

# Seizure and COVID-19

ศ.นพ. คณิตพงษ์ ปราบพาล.

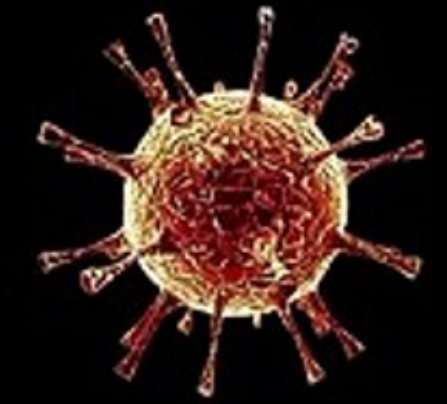
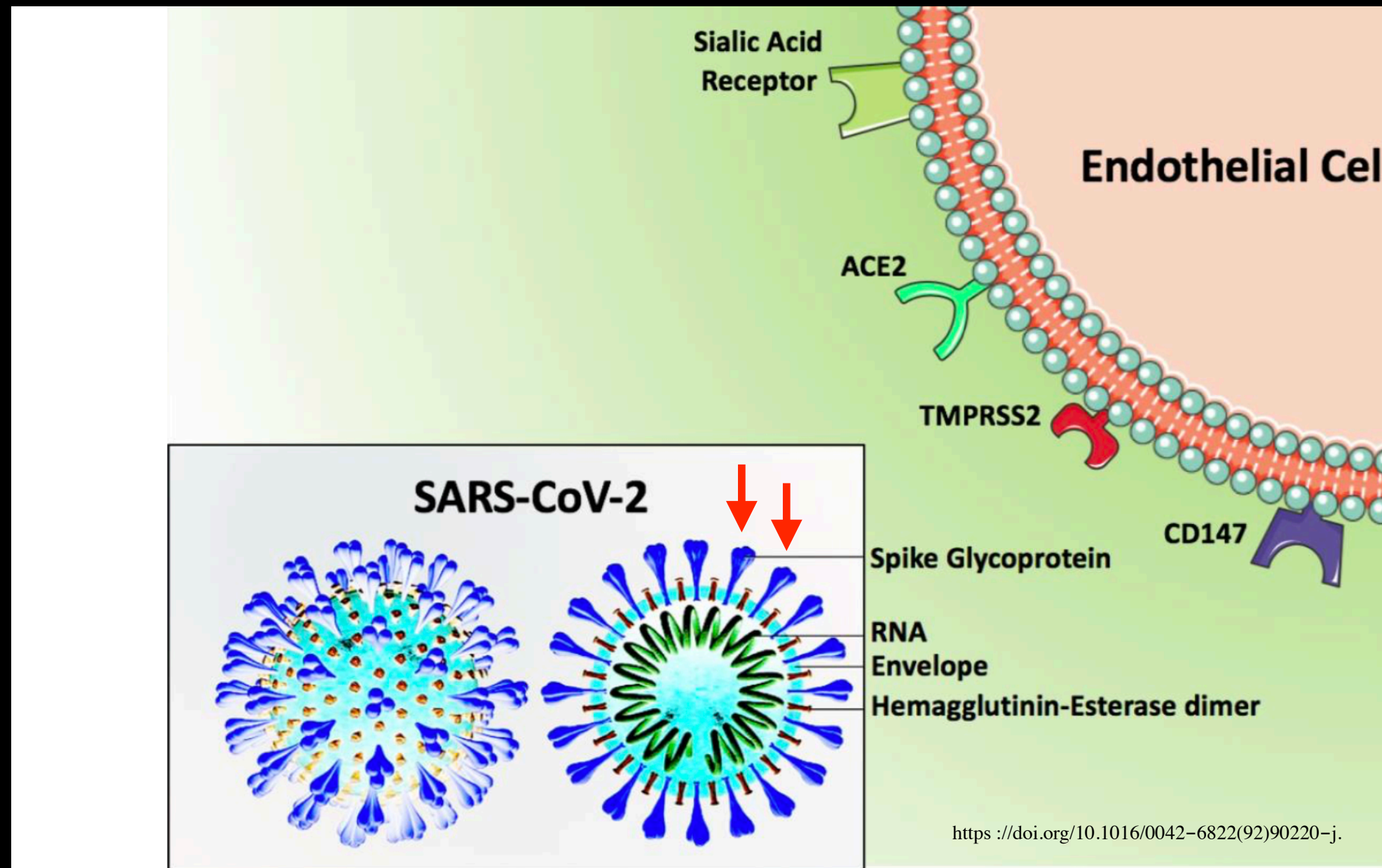
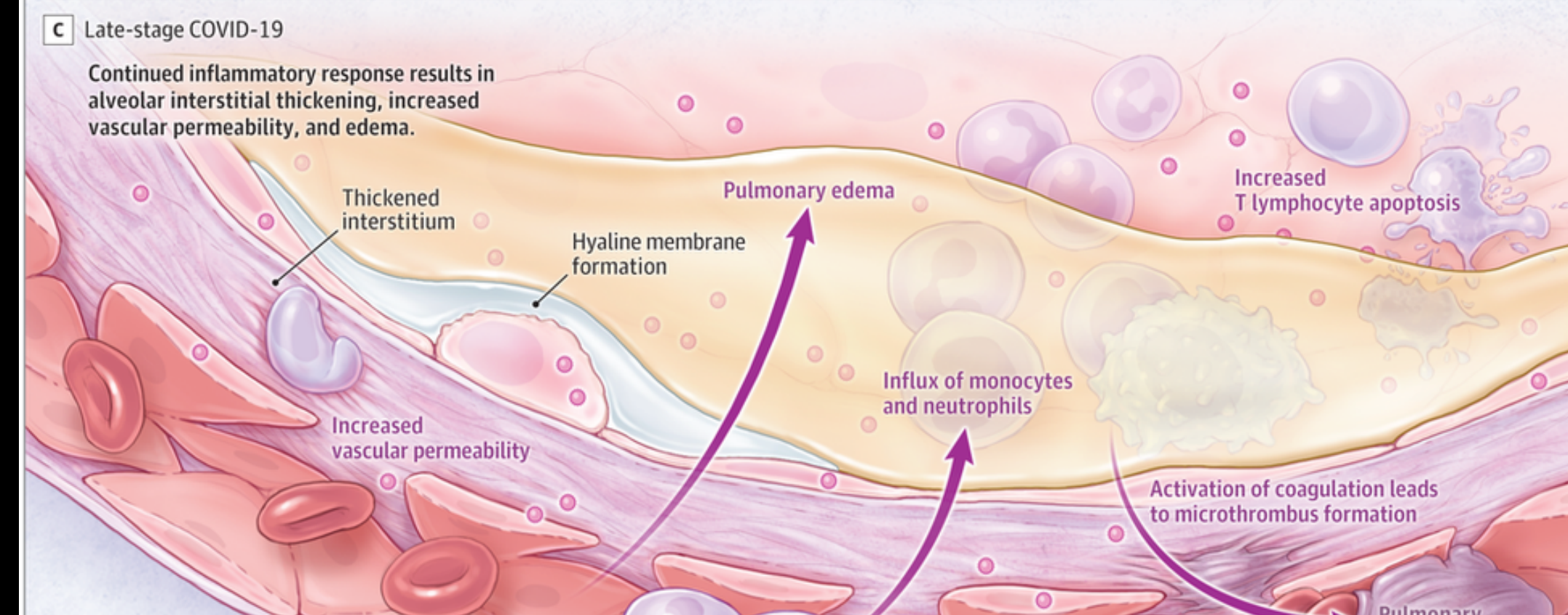
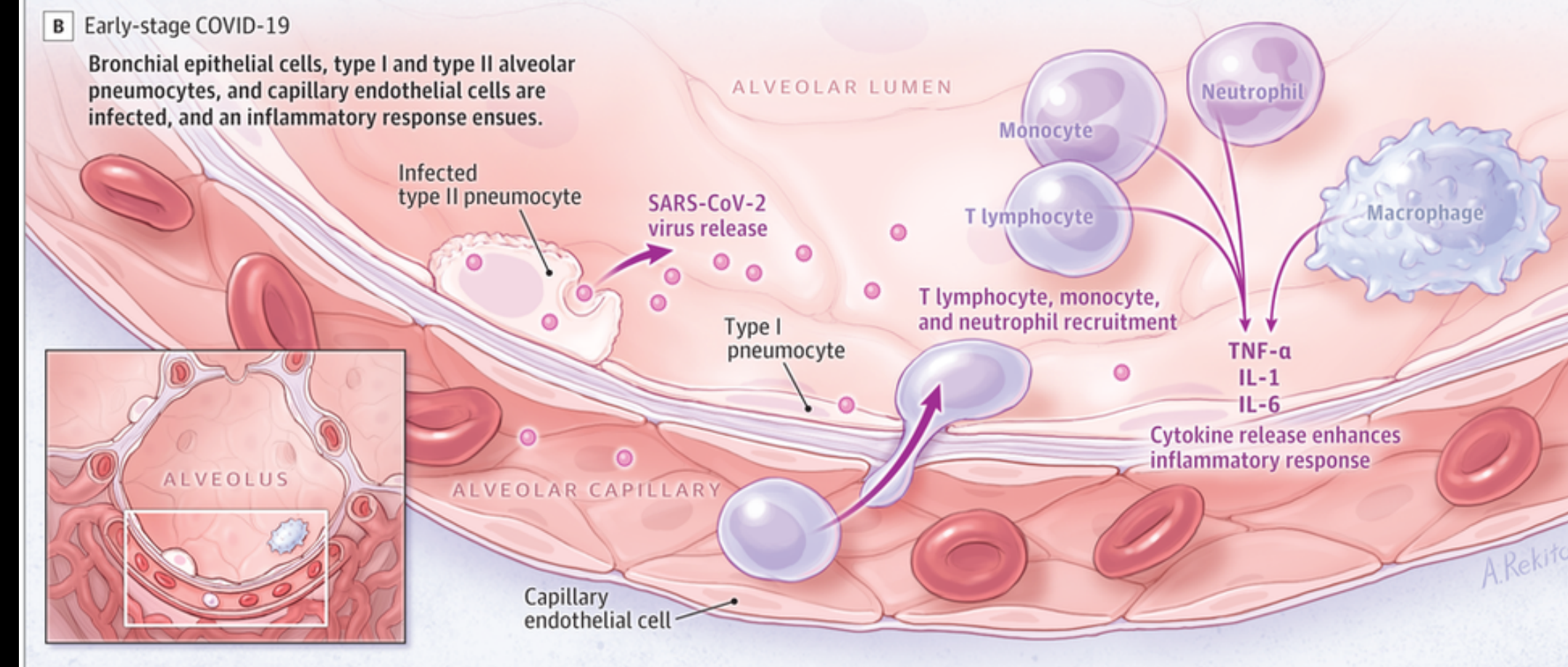
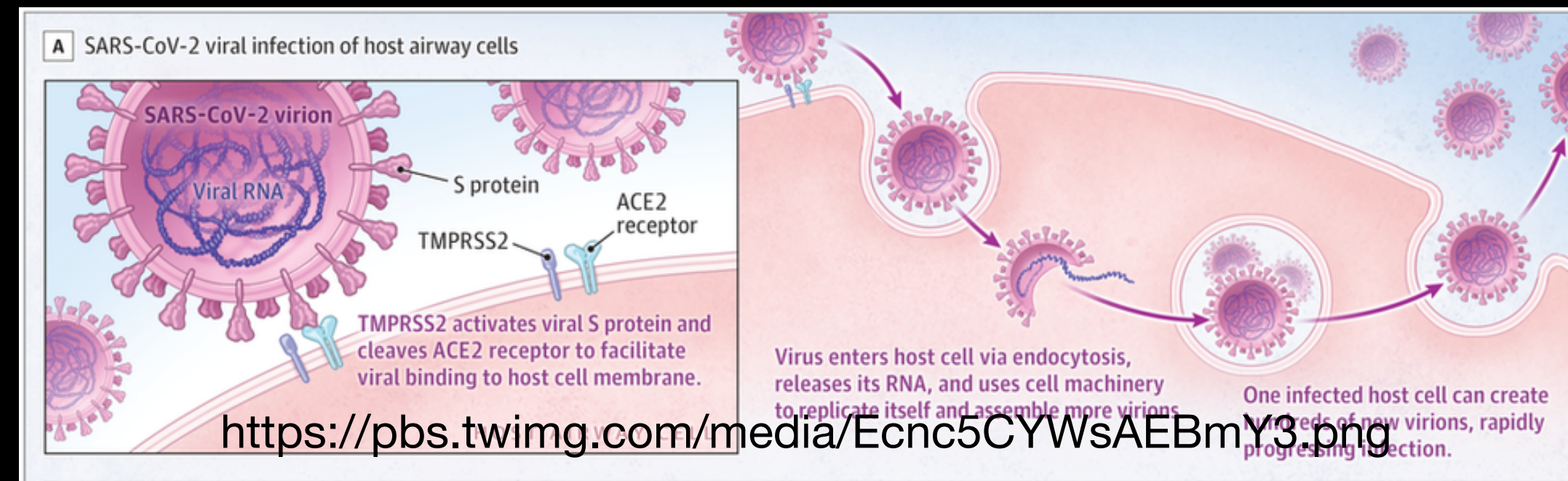
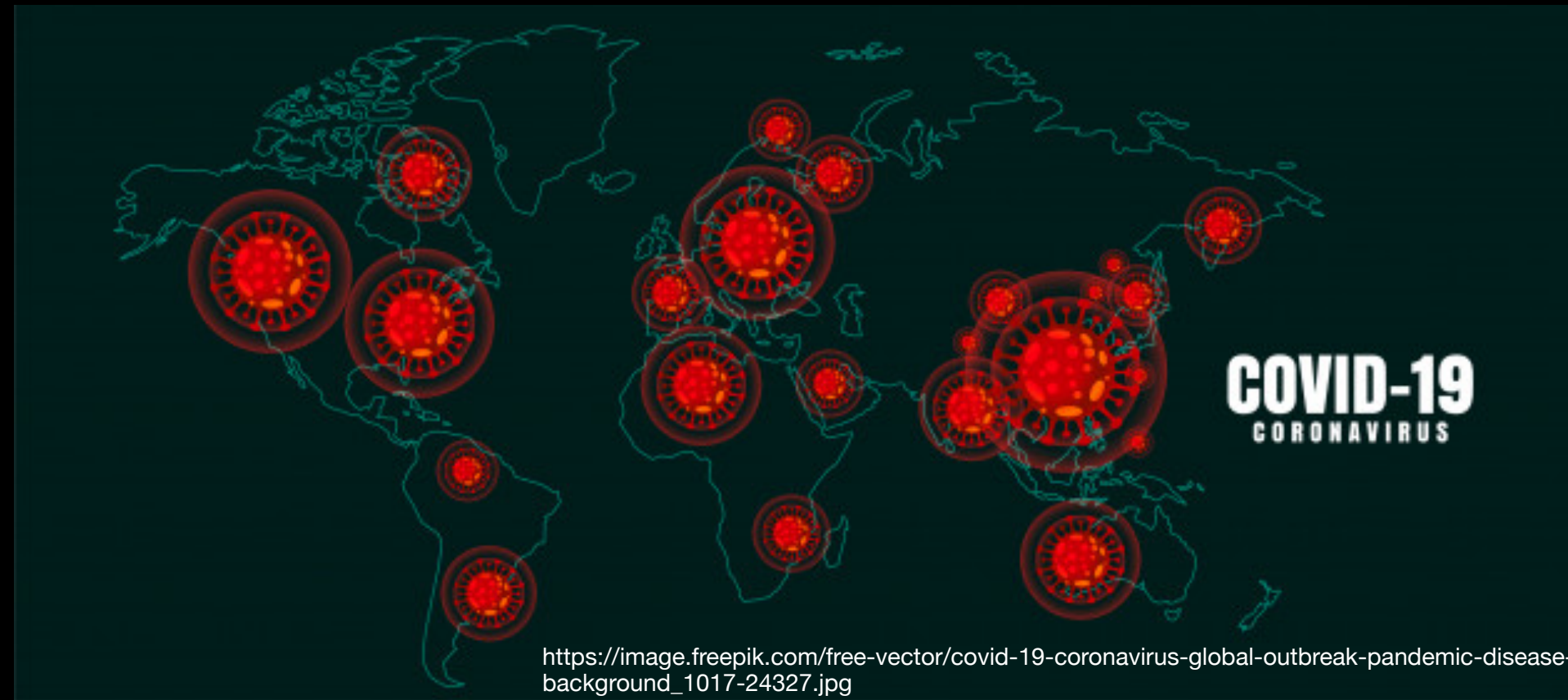
# Outline

- Pathophysiology
- Neurological involvement
- Patients without epilepsy
  - Seizure
  - EEG
  - Treatment
  - Epilepsy
- Patients with epilepsy

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# Pathophysiology



**SARS**

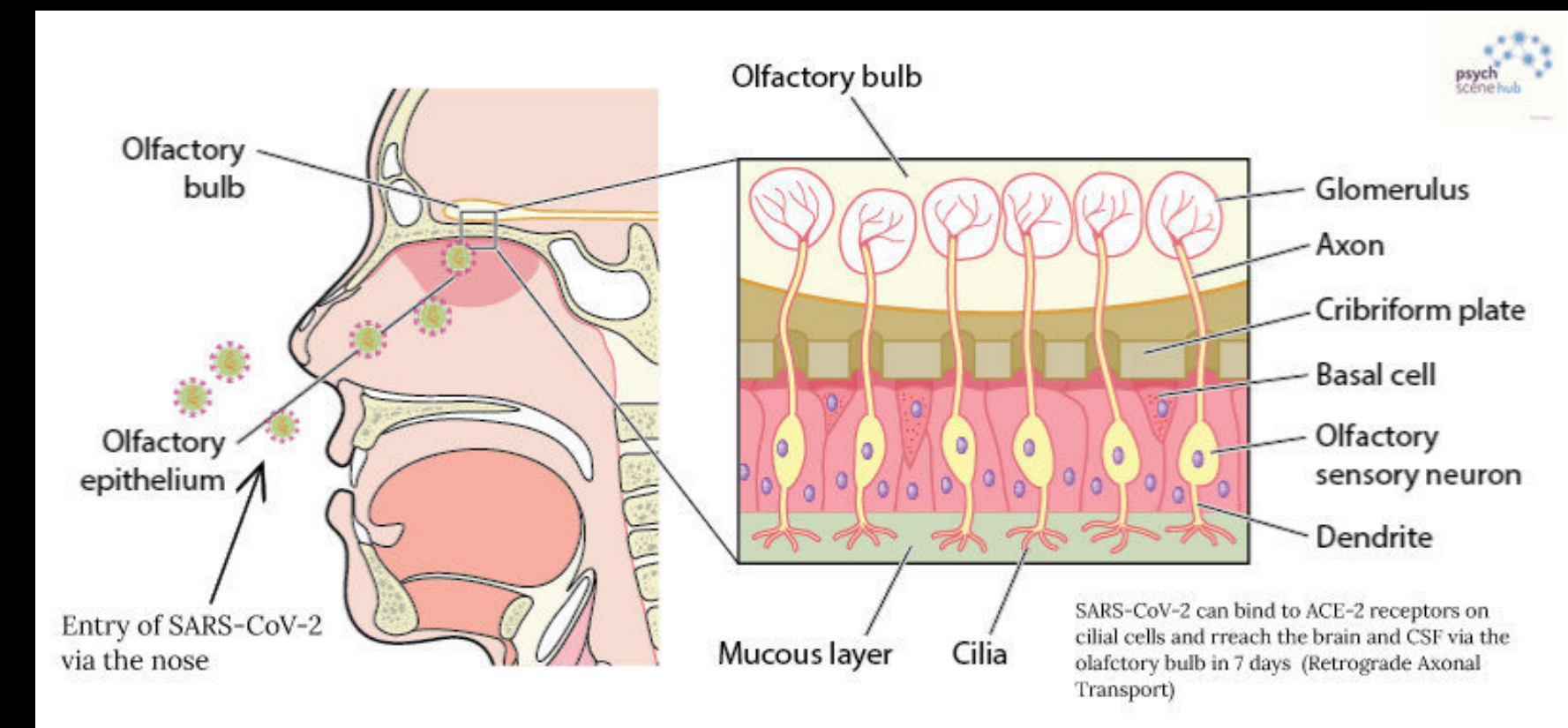
ID-19)

om/video/x7samry

# Pathophysiology

## Direct effect

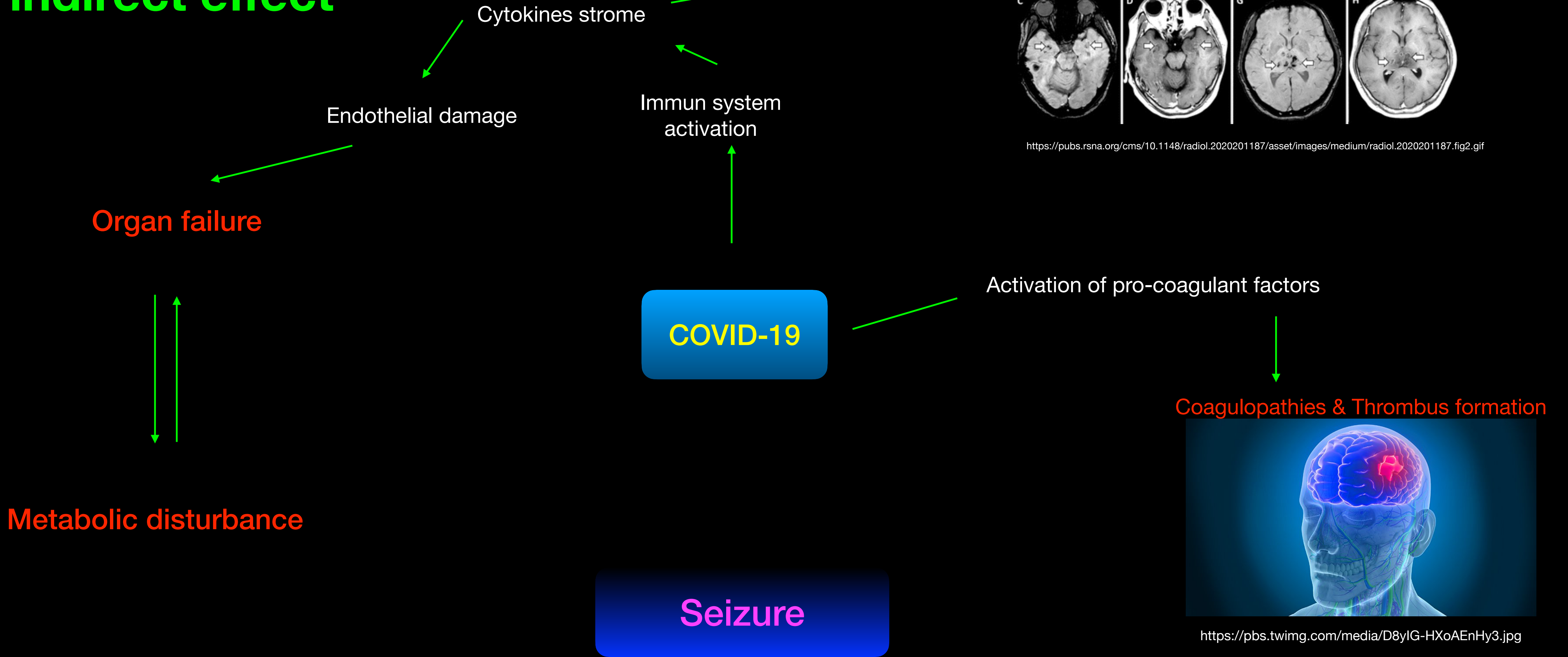
- Transneuronal: neuroinvasion, Neurotrophism
  - Acute encephalitis, SARS-CoV related deaths: HCoV strain 229E,, HCoV stain OC43 ,
  - Anosmia: SARS-CoV-2
- Blood brain barrier compromised
- Hematogenous route



https://psychscenehub.com/wp-content/uploads/2020/05/Coronavirus-entry-through-nose-olfactory-ciliated-and-goblet-cells.jpg

# Pathophysiology

indirect effect



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# Neurological involvement

Asadi-Pooya AA et al. J Neurol Sci 2020 inpress

Author/year	Methods			Neurological manifestation
	Study design/populations	Numbers	Country	
<b>Mao/2020</b>	Retrospective/ admitted patients	214	Wuhan/China	CNS manifestation (25%): headache (13%), dizziness (13%), impaired consciousness (8%) acute cerebrovascular problem (3%), ataxia (0.5%), seizure (0.5%)
<b>Li/2020</b>	Retrospective/ admitted patients	221	Wuhan/China	IS (5%), CVST (0.5%), cerebral haemorrhage (0.5%)
<b>Huang/2020</b>	Prospective/ admitted	41	Wuhan/China	Headache (8%)
<b>Yang/2020</b>	Retrospective/ critical ill adult patients	52	Wuhan/China	Headache (6%)
<b>Wang/2020</b>	Retrospective/ admitted	138	Wuhan/China	Dizziness (9%), Headache (7%)
<b>Chen/2020</b>	Retrospective/ admitted	99	Wuhan/China	Confusion (9%), headache (8%)

Mao T et al. <https://www.medrxiv.org/content/10.1101/2020.02.22.20026500v1/>.

Li Y et al. [https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3550025/](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3550025/),

Huanf C et al. Lancet 2000: 395; 497-506

Yang X, C et al. Lancet Res. Med 2000 inpress

Wang D et al. JAMA 2020 inpress

Chen N et al. Lancet 2000: 395; 507-513



April 10, 2020

# Neurologic Manifestations of Hospitalized Patients With Coronavirus Disease 2019 in Wuhan, China

Ling Mao<sup>1</sup>; Huijuan Jin<sup>1</sup>; Mengdie Wang<sup>1</sup>; et al

» Author Affiliations | Article Information

JAMA Neurol. 2020;77(6):683-690. doi:10.1001/jamaneurol.2020.1127

No CSF study, no EEG, no clear definitions

Characteristic	No. (%)			P value <sup>a</sup>
	Total (N = 214)	Severe (n = 88)	Nonsevere (n = 126)	
Nervous system symptoms				
Any	78 (36.4)	40 (45.5)	38 (30.2)	.02
214 pts: severe 88 pts, non severe 126 pts				
Neurolocal involvement 36%				
CNS 24.8% : dizziness, headache				
PNS 8.9%				
Muscle 10.7%				
Smell	11 (5.1)	3 (3.4)	8 (6.3)	.34
Vision	3 (1.4)	2 (2.3)	1 (0.8)	.37
Nerve pain	5 (2.3)	4 (4.5)	1 (0.8)	.07
Skeletal muscle injury	23 (10.7)	17 (19.3)	6 (4.8)	<.001
Onset of symptoms to hospital admission, median (range), d				
CNS				
Dizziness	1 (1-30)	1 (1-30)	1 (1-14)	NA
Headache	1 (1-14)	1 (1-3)	3 (1-14)	NA
Impaired consciousness	8 (1-25)	10 (1-25)	1 (1-3)	NA
Acute cerebrovascular disease	9 (1-18)	10 (1-18)	1 (1)	NA
Ataxia	2 (2)	2 (2)	NA	NA
Seizure	2 (2)	2 (2)	NA	NA
PNS				
Impairment				
Taste	2 (1-5)	3 (1-3)	2 (1-5)	NA
Smell	2 (1-5)	1 (1-4)	2 (1-5)	NA
Vision	3 (1-3)	3 (2-3)	1 (1)	NA

# Neurological involvement

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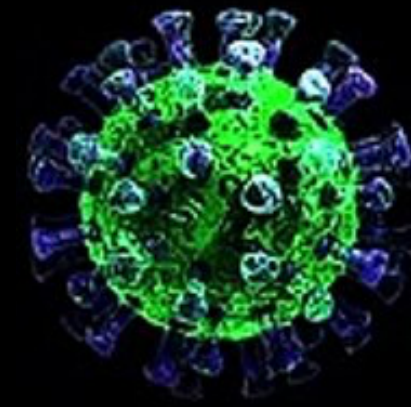
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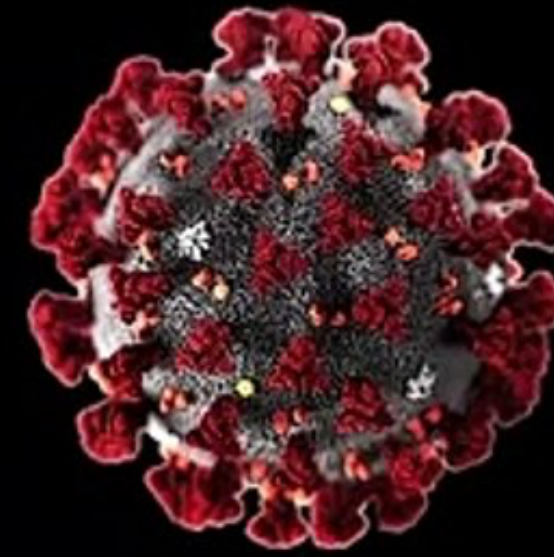
Wang D et al. JAMA 2020 inpress

Chen N et al. Lancet 2000: 395; 507-513

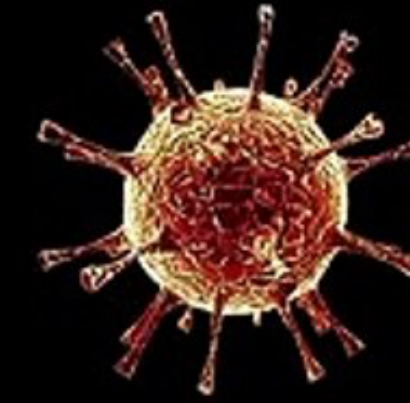
<https://www.dailymotion.com/video/x7samry>



**MERS**



**CORONAVIRUS (COVID-19)**



**SARS**

Saad M, et al. J Infct Dis 2014;29;301-306

18/70 (26%)  
6/70 (9%)

78/214 (36%)

22/183 (12%)

Li Y, et al. Interirology 2016;59;163-169

Mao L, et al. J Infct Dis 2014;29;301-306

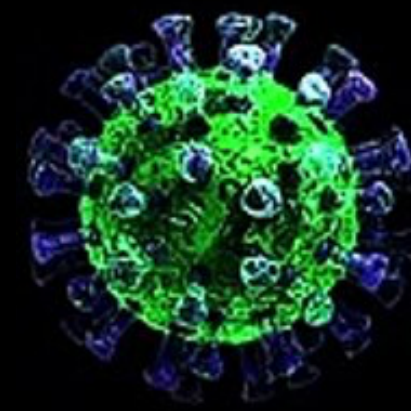
<https://www.medrxiv.org/content/10.1101/2020.02.22.20026500v1/>

**Neurological manifestration**

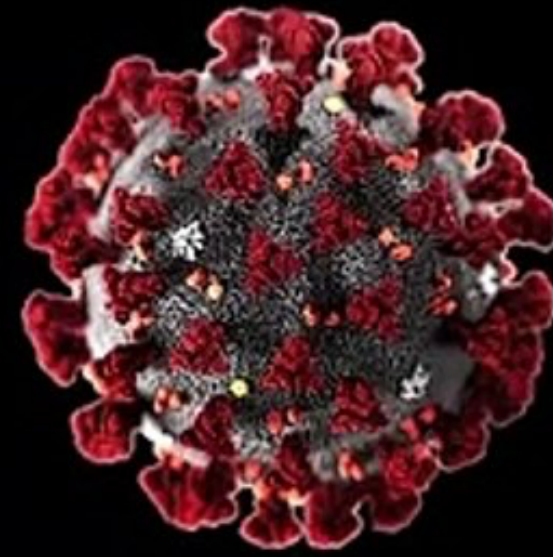
# Outline

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- Patients without epilepsy
  - Seizure
  - EEG
  - Treatment
  - Epilepsy
- Patients with epilepsy

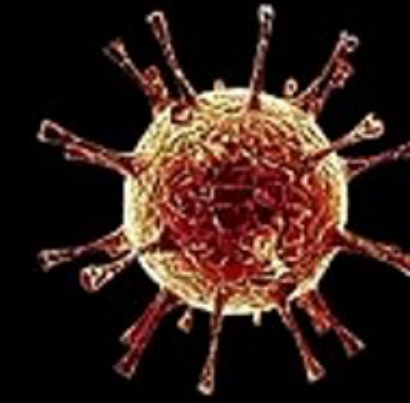
<https://www.dailymotion.com/video/x7samry>



**MERS**



**CORONAVIRUS (COVID-19)**



**SARS**

Li Y, et al. Interirology 2016;59;163-169

Beijing, China

Saad M, et al. J Infcet Dis 2014;29;301-306  
Riyadh, Saudi Arabia

6/70 (9%)

0.5%

5/22 (23%)

Mao L, et al. J Infcet Dis 2014;29;301-306

<https://www.medrxiv.org/content/10.1101/2020.02.22.20026500v1/>

**HCoV**

5/64 (8%)

**Seizure**

Colorado, USA

Dominguez SR, et al J Med Virol 2009;81:1597-1604

**HCoV-OC43**

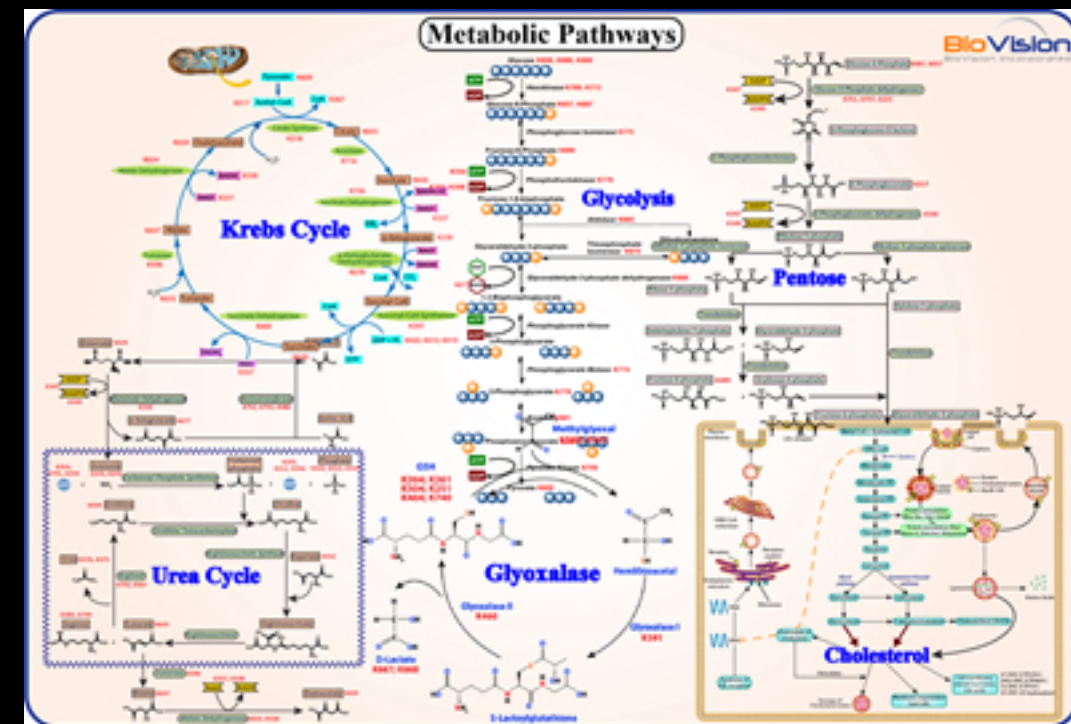
**Febrile seizure**

**HCoV-HKU1**

Carman KB, et al Hum Vaccin Immunother 2019;15:496-502

Wo PCet al. Honk Kong Med J 2012;18(Suppl 2):22-24

# COVID-19 and seizure



Seizure



<https://m.economictimes.com/thumb/msid-71344481,width-1200,height-900,resizemode-4,imgsize-523232/1.jpg>

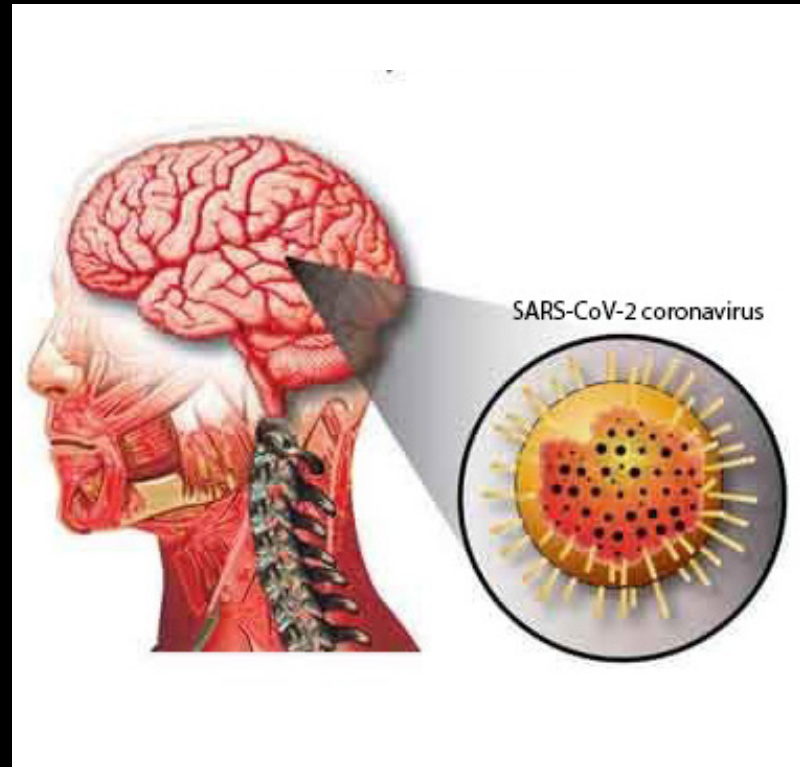
<https://www.thailandmedical.news/uploads/editor/files/encephalitis.jpg>

[https://cardiff.imgix.net/\\_\\_data/assets/image/0011/25958/Fight-against-organ-failure-advances.jpg?w=873&h=491&fit=crop&q=60&auto=format](https://cardiff.imgix.net/__data/assets/image/0011/25958/Fight-against-organ-failure-advances.jpg?w=873&h=491&fit=crop&q=60&auto=format)

<https://www.biovision.com/media/biovision/categories/metabolic-banner-09242019.jpg>

<https://prognoshealth.com/wp-content/uploads/2019/08/lung-cancer-image.jpeg>

# COVID-19 and seizure



Seizure

Neurotrophic pathogenic mechanism

Seizure: European Journal of Epilepsy 78 (2020) 109–112

Contents lists available at ScienceDirect

**Seizure: European Journal of Epilepsy**

journal homepage: [www.elsevier.com/locate/seizure](http://www.elsevier.com/locate/seizure)

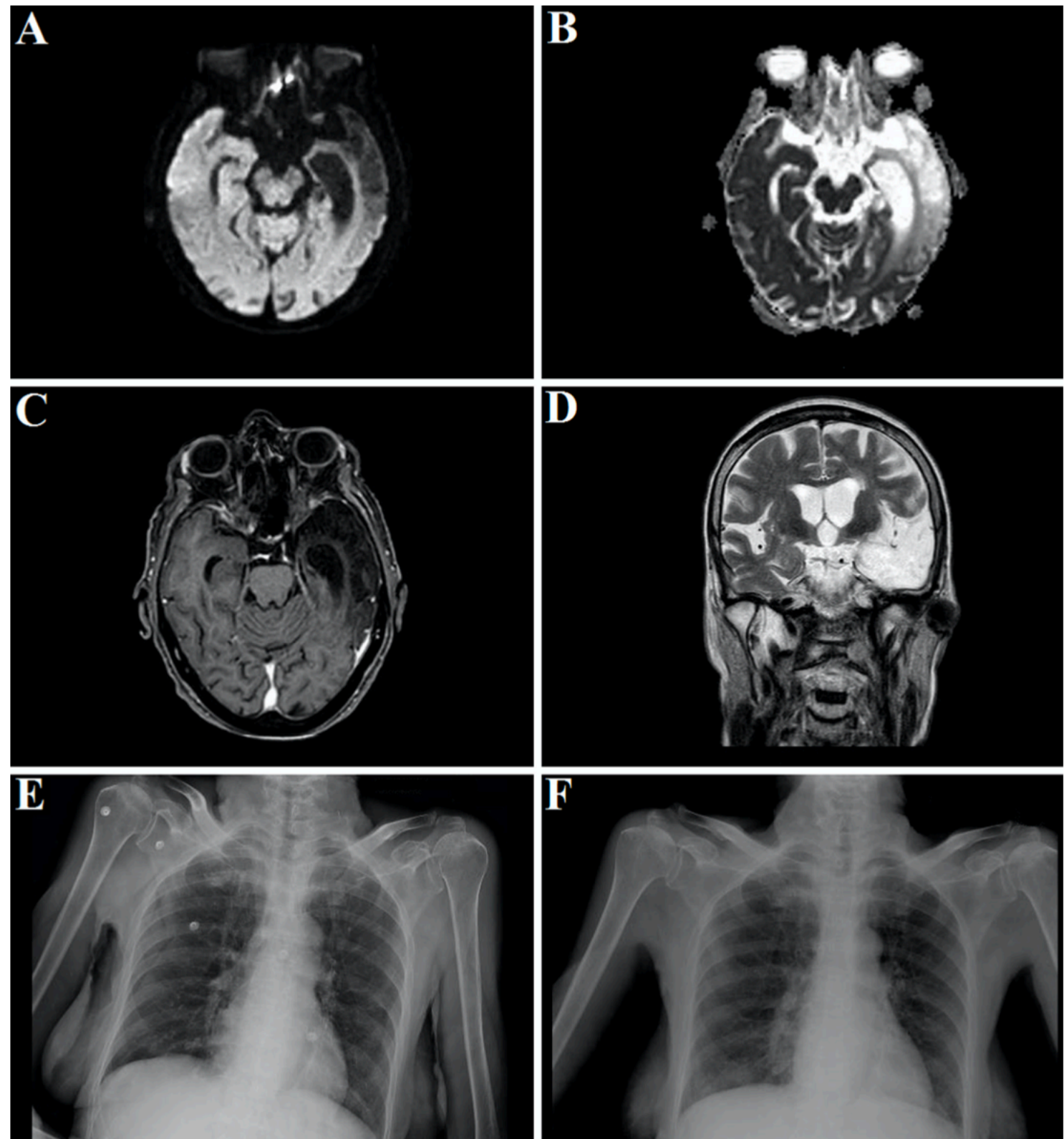
Short communication

**Focal status epilepticus as unique clinical feature of COVID-19: A case report**

Catello Vollono<sup>a,\*</sup>, Eleonora Rollo<sup>b,1</sup>, Marina Romozzi<sup>b</sup>, Giovanni Frisullo<sup>c</sup>,  
Serenella Servidei<sup>a,b</sup>, Alberto Borghetti<sup>d</sup>, Paolo Calabresi<sup>b,c</sup>

<sup>a</sup> Neurofisiopatologia, Fondazione Policlinico Universitario Agostino Gemelli IRCCS, Rome, Italy  
<sup>b</sup> Neurologia, Dipartimento di Neuroscienze, Università Cattolica del Sacro Cuore, Rome, Italy  
<sup>c</sup> Neurologia, Fondazione Policlinico Universitario Agostino Gemelli IRCCS, Rome, Italy  
<sup>d</sup> UOC Malattie Infettive, Fondazione Policlinico Universitario Agostino Gemelli IRCCS, Rome, Italy

Check for updates



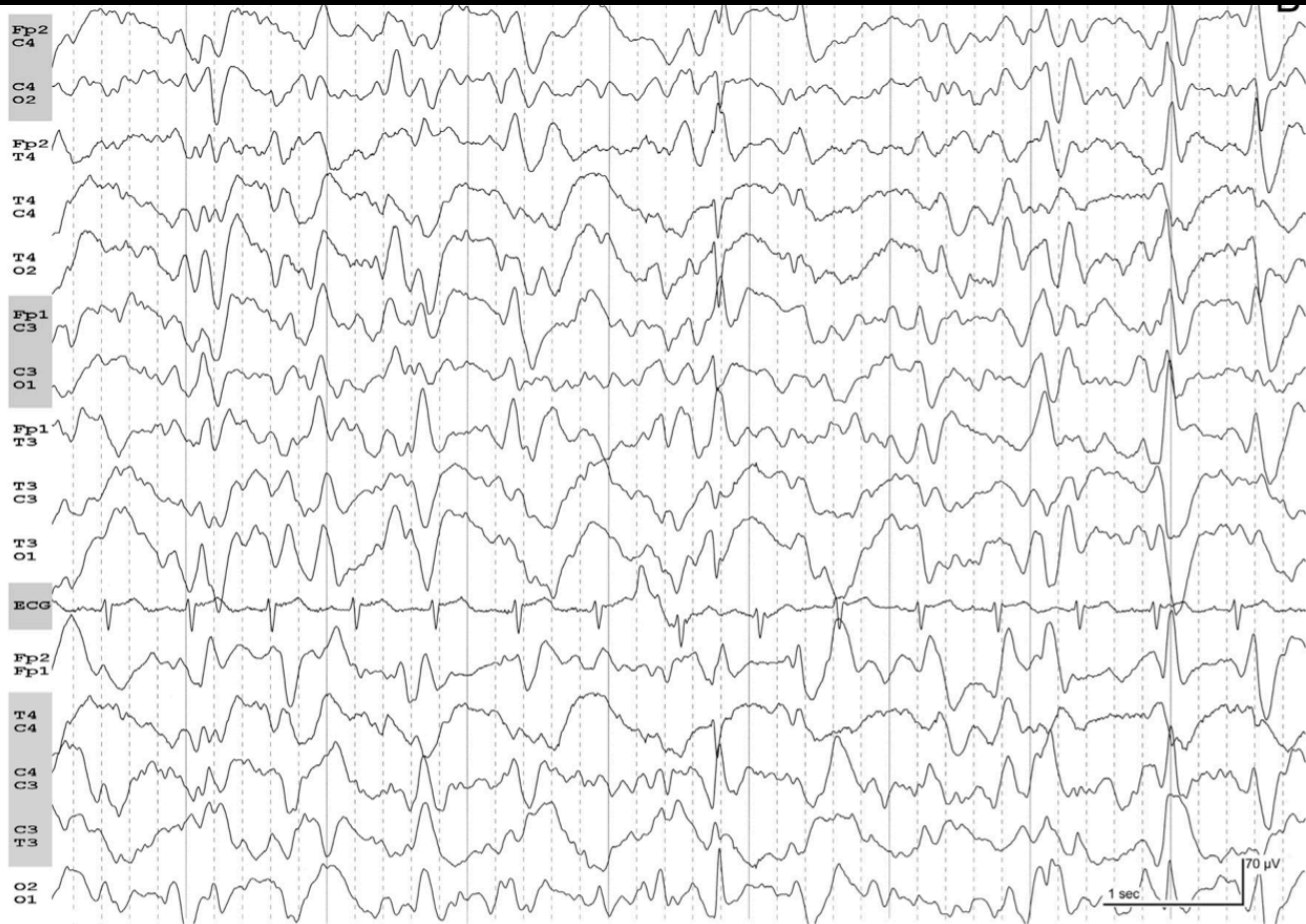
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# EEG in COVID-19 patients in ICU

- EEG provide a readily available, safe, and effective means of evaluating brain function
- Full 10-20 EEG placement with an ECG derivation remains the standard
- Using simplified montages may limit the risk of infection to EEG technologists
- Reduced montages with subdermal single-use EEG needle electrodes may be used in comatose COVID-19 patients.
- A prone (face-down) position is used for the treatment of acute respiratory distress syndrome to improve oxygenation.
- Prone positioning effects on the EEG in adults for periods of 16 hours per day are unknown
- Caution: Ventilator-triggered artifacts, head movements, water condensation within the tubing connected to the ventilator may produce artifacts that simulate intermittent polyspike-waves
- EEG pattern in ICU



# The five key questions.

## Status epilepticus versus metabolic/toxic encephalopathies.

Q1 : Is it a confusional state or only a problem of vigilance?

Q2 : Is there a fluctuation of symptoms or change in consciousness from somnolence to coma?

Q3 : Is the EEG activity rhythmic or periodic?

Q4: Is the EEG activity dynamic, showing spatiotemporal evolution, or relatively monomorphic?

Q5 : Is the EEG reactive to stimuli, wakefulness, sleep, arousal, or antiseizure drugs\*?

\* Only consider an IV benzodiazepine test positive if both EEG and consciousness normalize.

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# Management of seizures

- Diagnosis
- Evaluate causes
- First seizure:

# Management of seizures

- Diagnosis
- Evaluate causes
- Drug factors: onset of action, drug interaction, respiratory failure, renal failure, liver failure

# Duration of treatment

- New-onset seizures in these patients could be considered as acute symptomatic seizures.
- Patients with acute symptomatic seizures do not need long-term ASM therapy after the period of acute illness, unless a subsequent seizure occurs
- Patients with acute symptomatic seizures do not need long-term ASM therapy after the period of acute illness, unless a subsequent seizure occurs<sup>1,3</sup>
- Since the period from the onset of COVID-19 symptoms to death may range from 6 to 41 days<sup>2,3</sup>
- It is reasonable to continue the ASM for about 6 weeks and then taper and discontinue the drug rapidly in 1–2 weeks.<sup>3</sup>

1 Bergey GK. Continuum (minneap Minn) 2016;22:38-50

2 Rothan HA and Byrareddy SN. J Autoimmun 2020 inpress

3 Asadi-Pooya AA. Seizure 2020; 79:49-52

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No Evidence



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# Patients with seizures and COVID-19

- COVID-2 สามารถ precipitate or aggravate existing seizures ได้หรือไม่
- ผู้ป่วย โรคลมชักมี โอกาสที่จะติดเชื้อ COVID-2 ง่ายกว่าคนทั่วไปหรือไม่
- ยาที่ใช้รักษา COVID-19 ตัวไหนที่ควรเลือกใช้ ในผู้ป่วย โรคลมชัก
- แพทย์ควรเปลี่ยนแปลงการดูแลผู้ป่วย โรคลมชัก ในสถานการณ์ที่มีการระบาดของ COVID-19 อย่างไร

# Patients with seizures and epilepsy and COVID-19

COVID-2 สามารถ precipitate or aggravate existing seizures ได้หรือไม่

- Seizures in severe/end-stage disease likely reflect COVID-19–related hypoxia, encephalopathy, or encephalitis than lowered seizure threshold in susceptible individuals with preexistent neurologic disease.
- Some may include new-onset seizures
- Individuals with epilepsy are not more likely to be infected by the virus, nor are they more likely to have severe COVID-19 manifestations because they have epilepsy

# Patients with seizures and epilepsy and COVID-19

ผู้ป่วยโรคลมชักมีโอกาที่จะติดเชื้อ COVID-2 ง่ายกว่าคนทั่วไปหรือไม่

- Individuals with epilepsy are not more likely to be infected by the virus, nor are they more likely to have severe COVID-19 manifestations because they have epilepsy
- May be concern: Autoimmune associated epilepsy, tuberous sclerosis, Dravet syndrome

# Patients with seizures and epilepsy and COVID-19

## ยาที่ใช้รักษา COVID-19 ตัวไหนที่ควรเสี่ยงในผู้ป่วยโรคลมชัก

- Some medications used to treat individuals with upper respiratory tract infections
- A number of medications are now being studied as possible treatments for COVID-19 to reduce viral load and/or severity of disease
  - Chloroquine and hydroxychloroquine, either alone or with azithromycin
  - Antiviral and immune therapies
    - carbamazepine and lopinavir/ritonavir or atazanavir combination
    - Phenytoin and lopinavir/ritonavir
    - Valproate/lamotrigine and lopinavir/ritonavir

# Patients with seizures and epilepsy and COVID-19

แพทย์ควรเปลี่ยนการดูแลผู้ป่วย โรคลมชัก ในสถานการณ์ที่มีการระบาดของ COVID-19 อย่างไร

- Reduce health. Care availability
- Attendance at medical facilities poses an additional risk of contracting the virus for individuals and their carers/families
- Clinicians should formulate approaches to reduce emergency department, clinic, and hospital visits
- People with epilepsy should have an emergency care plan
- The threshold to provide emergency rescue medication (e.g., benzodiazepines via buccal, nasal, or rectal routes or oral if they can be safely swallowed) may be lowered.
- Should be reassured that most tonic-clonic seizures last under 2–3 minutes and do not require emergency medical

# Patients with seizures and epilepsy and COVID-19

แพทย์ควรเปลี่ยนการดูแลผู้ป่วย โรคลมชัก ในสถานการณ์ที่มีการระบาดของ COVID-19 อย่างไร

- A regular supply of antiseizure medication should be ensured as well as access to repeat prescriptions and supplies
- Changes to treatment could be postponed
- Any initiated withdrawal/wean or down-titration of medication should be delayed or reversed unless there are strong reasons for doing otherwise.
- Key advice on lifestyle issues should be reinforced
- Telehealth
- For new presentations, care can be enhanced through careful history taking and home video where possible

# Patients with seizures and epilepsy and COVID-19

แพทย์ควรเปลี่ยนการดูแลผู้ป่วย โรคลมชัก ในสถานการณ์ที่มีการระบาดของ COVID-19 อย่างไร

- Diagnostic procedure can be delayed to a later date.
- A system to reduce direct exposure of health care professionals to people with epilepsy is advisable.