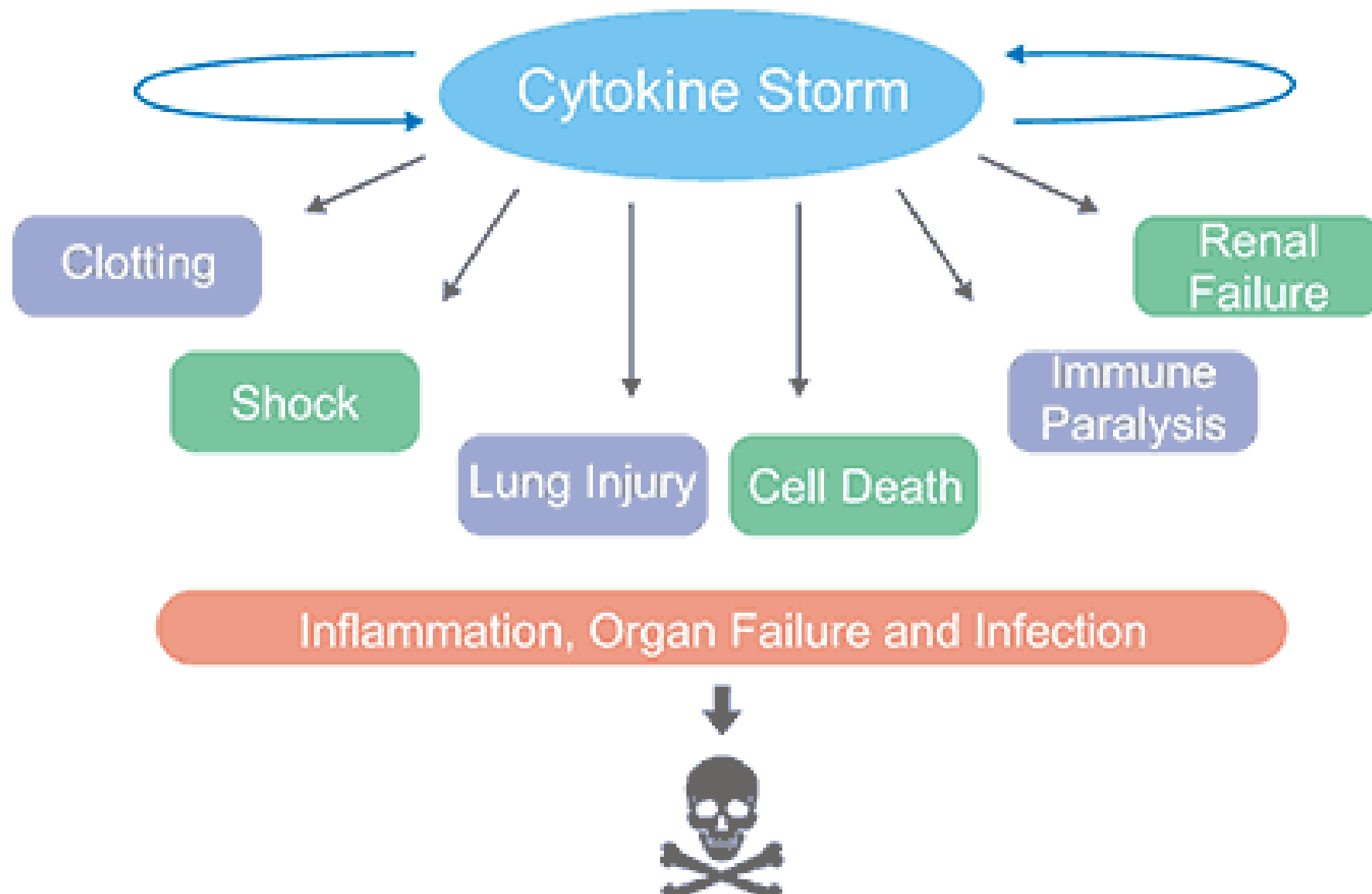
Interaction between SARS-CoV-2 and the Renin–Angiotensin–Aldosterone System.



N Engl J Med 2020; 382:1653-1659
DOI: 10.1056/NEJMs2005760



Clinical Symptoms	Mild constitutional symptoms Fever $>99.6^{\circ}\text{F}$ Dry Cough, diarrhea, headache	Shortness of Breath Hypoxia ($\text{PaO}_2/\text{FiO}_2 \leq 300\text{mmHg}$)	ARDS SIRS/Shock Cardiac Failure
Clinical Signs	Lymphopenia, increased prothrombin time, increased D-Dimer and LDH (mild)	Abnormal chest imaging Transaminitis Low-normal procalcitonin	Elevated inflammatory markers (CRP, LDH, IL-6, D-dimer, ferritin) Troponin, NT-proBNP elevation
Potential Therapies	Remdesivir, chloroquine, hydroxychloroquine, convalescent plasma transfusions		
	Reduce immunosuppression	Corticosteroids, human immunoglobulin, IL-6 inhibitors, IL-2 inhibitors, JAK inhibitors	



Clinical manifestations of the disease – COVID-19

- **Mild disease:** non-pneumonia and mild pneumonia - 81% of cases.
- **Severe disease** - in 14% of cases
 - dyspnea,
 - respiratory frequency $\geq 30/\text{min}$
 - blood oxygen saturation (SpO_2) $\leq 93\%$
 - $\text{PaO}_2/\text{FiO}_2$ ratio or $\text{P/F} < 300$
 - lung infiltrates $> 50\%$ within 24 to 48 hours
- **Critical disease** -5% of cases
 - respiratory failure
 - septic shock
 - multiple organ dysfunction (MOD) or failure (MOF)



Complications of COVID-19

ARDS

Cardiac complications

arrhythmias, acute cardiac injury, and shock

thromboembolic complications

- pulmonary embolism
- acute stroke

exuberant inflammatory response - cytokine release syndrome

Own perspective – from 12.02.2020

- 957 children tested – SARS-CoV-2 PCR from nasopharyngeal swabs
- 12 positive - age 4-18 years
- Mild disease – 9 children
 - Fever
 - Cough
 - Anosmia
 - Dysgeusia
- Severe disease -3 cases
 - Severe pneumonia – coinfection with invasive pneumococcal disease
 - Macrophage activation syndrome like disease with lung involvement
 - Bone-marrow suppression



COVID-19- SPECIFIC THERAPY

Remdesivir

Lopinavir-ritonavir

Convalescent plasma

IL-6 pathway inhibitors

Hydroxychloroquine/chloroquine

Pediatric inflammatory multisystem syndrome PIMS

- Fever $>38.0^{\circ}\text{C}$ for ≥ 24 hours, or report of subjective fever lasting ≥ 24 hours
- Laboratory evidence of inflammation (eg, elevated CRP, ESR, fibrinogen, procalcitonin, D-dimer, ferritin, LDH, or interleukin-6 [IL-6] level; neutrophilia; lymphocytopenia; and/or hypoalbuminemia)
- Severe illness requiring hospitalization
- ≥ 2 organ systems involved (cardiac, renal, respiratory, hematologic, gastrointestinal, dermatologic, and/or neurologic)
- No alternative plausible diagnoses
- Recent or current SARS-CoV-2 infection or exposure:
 - Positive SARS-CoV-2 polymerase chain reaction (PCR)
 - Positive serology for SARS-CoV-2
 - Positive antigen test
 - COVID-19 exposure within the four weeks prior to the onset of symptom



4-year old child
with fever,
diarrhorea on
admission

- Developed rash and cracked lips during hospital stay
- Laboartory findings : elevated WBC, CRP, hsTnI, BNP,
- SARS-CoV-2 – PCR – negative 2 x; SARS-Ab – pending
- Responded well to IVIG



Thank you very much for your attention

I will be delighted to answer your questions