Pharmaceutical Approach to COVID-19

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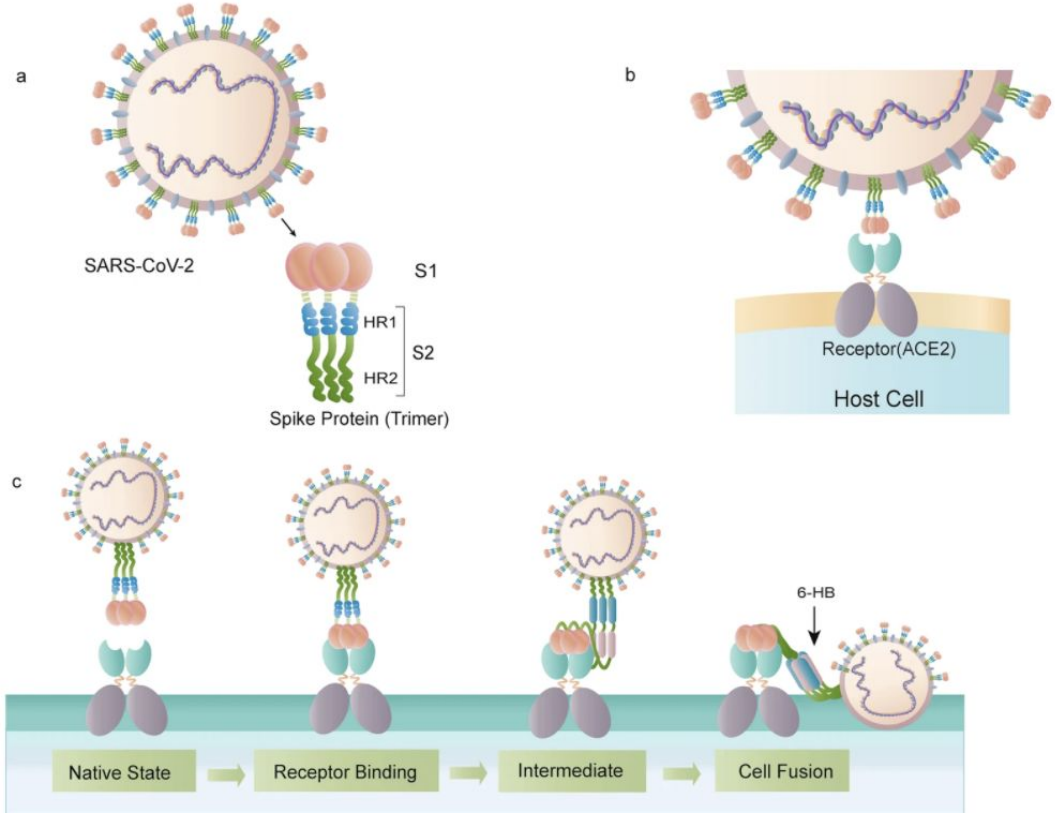
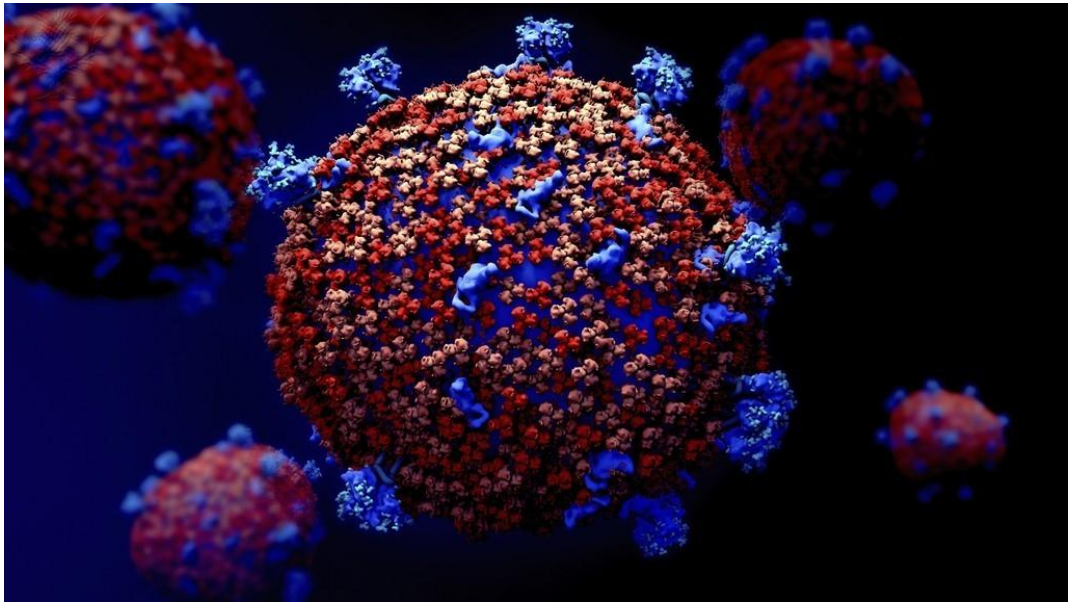
COVID-19 Structure and Binding Process

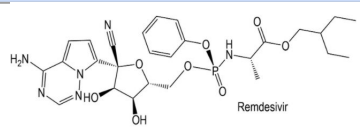
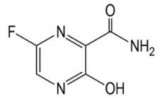
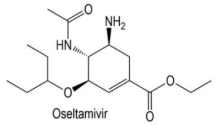
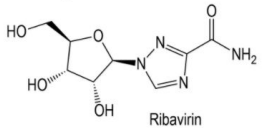
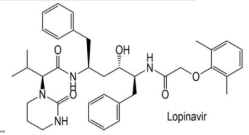
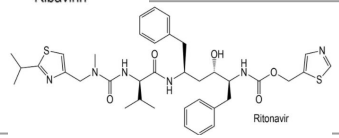
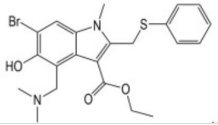


Challenges of Treating COVID-19



- No known antiviral treatment or vaccine
- Asymptomatic carriers
- Incubation period
- Variability of antibodies

Potential Antiviral Treatments Under Investigation

	Structure	Target	Current Application
Remdesivir	 Remdesivir	Transcription	Ebola
Favipiravir (Avigan)	 Favipiravir	Transcription	Influenza
Oseltamivir (Tamiflu)	 Oseltamivir	Neuraminidase	Influenza A & B
Ribavirin	 Ribavirin	Transcription	Hepatitis C
Lopinavir/ Ritonavir	 Lopinavir  Ritonavir	Protease	HIV
Umivenofir (Arbidol)		Fusion	Influenza

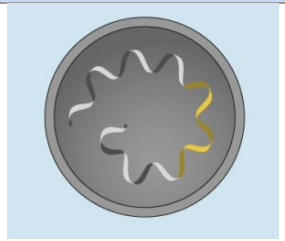
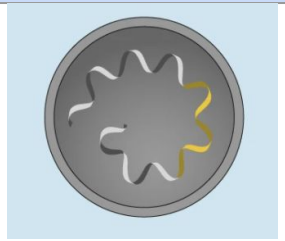
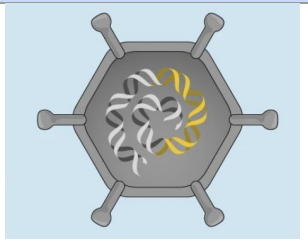
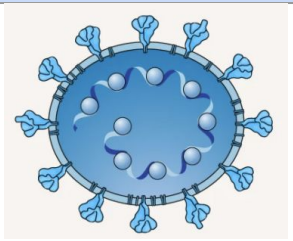
Other Potential Treatments

- Hydroxychloroquine, chloroquine, azithromycin
  - EUA issued and retracted due to severe side effects and ineffectiveness
- Corticosteroids
  - Clinical recommendations shift toward usage for critically ill
- Convalescent plasma
  - EUA issued, questionable scientific basis

Status of COVID Vaccine Development

PHASE 1	PHASE 2	PHASE 3	LIMITED	APPROVED
24	14	9	3	0
Vaccines testing safety and dosage	Vaccines in expanded safety trials	Vaccines in large-scale efficacy tests	Vaccines approved for early or limited use	Vaccines approved for full use

Comparison of Leading Vaccine Candidates

	Moderna	Pfizer	AZN/Oxford	Merck/IAVI
Method				
Technology	mRNA nanoparticle	mRNA nanoparticle	Non-replicating viral vector (Chimpanzee Adenovirus)	Recombinant Vesicular Stomatitis Virus (rVSV)
Antigen	Modified full-length s protein	Full-length s protein	Full-length s protein	S protein

Complexities With Vaccine Deployment

- From 2010 to 2015, vaccines prevented an estimated 10 million deaths (WHO)
- Factors such as dosage, frequency and subpopulation effects must be evaluated
- Premature deployment presents safety risks
    - Polio (1955) to Dengue (2017)
- Politics, distrust, and misinformation effect inoculation rates and success

Questions?