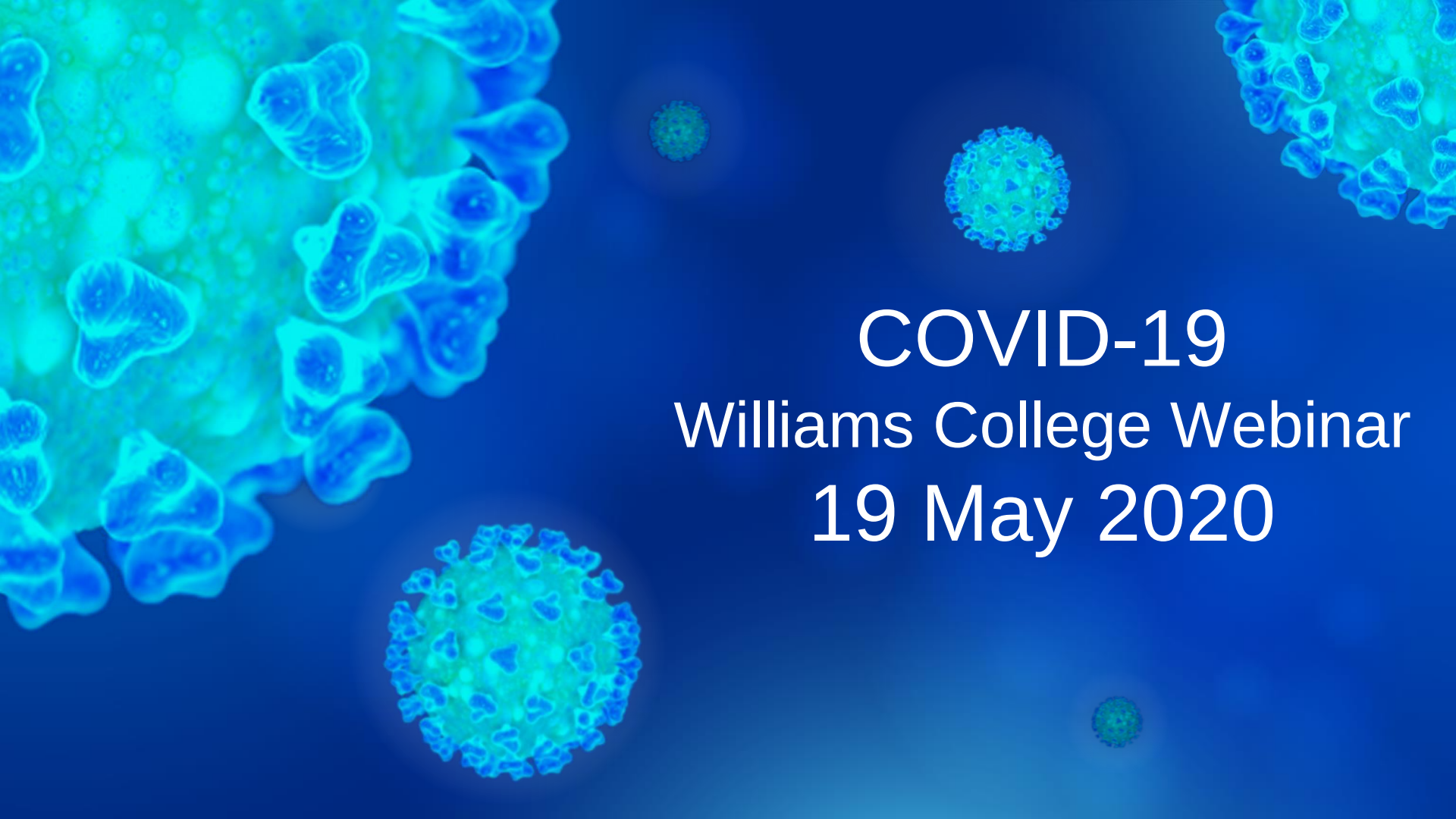


The background is a solid dark blue. It features several stylized, glowing green and yellow virus particles, which are spherical with a textured surface. There are also larger, more complex structures on the left and right sides, resembling clusters of cells or larger viral aggregates, also in green and yellow. The text is centered on the right side of the image.

COVID-19

Williams College Webinar
19 May 2020

Table 1. Coronavirus-based diseases in animals and humans.

Virus	Disease	Effect	Ref.
TGEV	Gastroenteritis in pigs	High morbidity, mortality	[3]
PEDV	Gastroenteritis in pigs	High morbidity, mortality	[4]
PHEV	Enteric infection	Diarrhea, encephalitis	[5]
BCoV	Respiratory tract infection	Significant loss in cattle industry	[6,7]
RCoV	Respiratory tract infection	Model system	[8]
IBV	Respiratory infections, renal disease	Significant losses in the chicken industry	[7,9]
FCoV	Respiratory tract infection	Mild or asymptomatic	[10]
FIPV	Infectious peritonitis	Lethal FIP	[11]
SW1	Respiratory, acute liver	SW1 found in deceased whale	[13]
Bat CoV	Respiratory tract infection	Potential threat of epidemics	[14]
SHC014-CoV	Risk of epidemic	Chimeric CoV presents risk	[15]
MHV	Respiratory, enteric, neurological infections	Mouse model for human disease	[16]
A59, JHMV	Chronic demyelination	Mouse model for MS	[17]
α HCoV-229E	Respiratory infection	15%–30% of annual common cold	[18]
α HCoV-NL63	Respiratory infection	Also associated with croup	[18,19]
β HCoV-OC43	Respiratory infection	15%–30% of annual common cold	[20]
β HCoV-HKU1	Respiratory infection	15%–30% of annual common cold	[20]
SARS-CoV	SARS	Epidemic with 774 deaths	[21,22]
MERS-CoV	MERS	Epidemic with 333 deaths	[23]

Novel Coronaviruses

	SARS - CoV -1	MERS - CoV	SARS –CoV - 2
When	Nov 2002-July 2003	Sep 2012 - ongoing	Dec 2019 - ongoing
Where	Worldwide (kind of)	27 countries	Worldwide
Number of cases	8096	2494	3.85 million
Case Fatality Ratio	9.6%	34.4%	6.9%
% HCWs	21% (43% Can)	0-18%	16% (NS data)

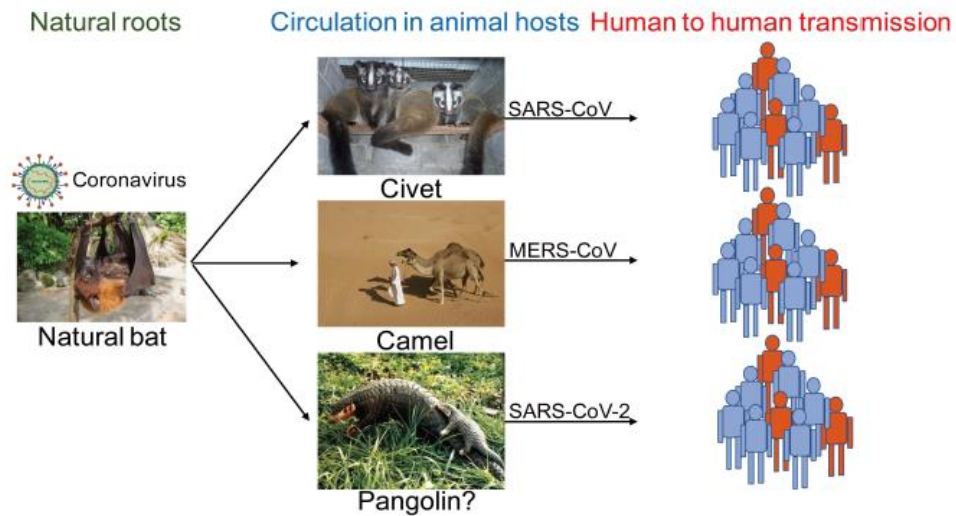


Figure 3. Ecology of emerging coronaviruses SARS-CoV, MERS-CoV, and SARS-CoV-2 are all bat origin coronaviruses, which cause human infections after circulation in animal hosts of civet, camel, and pangolin.



COVID -19 Timeline

(A)

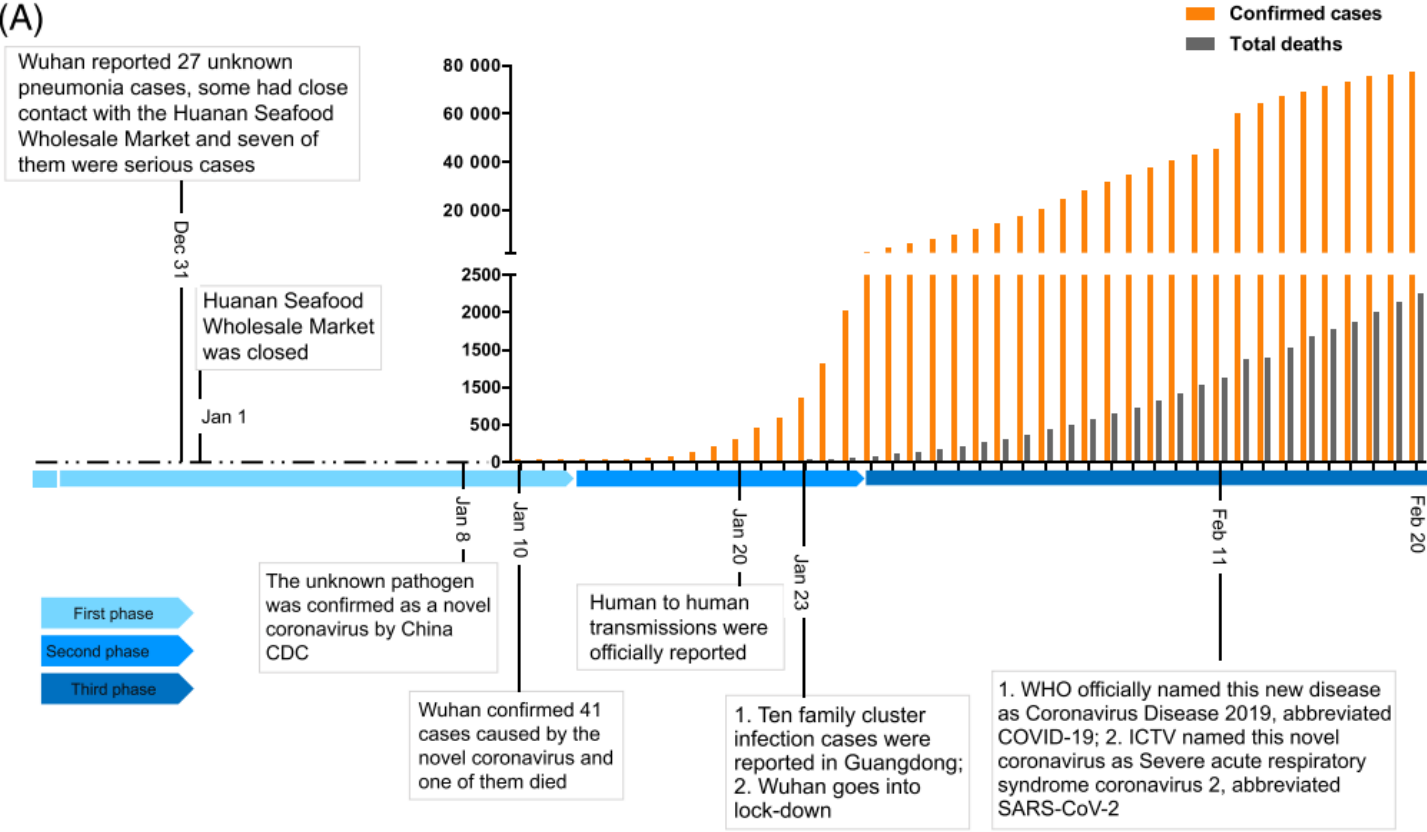
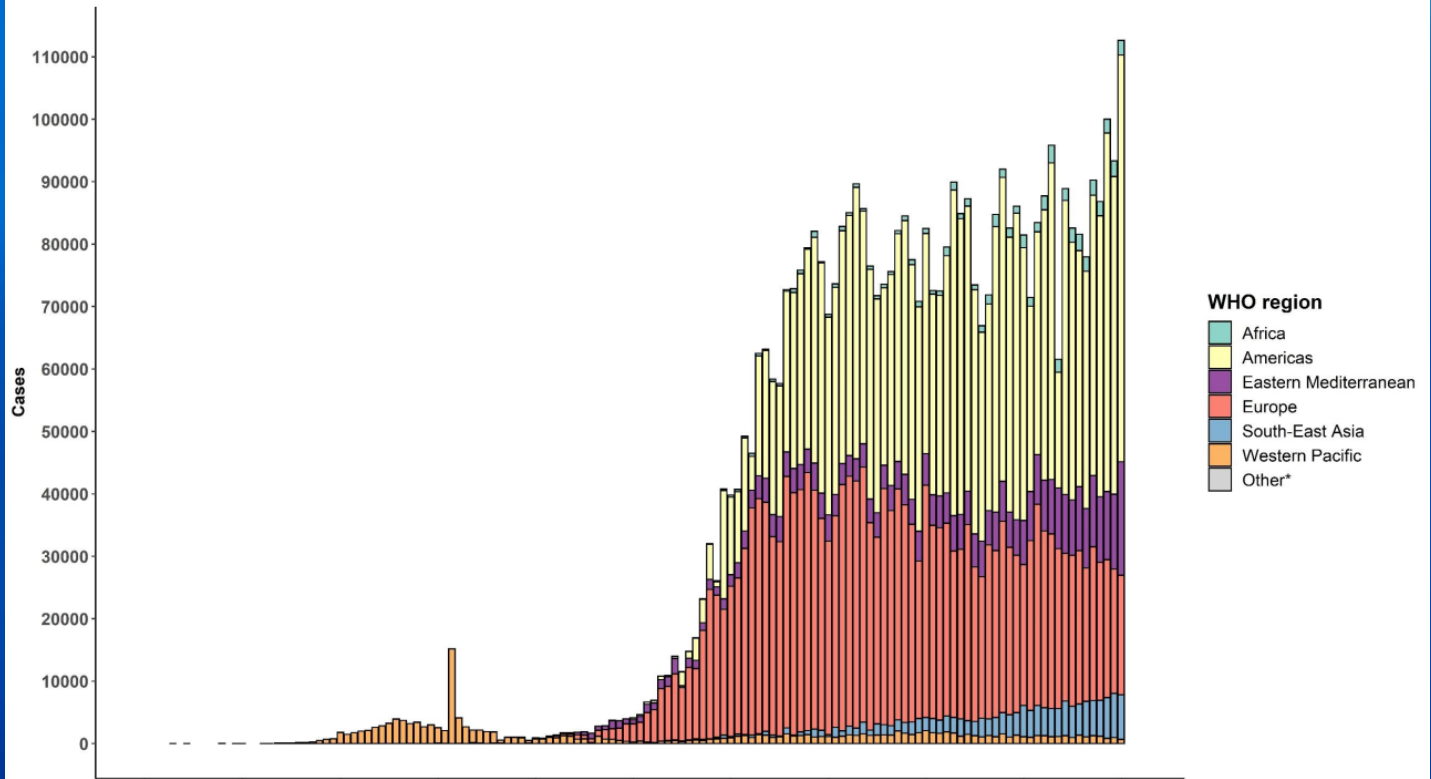


Figure 2. Number of confirmed COVID-19 cases, by date of report and WHO region, 30 December 2019 through 19 May 2020**



....WHO sit rep, 19 May 2020

151,615 Turkey

5/19/2020, 2:05:52 PM

countries/regions

Lead by [JHU CSSE](#). Automation Support: [Esri Living Atlas team](#) and [JHU APL](#). [Contact US](#). [FAQ](#). Read more in this [blog](#).



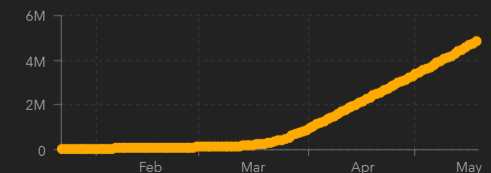
Hospitalization Rate

27,709 deaths

5,862 deaths, recovered
Massachusetts US

4,915 deaths, **28,234**
recovered

US Deaths, Recov...



Daily Cases

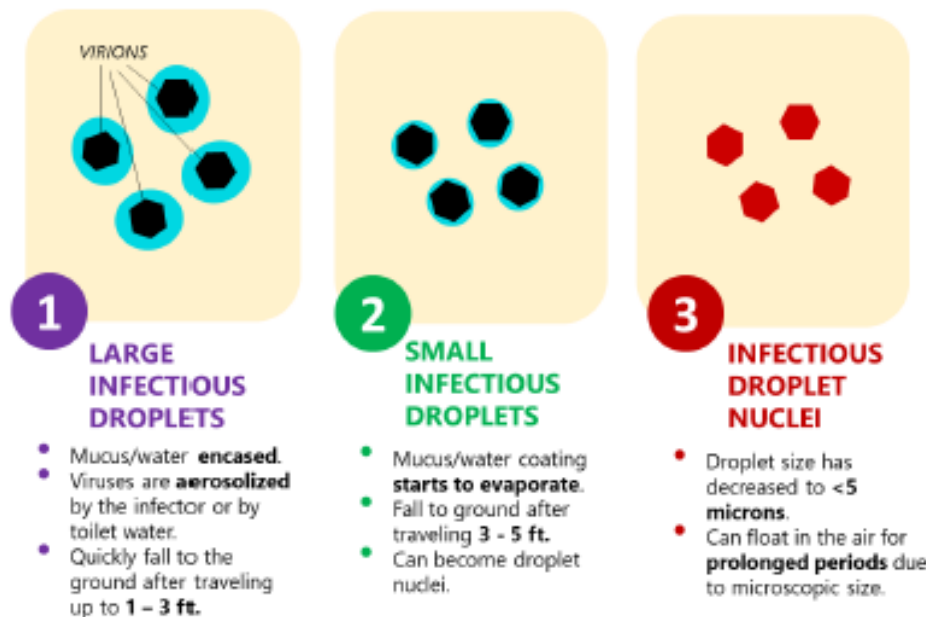
The concept of reproductive number (R_t or R -“naught”)

Table 1 R_0 Estimations from different groups

Group	R_0	Date	Source
WHO	1.4–2.5	23 Jan	[20]
Majumder	2.0–3.3	Updated 27 Jan	[18]
Althaus	2.2 (90% CI 1.4–3.8)	25 Jan	[21]
Tang	6.47 (95% CI 5.71–7.23)	24 Jan	[19]
Read	3.11 (90% CI 2.39–4.13)	Updated 27 Jan	[17]
Leung	2.13 (1.92–2.31)	25 Jan	[22]
Gardner	2	26 Jan	[23]
Li	2.2 (95% CI 1.4–3.9)	29 Jan	[15]

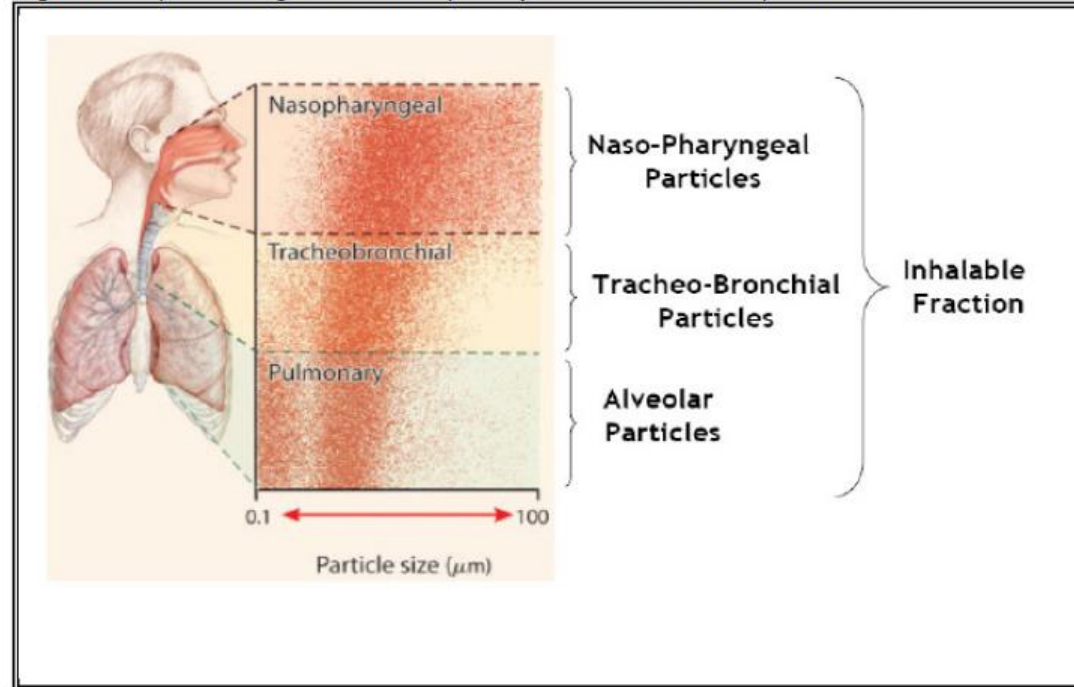
...for up-to-date dynamic US data visit Web site - *rt.live*

Stages Of Infectious Droplets And Droplet Nuclei



Where do aerosols land?

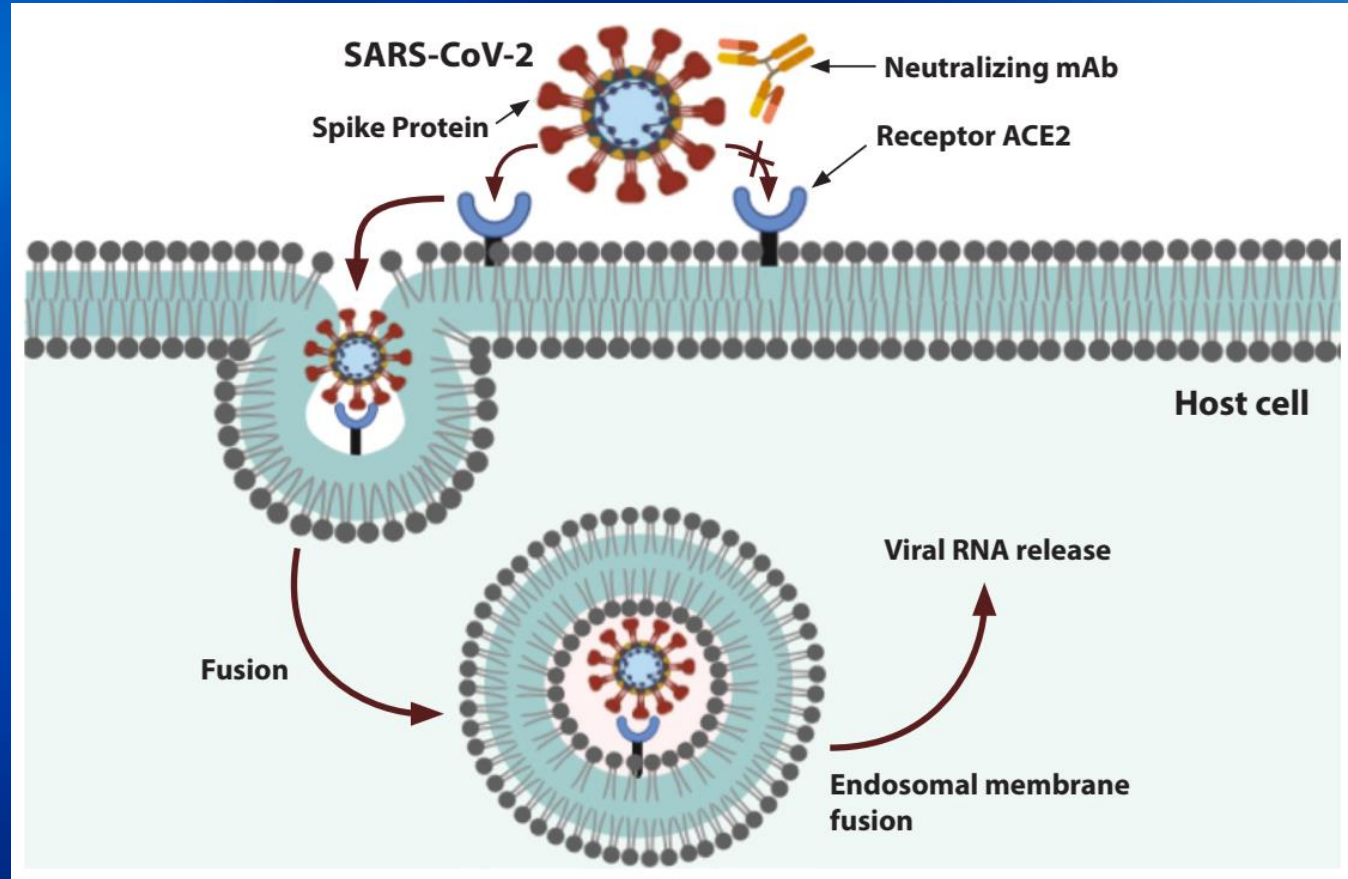
Figure 3: Deposition regions of the respiratory tract for the various particle sizes⁽¹²⁵⁾



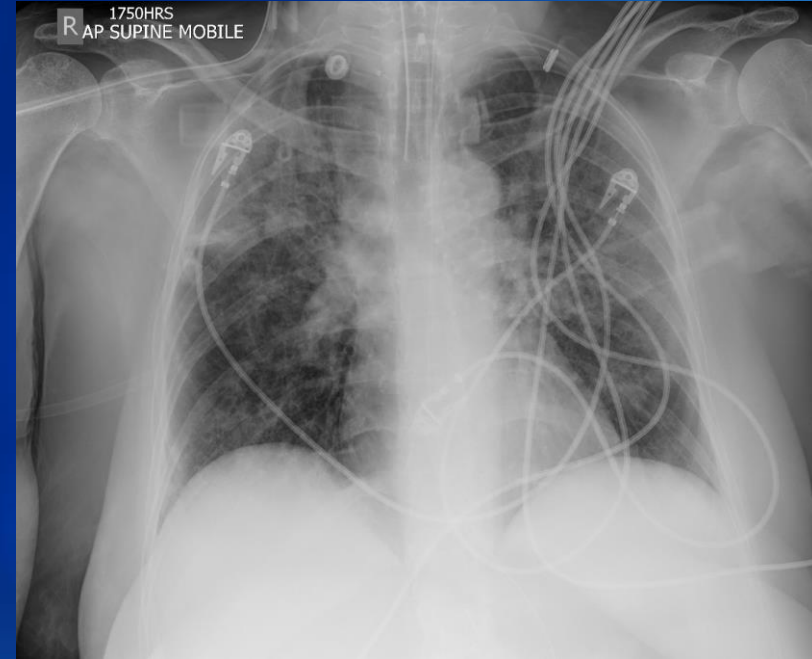
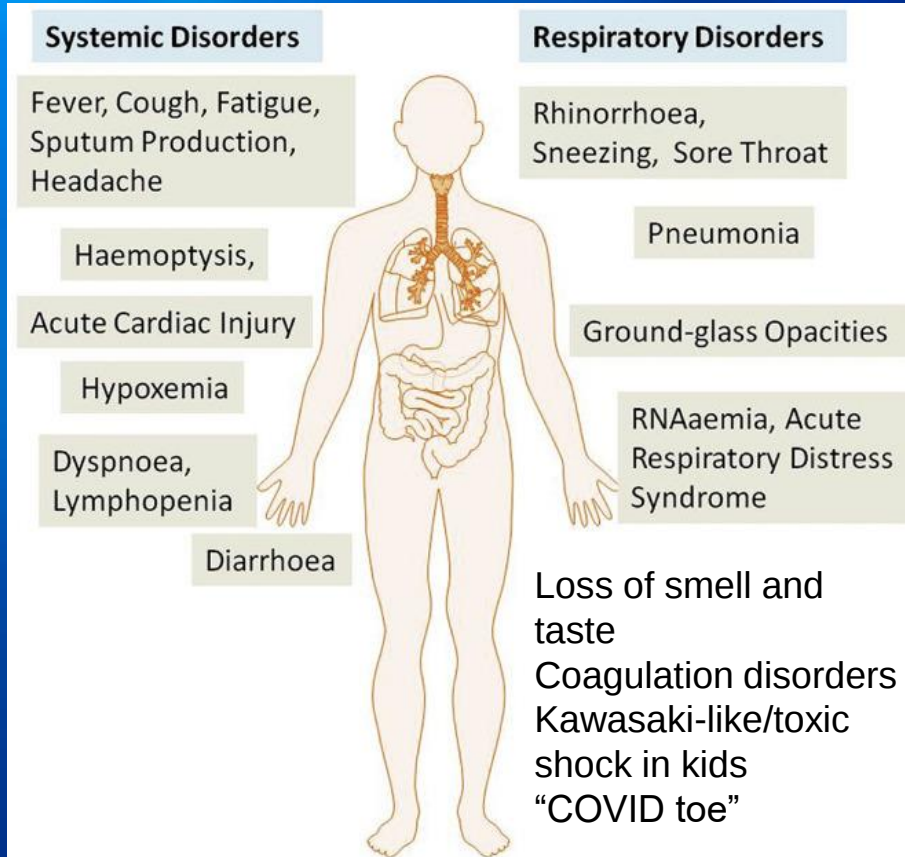
Inspirable: 10 - 100 μm

Respirable: ≤ 10 μm

How does SARS-CoV-2 cause infection ?



What are symptoms of COVID-19?



One of our cases last week
...a typical chest X-ray

Some potential treatments for COVID-19...

