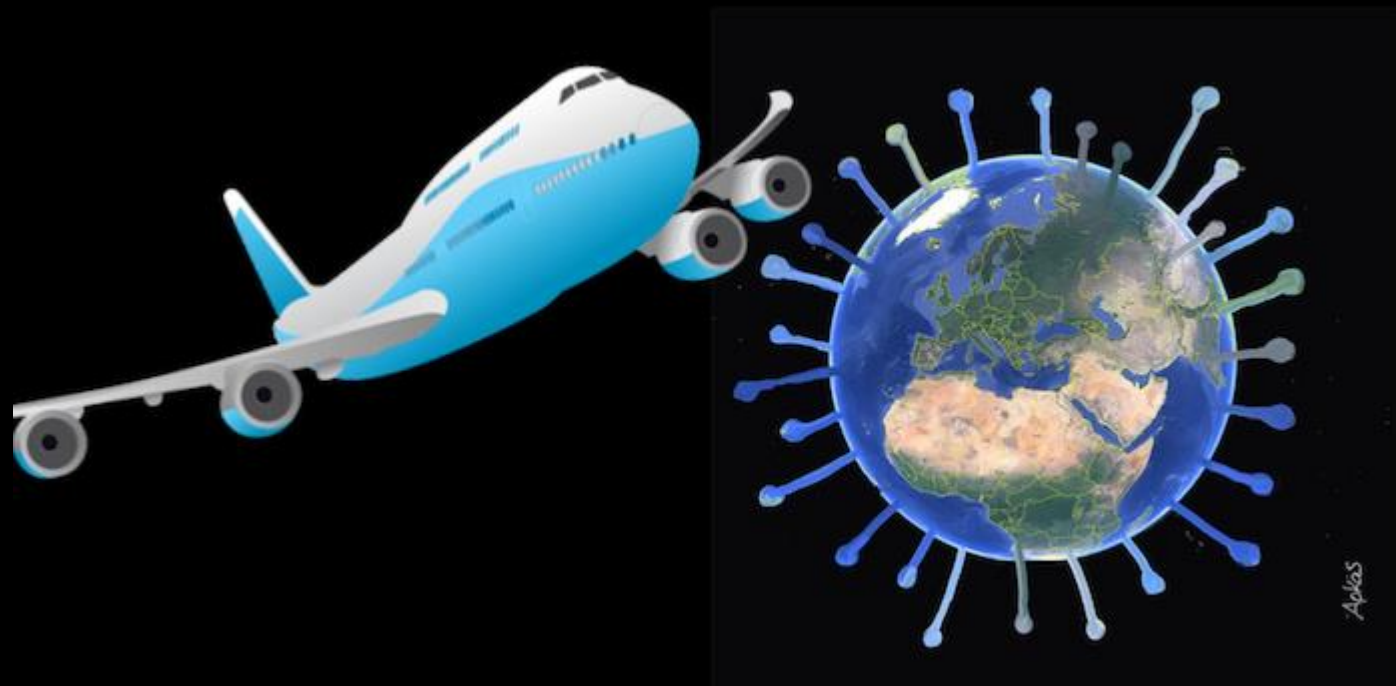


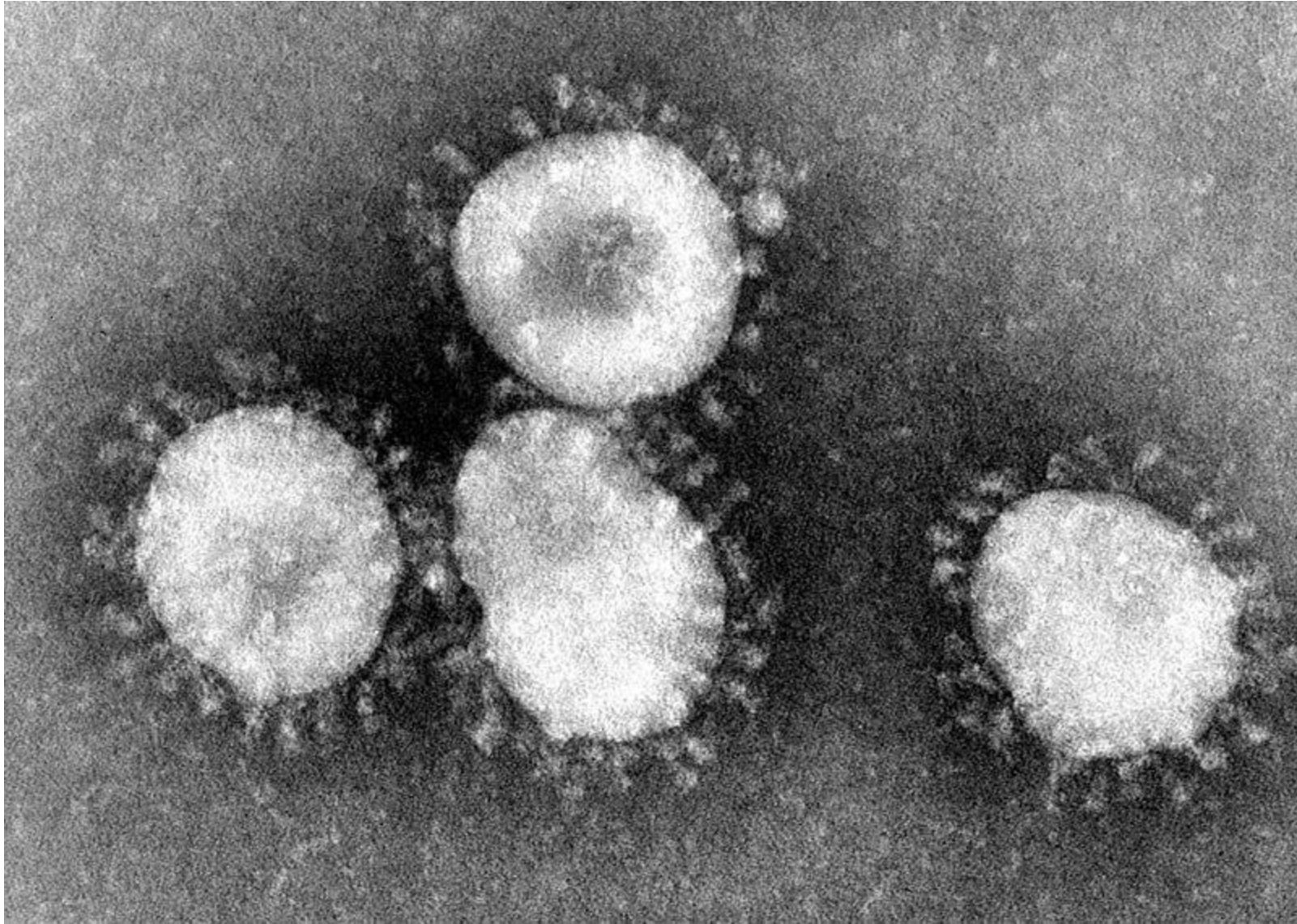
Βιολογία του COVID-19

N. Καφάση

Αθήνα, 16/05/2020

Δεν υπάρχει σύγκρουση συμφερόντων





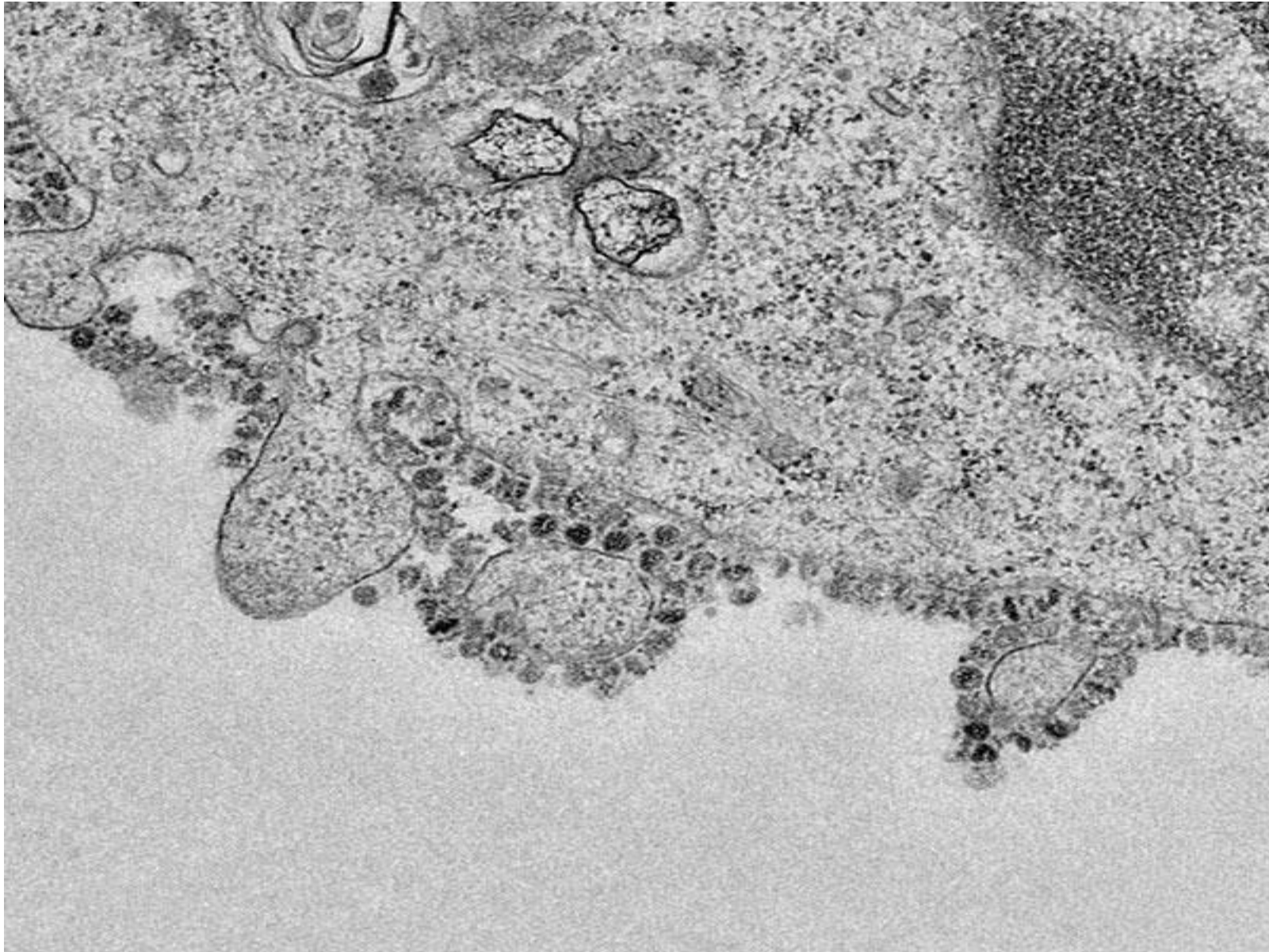
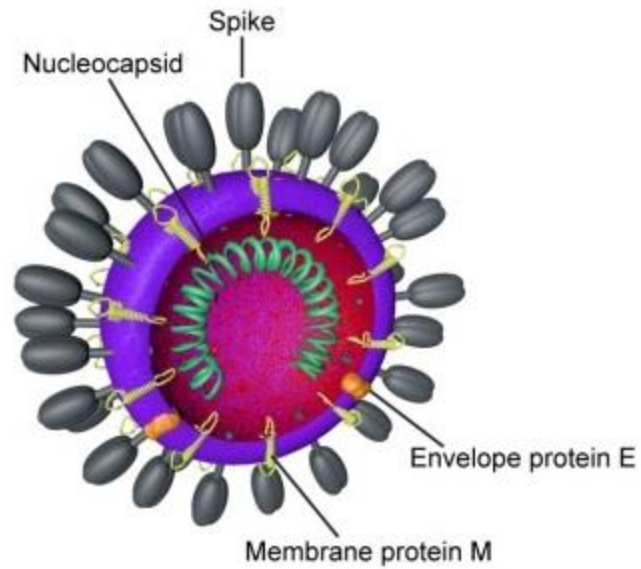


Diagram of coronavirus virion structure



CLASSIFICATION OF VIRUSES

Enveloped viruses

Single-standed RNA



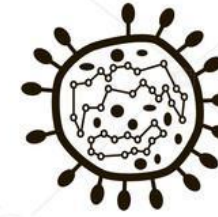
Coronaviridae



Paramyxoviridae



Bunyaviridae



Arenaviridae



Orthomyxoviridae



Retroviridae



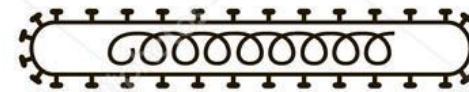
Togaviridae



Flaviviridae

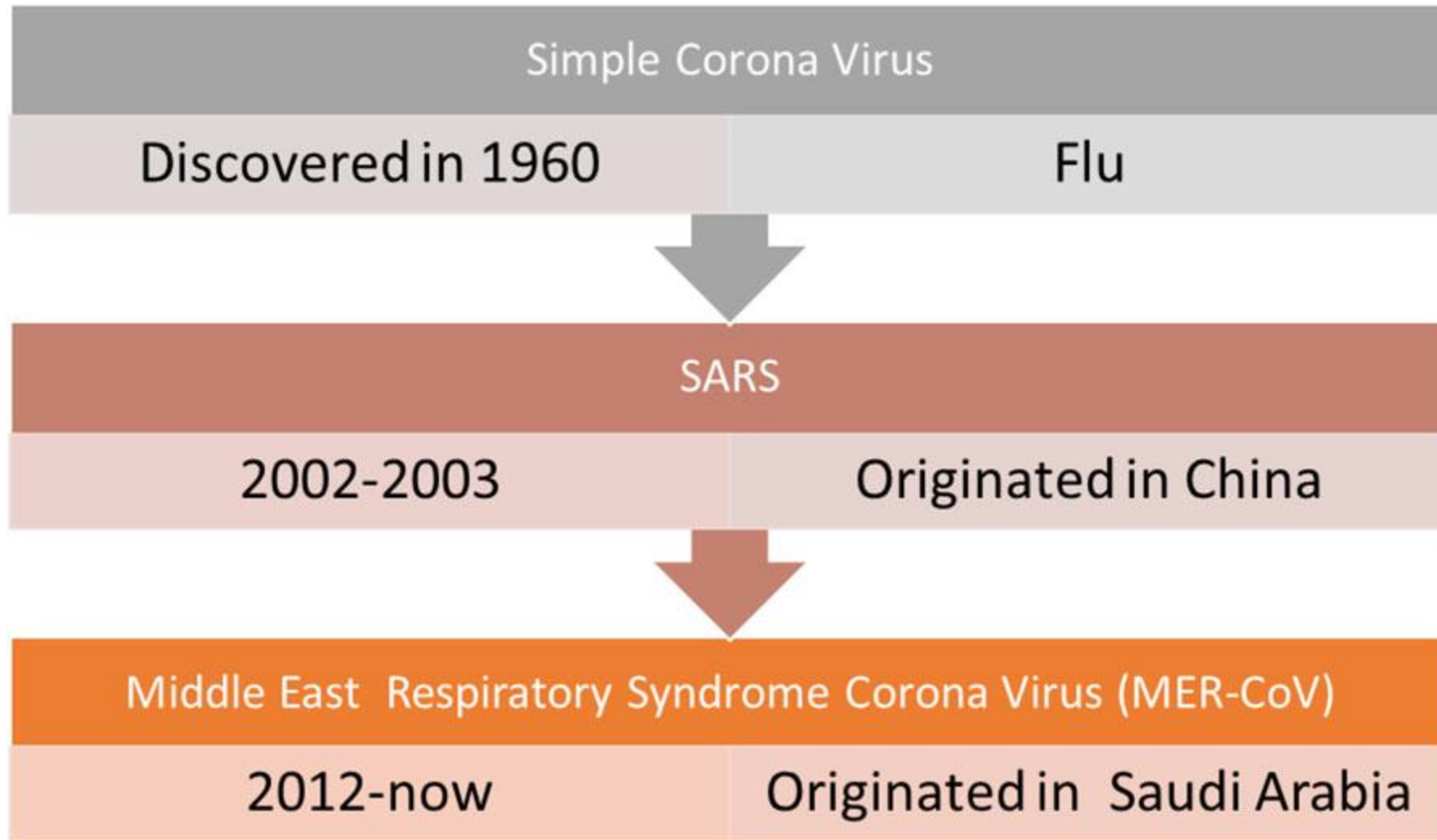


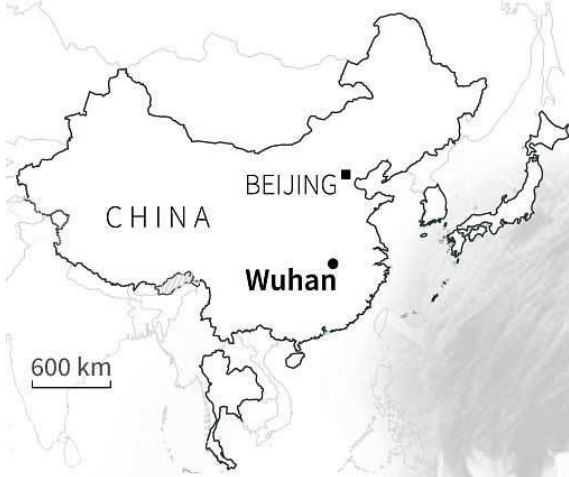
Rhabdoviridae



Filoviridae

The history and epidemiology of Middle East respiratory syndrome corona virus





Coronavirus

Large family of viruses, with a seventh and new strain identified in Wuhan, China

Transmission

Circulate in animals, can be transmitted to humans

Spread through air, close personal contact or touching contaminated objects

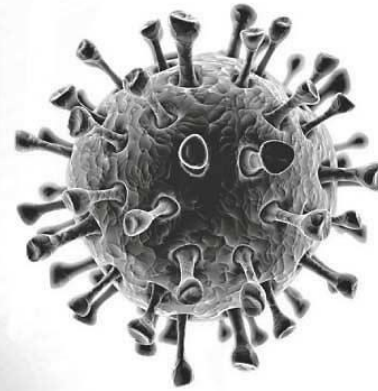
New strain

2019 novel coronavirus

- More than 200 cases detected in China; at least 3 killed. Cases detected in Japan, Thailand, South Korea
- Seafood/animal market in Wuhan, China believed to be centre of the outbreak

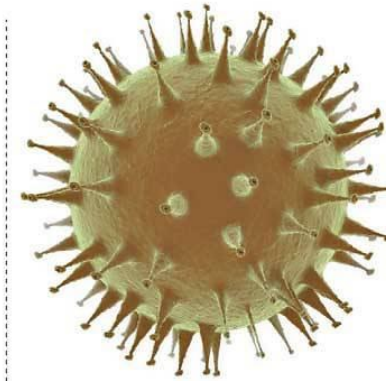
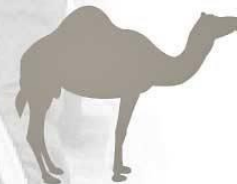


Two epidemics



Middle East Respiratory Syndrome (MERS-CoV)

- First identified in Saudi Arabia in 2012
- Over 800 killed in Middle East since
- From dromedary camels to humans



Severe Acute Respiratory Syndrome (SARS-CoV)

- Identified in 2003, first infected humans in China in 2002
- Killed nearly 650 people in China/ Hong Kong 2002-2003
- Thought to be from bats, spread to civet cats to humans



Common signs of infection

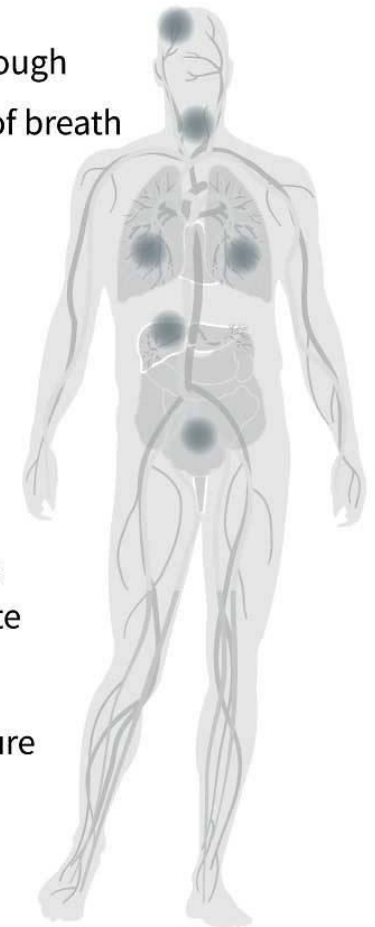
- Fever
- Cough
- Shortness of breath
- Breathing difficulties
- Gastro-intestinal symptoms
- Diarrhea

Severe cases

- Pneumonia
- Severe acute respiratory syndrome
- Kidney failure
- DEATH

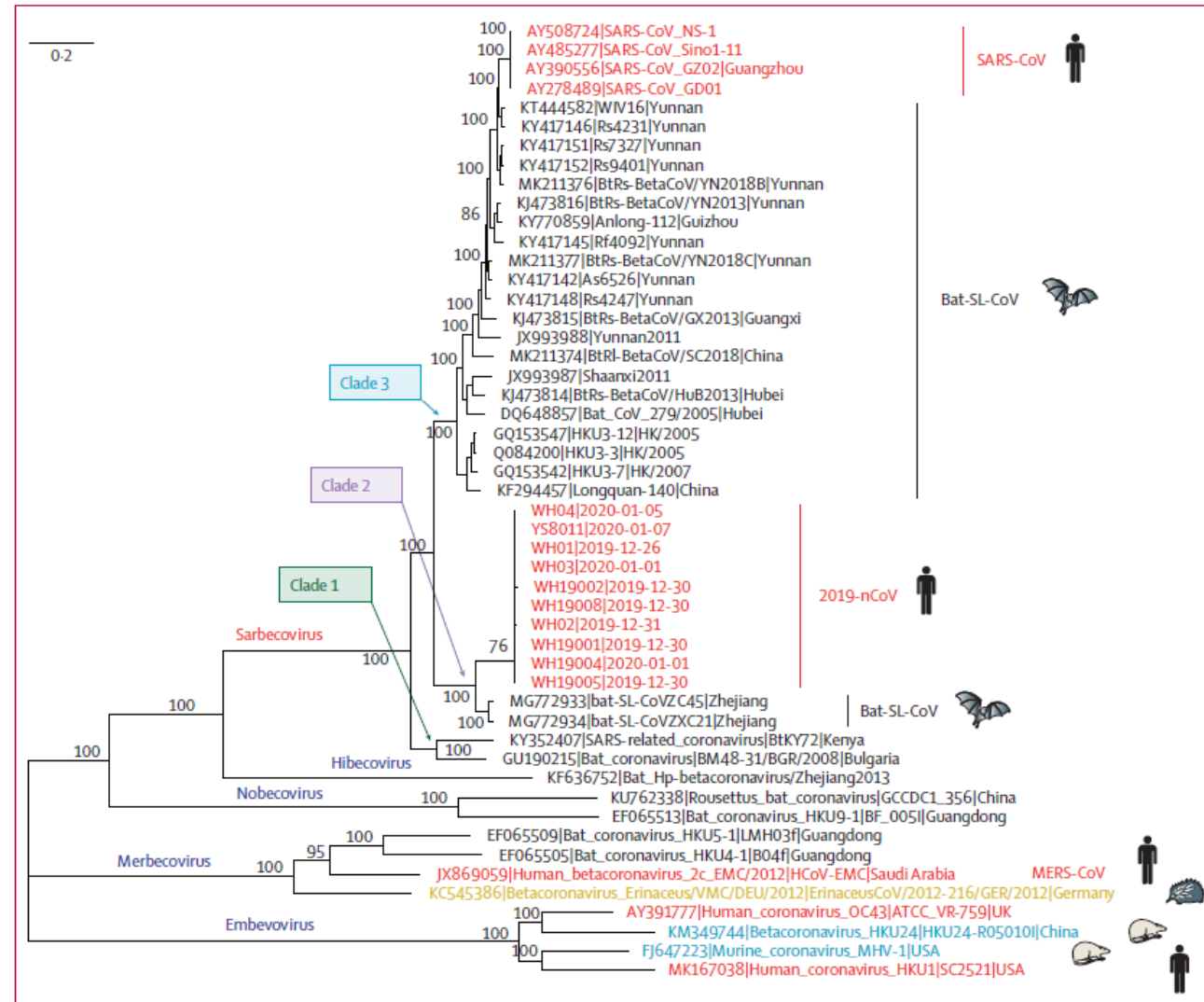
Treatment

- No vaccines or antiviral drugs available for these viruses
- Symptoms can be treated

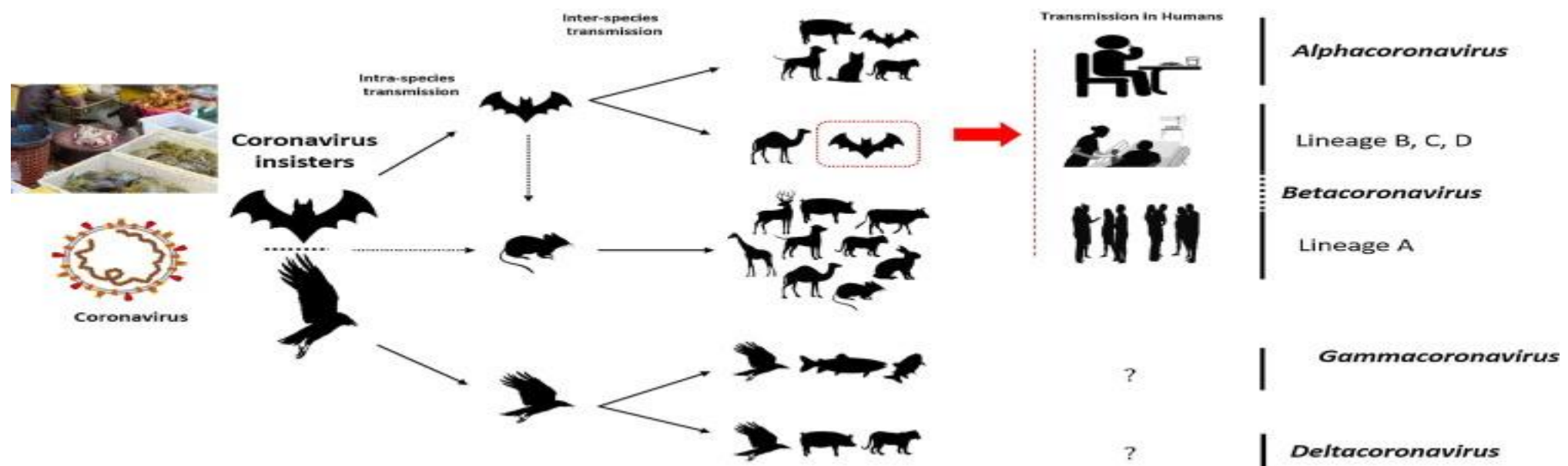


Sources: WHO/CDC/Institut Pasteur

Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding



COVID-19 infection: Origin, transmission, and characteristics of human coronaviruses

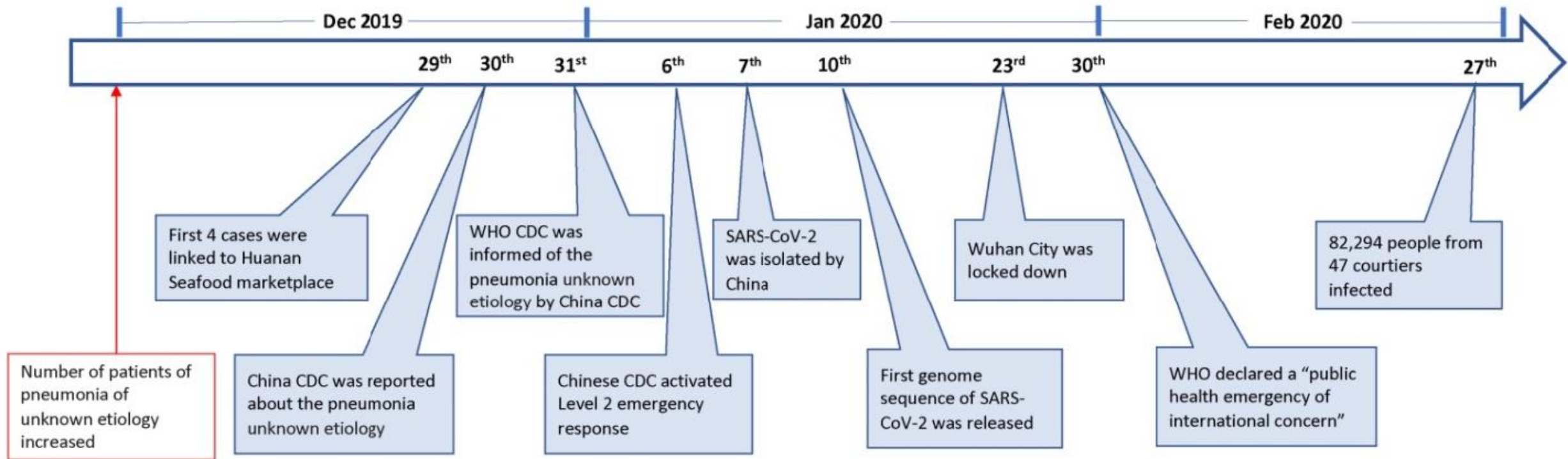




Παθοφυσιολογία του 2019-nCoV I

- Ανήκει στην β ομάδα των κοροναϊών,
- Η αναγνώριση της επιδημίας ξεκίνησε με την διερεύνηση περιστατικών “πνευμονίας άγνωστης αιτιολογίας”,
- “Πνευμονίας Άγνωστης Αιτιολογίας” :
 - ✓ Πυρετός $\geq 38^{\circ}\text{C}$,
 - ✓ Ακτινολογική επιβεβαίωση πνευμονίας,
 - ✓ Χαμηλά ή φυσιολογικά λευκά, ή χαμηλά λεμφοκύτταρα,
 - ✓ Καμιά βελτίωση μετά από 3 έως 5 μέρες αντιμικροβιακής θεραπείας σύμφωνα με καθιερωμένα πρωτόκολλα

SARS-CoV-2: an Emerging Coronavirus that Causes a Global Threat

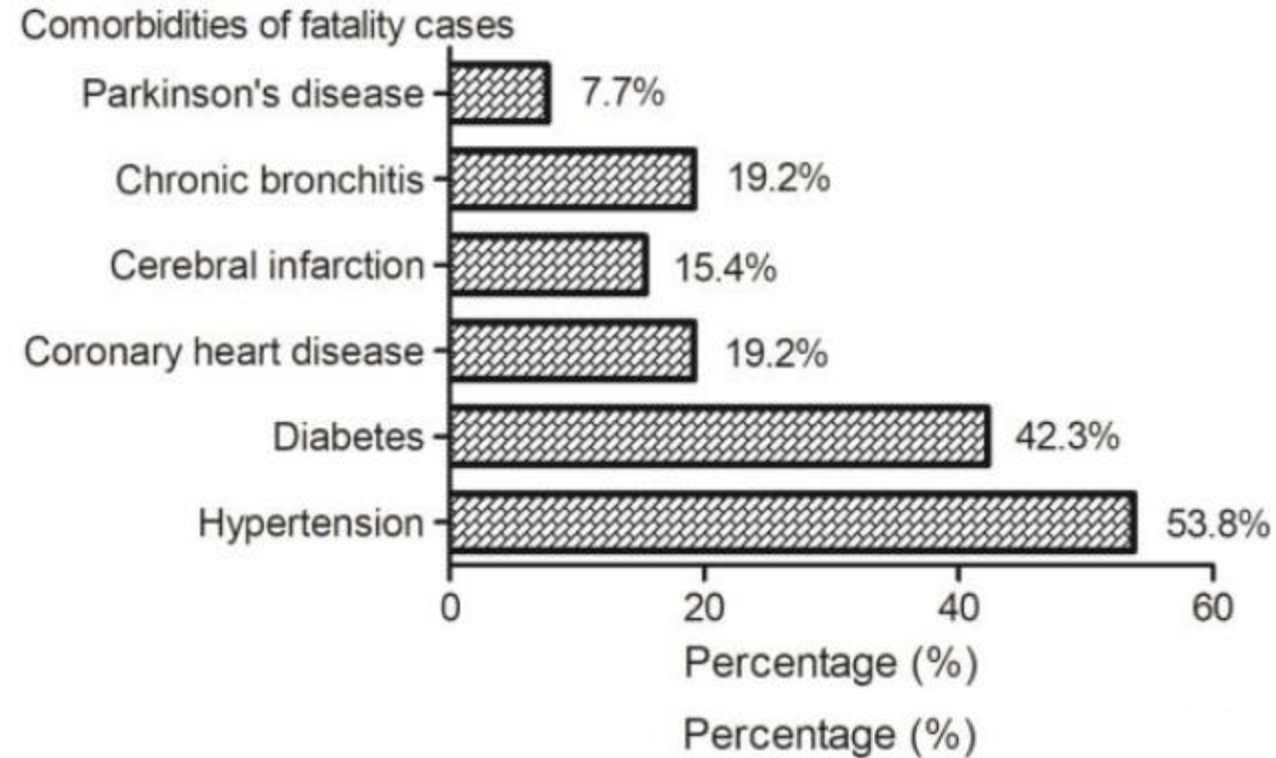


SARS-CoV-2: an Emerging Coronavirus that Causes a Global Threat

Signs or Symptoms	Number of patients with signs or symptoms from each report				Number of patients with signs or symptoms	Total number of patients	Percentage
	Report 1 [21]	Report 2 [23]	Report 3 [24]	Report 4 [25]			
Fever	82 (n=99)	40 (n=41)	136 (n=138)	975 (n=1099)	1233	1377	90%
Cough	81 (n=99)	31 (n=41)	82 (n=138)	745 (n=1099)	939	1377	68%
Sputum production/ Expectoration	NR	11 (n=39)	37 (n=138)	370 (n=1099)	418	1276	33%
Shortness of breath/ Dyspnoea	31 (n=99)	22 (n=40)	43 (n=138)	205 (n=1099)	301	1376	22%
Headache	8 (n=99)	3 (n=38)	9 (n=138)	150 (n=1099)	170	1374	12%
Sore throat/Pharyngalgia	5 (n=99)	NR	24 (n=138)	153 (n=1099)	182	1336	14%
Diarrhoea	2 (n=99)	1 (n=38)	14 (n=138)	42 (n=1099)	59	1374	4%

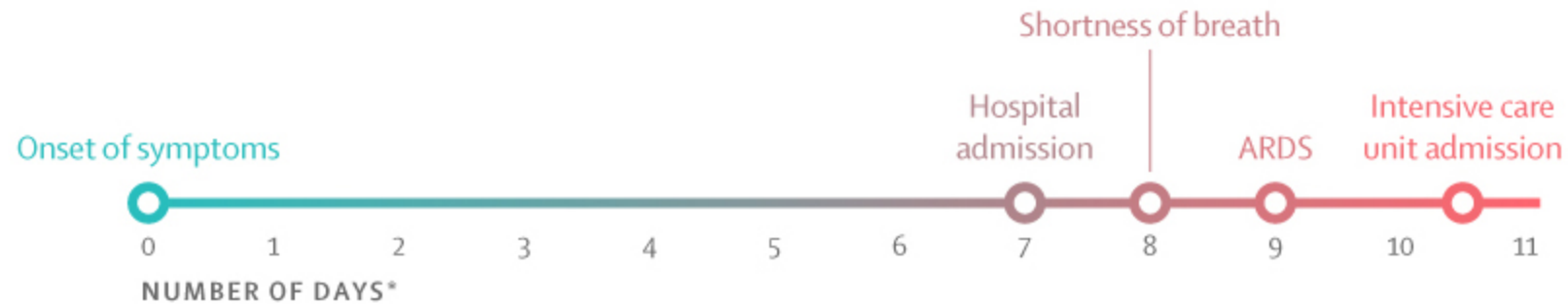
NR: Not Recorded.

Characteristics of and Public Health Responses to the Coronavirus Disease 2019 Outbreak in China



Η εξέλιξη του περιστατικού με 2019-nCoV λοίμωξη

Timeline of coronavirus onset



ARDS=Acute respiratory disease syndrome

*Median time from onset of symptoms, including fever (in 98% of patients), cough (75%), myalgia or fatigue (44%), and others.

THE LANCET

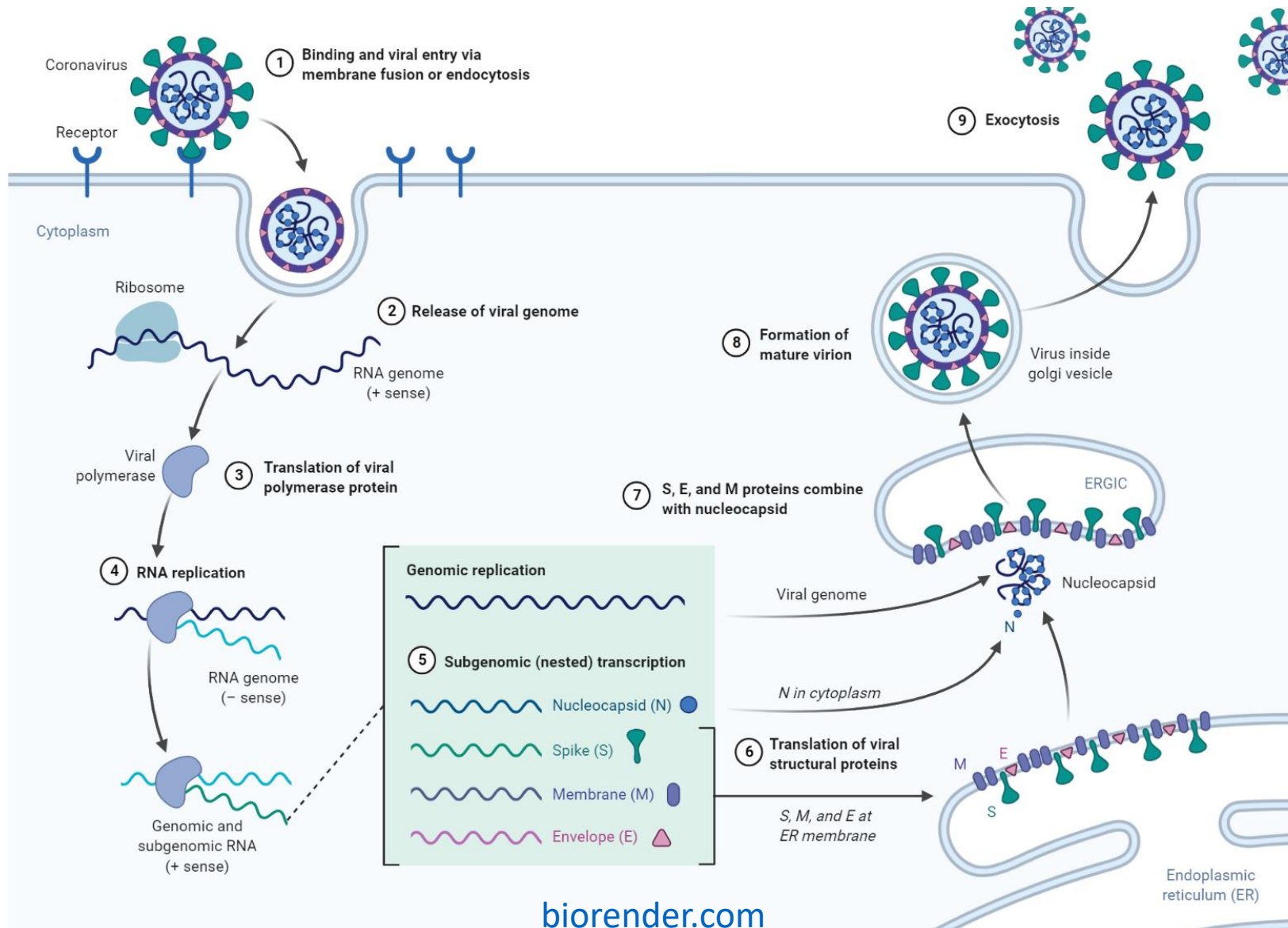
Παθοφυσιολογία του 2019-nCoV II

- Η θνητότητα από τον CoV-2019 έχει υπολογισθεί σε 2,84 %,
- Προσβάλλει κυρίως άνδρες μέσης ή μεγαλύτερης ηλικίας,
- Αναγνωρίζει τον υποδοχέα του Μετατρεπτικού Ενζύμου της Αγγειοτενσίνης 2 (ACE2). Αυτός εκφράζεται κυρίως στα τύπου II κυψελιδικά κύτταρα του πνεύμονα,
- Έχει βρεθεί ότι, οι άνδρες έχουν υψηλότερη έκφραση από τις γυναίκες και οι Ασιάτες από τους Καυκάσιους και τους Αφρομερικανούς.
- Η σύνδεση του 2019-nCoV επάγει την έκφραση του ACE2 και αυτό οδηγεί σε σημαντικές βλάβες των κυψελιδικών κυττάρων, που οδηγούν σε συστηματικές αντιδράσεις ή/ε τον θάνατο,
- Η ικανότητα σύνδεσης του σε σχέση με τον SARS-CoV είναι 10 έως 20πλάσια.

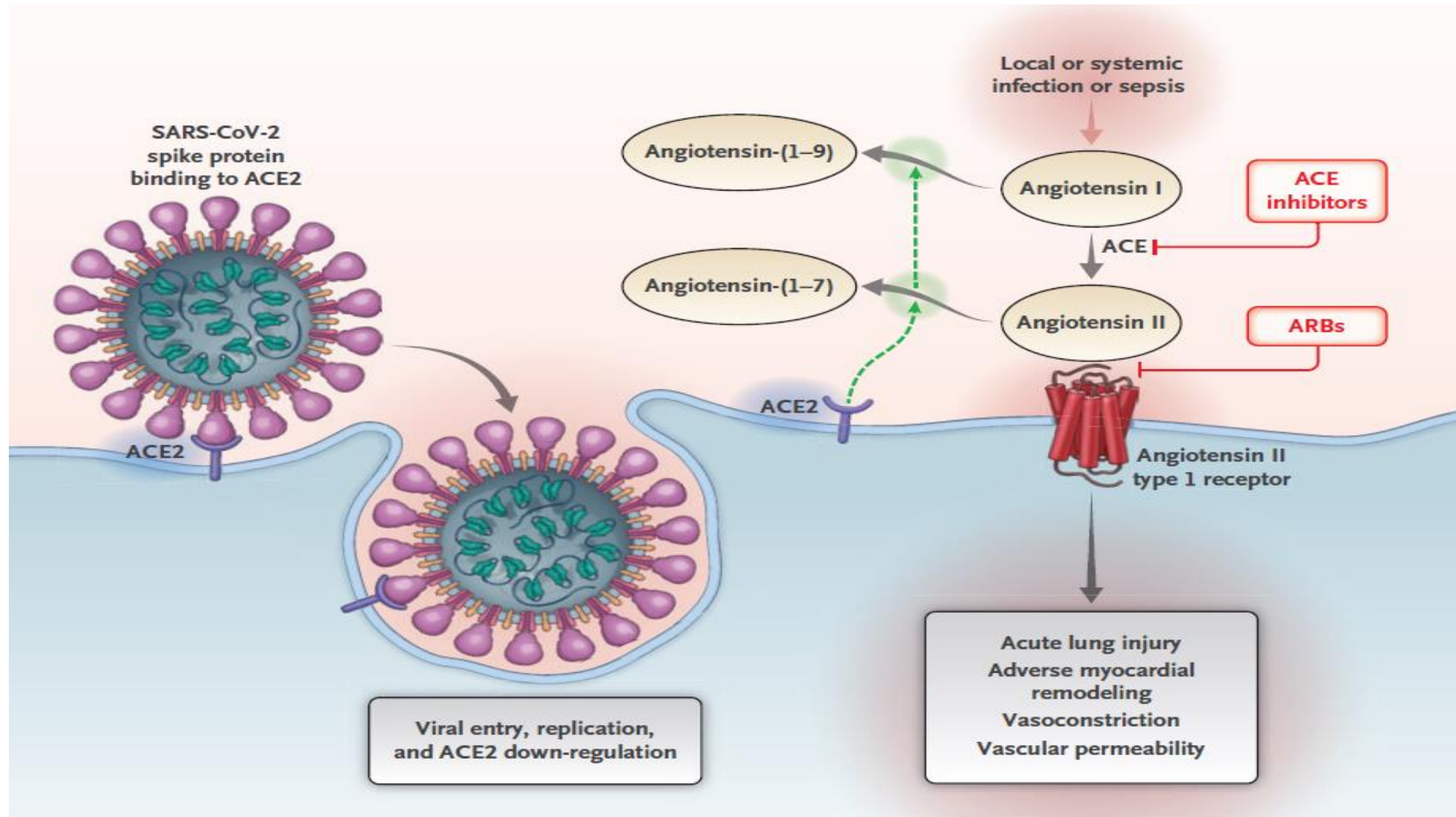
Παθοφυσιολογία του 2019-nCoV III

- Η στάθμη του ACE2 στο πλάσμα των ανδρών είναι ψηλότερη από τις γυναίκες,
- Η στάθμη του ACE2 δεν φαίνεται να επηρεάζεται από την λήψη αναστολέων ή ανταγωνιστών του συστήματος Ρενίνης - Αγγειοτενσίνης
- Άτομα, που λαμβάνουν αναστολείς της ACE , έχουν χαμηλότερο κίνδυνο προσβολής από τον ιό της ινφλουέντσας,
- Τα ψηλότερες στάθμες ACE2 στο πλάσμα, αντανakλούν σε χαμηλότερα επίπεδα στους ιστούς (ελαττωμένη προστασία από την λειτουργία του συστήματος Ρενίνης - Αγγειοτενσίνης ,
- Το ένζυμο ADAM-17 ρυθμίζει τα επίπεδα ACE2 στους ιστούς με αποκοπή,
- Πιστεύεται ότι ο nSARS-19 ενεργοποιεί το ένζυμο ADAM-17, επάγει την αποκοπή του ACE2 στους ιστούς και προφλεγμονώδη αντίδραση, οπότε μειώνει την προστατευτική δράση του ACE2 στην καρδιά

Replication of Coronavirus

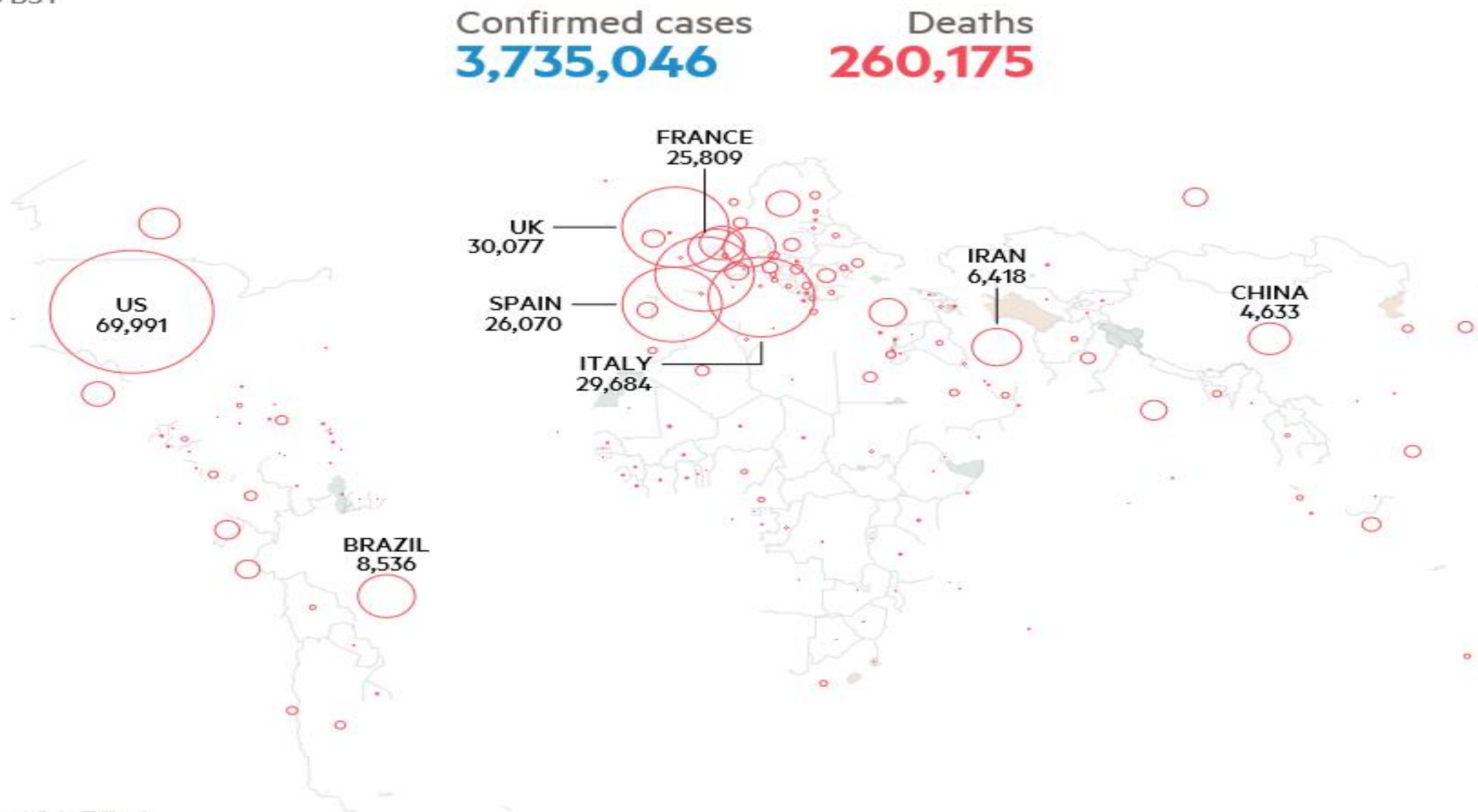


Renin–Angiotensin–Aldosterone System Inhibitors in Patients with Covid-19



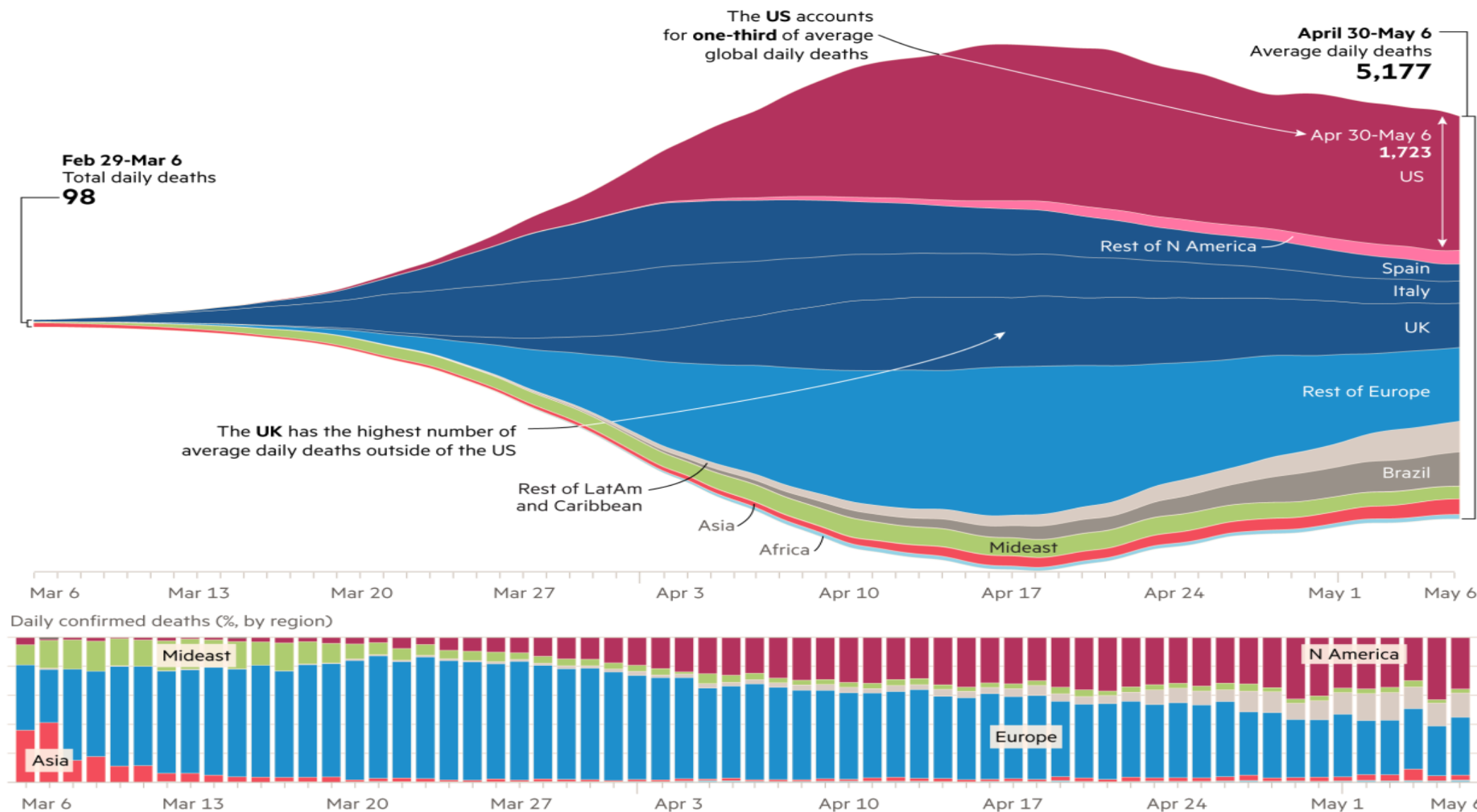
Mapping the coronavirus outbreak

As of 12:10am May 8 BST



The global Covid-19 death toll is finally easing

Daily deaths of patients diagnosed with coronavirus (7-day rolling average)

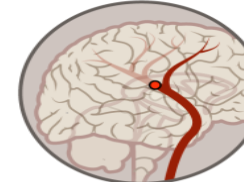
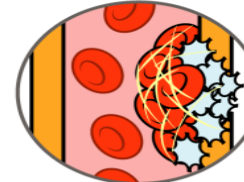
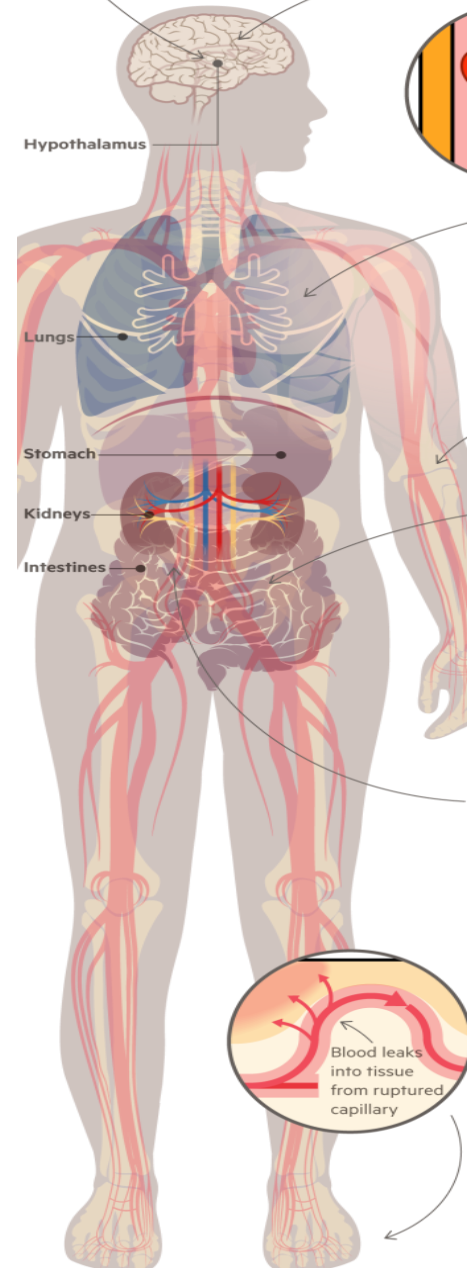


How coronavirus affects the body from top to toe

Fever Body temperature rises to try and incapacitate heat-sensitive viruses when the hypothalamus receives signals from immune cells

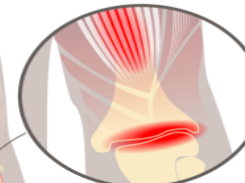
Blood clots and strokes
An accumulation of blood platelets and proteins plugs broken blood vessels (below). Once healed, these clots dissolve

If an excessive immune response to Covid-19 causes abnormal clotting, blood vessels in the brain may be blocked, triggering a stroke (below). Symptoms depend on the region affected



Coughing Reflex
reaction expels air rapidly from the lungs to clear irritants from airways

Shortness of breath
As the virus reduces lung capacity, breathing becomes difficult



Muscle and joint pain
Viral inflammation in joints and muscles (left) can cause pain and stiffness

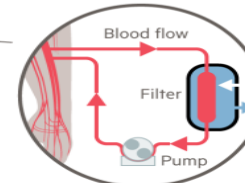
Post-viral fatigue
Infections often lead to long-term fatigue and weakness

Intestinal (enteric) symptoms
Inflammation is a complex immune response intended to carry disease-fighting molecules to the site of infection and carry away debris. Excessive intestinal inflammation can cause:

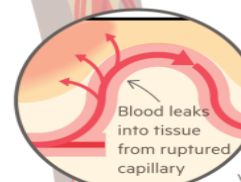
Vomiting Reflex
contraction of diaphragm and abdominal muscles empties the stomach contents via the mouth, ridding the body of toxins

Diarrhoea Unable to absorb fluid, the intestine's bowel movements become watery

Abdominal pain

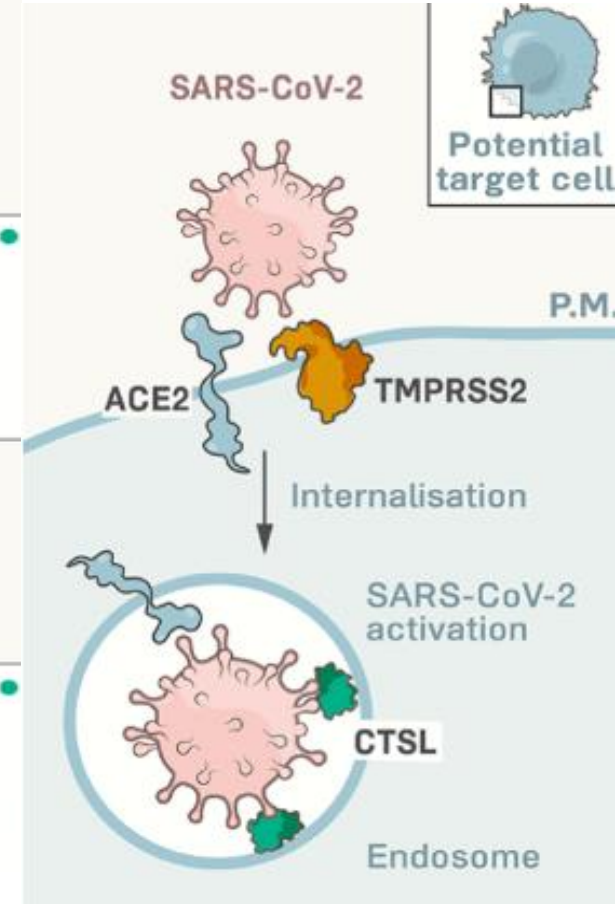
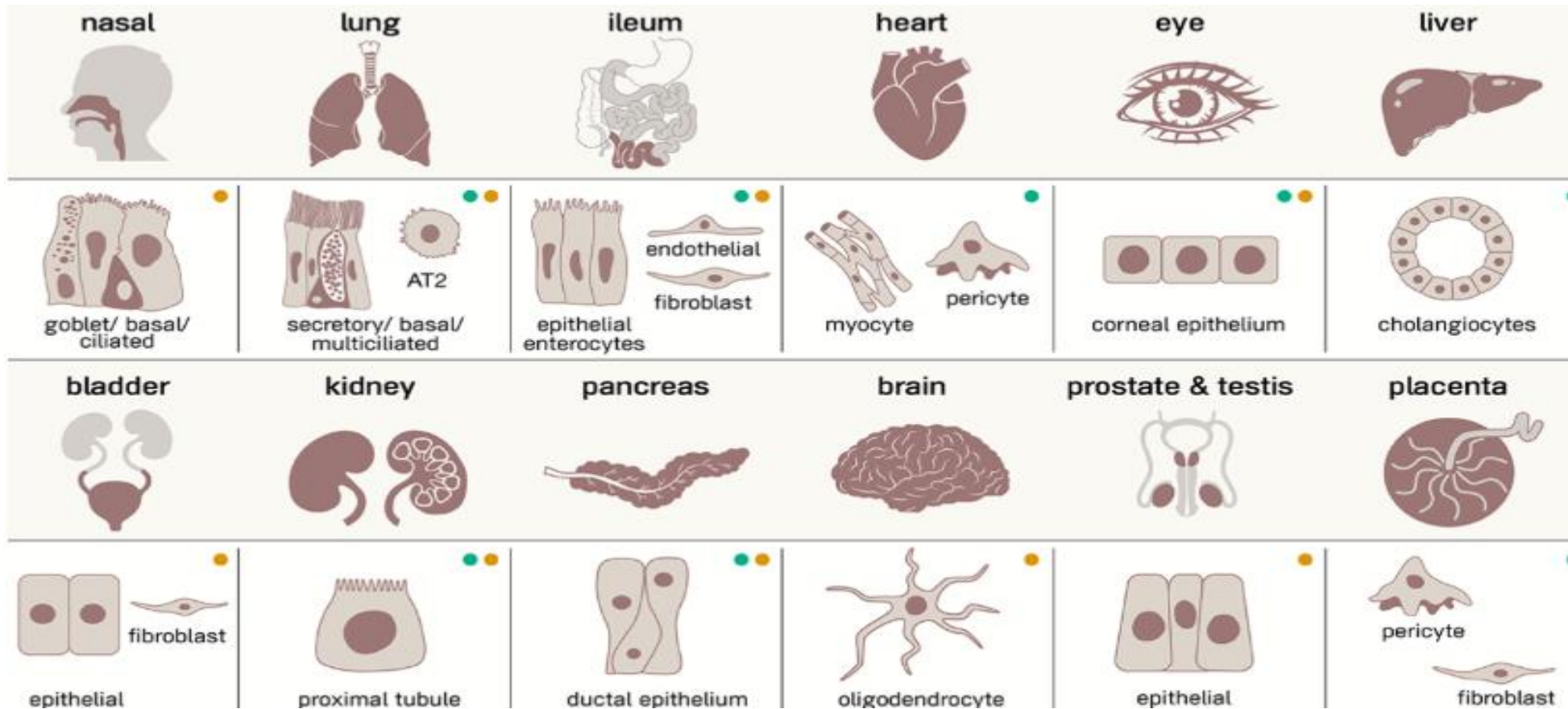


Kidneys These organs filter the blood, balancing chemicals and removing waste and excess water as urine. If they fail, blood can be circulated through a dialysis machine (left), an artificial filter replicating kidney function



Rashes, skin lesions and 'Covid toes'
When the smallest blood vessels, capillaries, become inflamed, leakage causes spots and rashes on the skin. The effect is similar to chilblains (left), which form on fingers and toes when capillaries contract in the cold and then expand rapidly as they warm up – rupturing and causing irritation and swelling as blood leaks out

Receptors for SARS-CoV-2 Present in Wide Variety of Human Cells



COVID-19 and Kawasaki Disease: Novel Virus and Novel Case

Veena G. Jones, MD; Marcos Mills, MD; Dominique Suarez, MD; Catherine A. Hogan, MD; Debra Yeh, MD; J. Bradley Segal, MD; Elizabeth L. Nguyen, MD; Gabrielle R. Barsh, MD, PhD; Shiraz Maskatia, MD; Roshni Mathew, MD

DOI: 10.1542/hpeds.2020-0123

Journal: *Hospital Pediatrics*

Received: 5 February 2020 | Accepted: 22 February 2020

DOI: 10.1002/jmv.25722



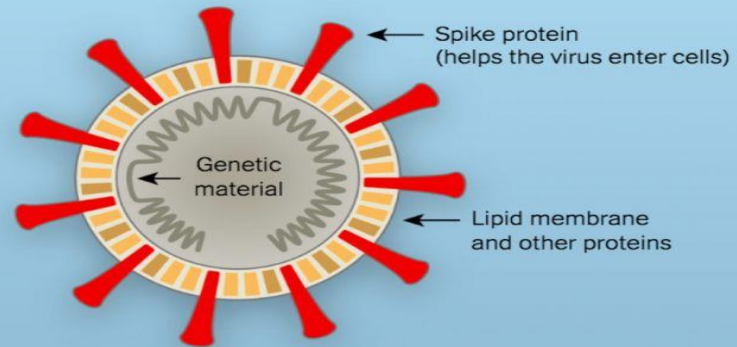
REVIEW

JOURNAL OF
MEDICAL VIROLOGY WILEY

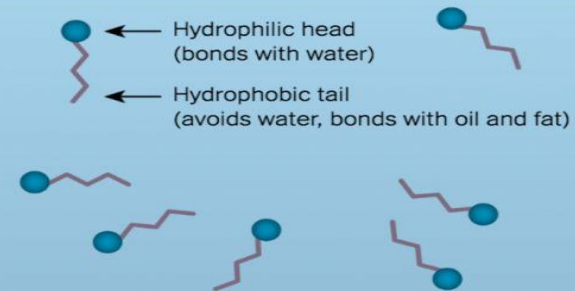
Understanding of COVID-19 based on current evidence

Pengfei Sun¹ | Xiaosheng Lu² | Chao Xu¹ | Wenjuan Sun³ | Bo Pan⁴ 

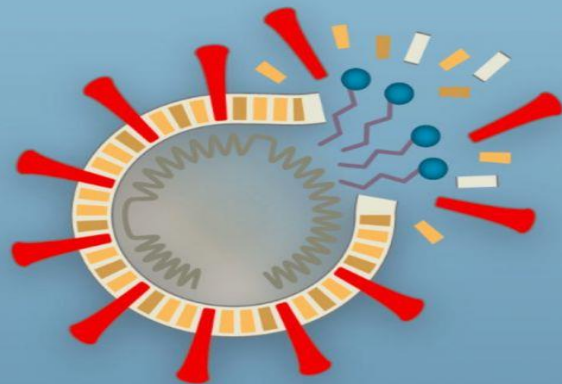
THE CORONAVIRUS has a membrane of oily lipid molecules, which is studded with proteins that help the virus infect cells.



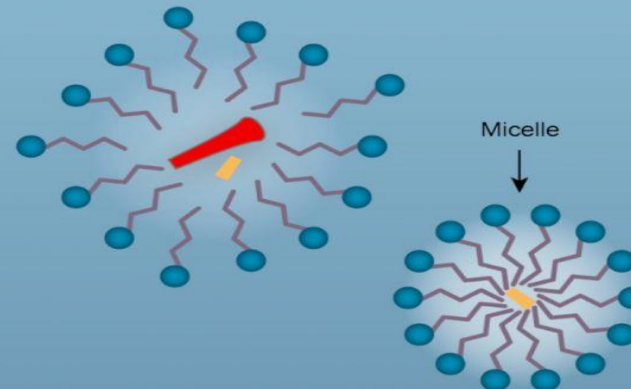
SOAP MOLECULES have a hybrid structure, with a head that bonds to water and a tail that avoids it.

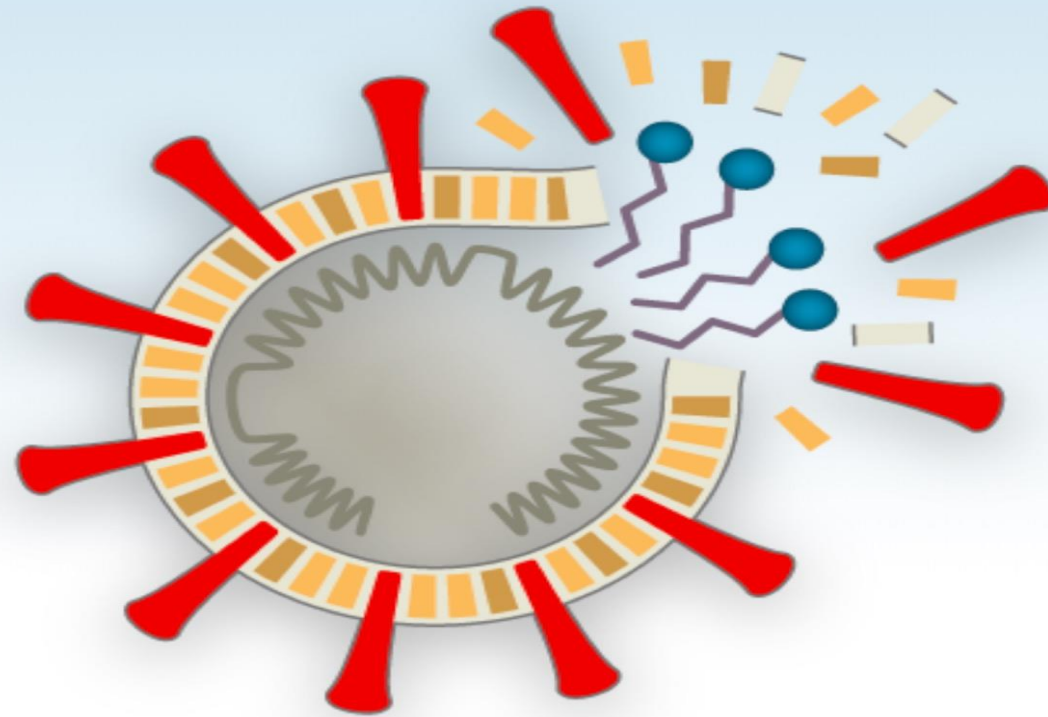


SOAP DESTROYS THE VIRUS when the water-shunning tails of the soap molecules wedge themselves into the lipid membrane and pry it apart.



SOAP TRAPS DIRT and fragments of the destroyed virus in tiny bubbles called micelles, which wash away in water.





How Soap Works

<https://www.nytimes.com/2020/03/13/health/soap-coronavirus-handwashing-germs.html>

