



# COVID-19: an update

Neuro Quiz # 70



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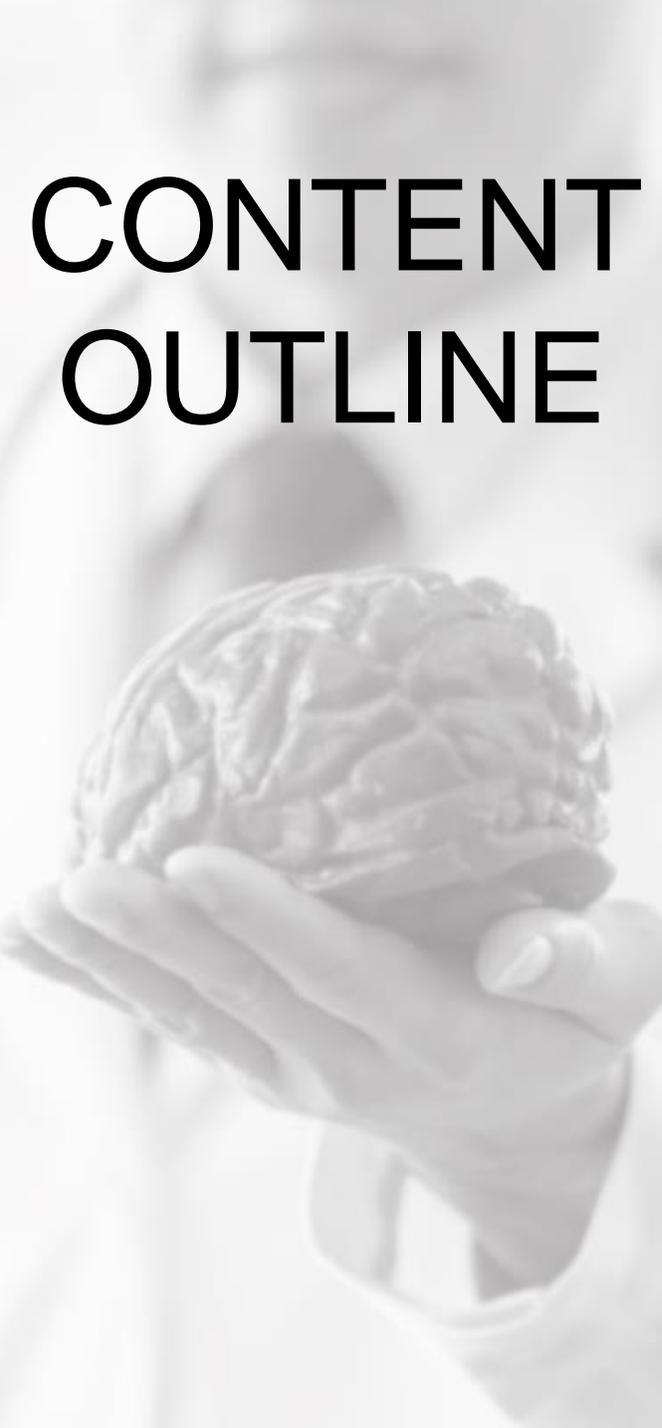
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# CONTENT OUTLINE

A grayscale image of a hand holding a human brain, positioned on the left side of the slide. The background is a blurred image of a person in a white lab coat.

Please click on any of the following links to proceed to that question/topic.

[Question 1: Asymptomatic COVID positive](#)

[Question 2: Mechanism of neurological complications](#)

[Question 3: COVID-19 vaccine](#)

[Question 4: Neurological symptoms of COVID-19](#)

[Question 5: Elective surgery after COVID-19](#)

[Title Slide](#)

# QUESTION 1

A patient with an incidental finding of a pituitary macroadenoma is scheduled for Trans-Sphenoidal Pituitary resection.

The nasal passages were swabbed for COVID testing and the RT-PCR test for SARS-CoV2 is positive.

Which of the following is the **CORRECT**?

Please click on any of the following links to proceed to that question/topic.

[\*\*A: If the patient is asymptomatic, the test can be ignored, and surgery can go ahead\*\*](#)

[\*\*B: The sensitivity of RT-PCR is only 65%\*\*](#)

[\*\*C: A serological test to check for antibodies should be done as it is more sensitive\*\*](#)

[\*\*D: After 4 weeks, if asymptomatic, proceed with surgery without retesting\*\*](#)

[Content Outline](#)

[Q2, Q3, Q4, Q5](#)

# Sorry! Incorrect.

## EXPLANATION

**A. If the patient is asymptomatic, the test can be ignored, and surgery can go ahead**

A COVID infected person may be asymptomatic but can transmit the virus. Therefore it would be prudent to defer elective surgery if the test is positive

World Health Organization (WHO) stated that testing for the virus should be considered for symptomatic patients on the basis of the suspicion and likelihood of COVID-19, as well as in those who are asymptomatic or minimally symptomatic but who have been in contact with confirmed cases

Jarrom et al. Effectiveness of tests to detect the presence of SARSCoV-2 virus, and antibodies to SARS-CoV-2, to inform COVID-19 diagnosis: a rapid systematic review BMJ Evidence-Based Medicine Month 2020

[Return to Question](#)

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## EXPLANATION

### **B. The sensitivity of RT-PCR is only 65%**

The reported diagnostic sensitivity estimates of RT-PCR test range from 74.7% to 100% and its specificity is about 87.7% to 100%

Jarrom et al. Effectiveness of tests to detect the presence of SARSCoV-2 virus, and antibodies to SARS-CoV-2, to inform COVID-19 diagnosis: a rapid systematic review BMJ Evidence-Based Medicine Month 2020

[Return to Question](#)

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## EXPLANATION

### **C. A serological test to check for antibodies should be done as it is more sensitive**

IgM and IgG antibodies may take 1 to 3 weeks to develop after infection. Some persons may not develop detectable antibodies after coronavirus infection. In others, it is possible that antibody levels could wane over time to undetectable levels.

Thus, serologic test for antibodies do not indicate with certainty the presence or absence of current or previous infection with SARS-CoV-2.

<https://www.cdc.gov/coronavirus/2019-ncov/lab/resources/antibody-tests-guidelines.html#:~:text=Some%20persons%20may%20not%20develop,to%20develop%20after%20infection.>

The sensitivity of antibody test range from 18.4% to 96.1%, and its specificity is 88.9% to 100% (data from 12 studies;682 participants)

Jarrom et al. Effectiveness of tests to detect the presence of SARSCoV-2 virus, and antibodies to SARS-CoV-2, to inform COVID-19 diagnosis: a rapid systematic review BMJ Evidence-Based Medicine Month 2020

[Return to Question](#)

# Great Job!! Correct.

## EXPLANATION

[Next Question](#)

**D. After 4 weeks, if asymptomatic, proceed with surgery without retesting**

According to the joint statement by ASA & APSF, elective surgery can proceed after four weeks for an asymptomatic patient or those recovered from mild, non-respiratory symptoms.

[asa-and-apsf-joint-statement-on-elective-surgery-and-anesthesia-for-patients-after-covid-19-infection](#). December 2020

[Return to Question](#)

## QUESTION 2

Neurological complications are common with COVID-19 infection.

The likely mechanisms of SARS-CoV-2 causing neurological symptoms include all, EXCEPT?

Please click on any of the following links to proceed to that question/topic.

**[A: Entry of SARS-CoV-2 virus through the olfactory nerves](#)**

**[B: Crosses the blood -brain barrier following viremia](#)**

**[C: Entry via neuronal and mucosal alpha \( \$\alpha\$ \) receptors](#)**

**[D: Innate adaptive immune response to the COVID-19 virus](#)**

[Content Outline](#)

[Q1, Q3, Q4, Q5](#)

# Sorry! Incorrect.

## EXPLANATION

### A. Entry of SARS-CoV-2 virus through the olfactory nerves

This is one of the routes of entry of SARS-CoV-2 into the nervous system

Coronavirus infects the nasal epithelial cells, and it can then reach the entire brain and cerebrospinal fluid through the olfactory nerve and olfactory bulb within 7 days and cause inflammation and demyelinating reaction.

Bohmwald, et al. "Neurologic alterations due to respiratory virus infections." *Frontiers in cellular neuroscience* 12 (2018): 386

Nepal et al. Neurological manifestations of COVID-19: a systematic review. *Critical Care* (2020) 24:421

Yavarpour-Bali. Update on neurological manifestations of COVID-19. *Life Sciences* 257 (2020) 118063

[Return to Question](#)

# Sorry! Incorrect.

## EXPLANATION

### **B. Crosses the blood -brain barrier following viremia**

Once the SARS-CoV-2 gains access to the general circulation, it could potentially invade the cerebral circulation and enter the neurons.

The interaction of the SARS-CoV-2 S protein and capillary endothelium ACE2 receptor would have the potential to infect from the capillary endothelium, thereby facilitating viral entry into the cerebrum

Nepal et al. Neurological manifestations of COVID-19: a systematic review. Critical Care (2020) 24:421

[Return to Question](#)

# Great Job!! Correct.

## EXPLANATION

[Next Question](#)

### C. Entry via neuronal and mucosal alpha ( $\alpha$ ) receptors

The SARS-CoV2 invades the nervous tissue through ACE-2 or TMPRSS-2 and NOT through alpha ( $\alpha$ ) receptors

Yavarpour-Bali. Update on neurological manifestations of COVID-19. Life Sciences 257 (2020) 118063

[Return to Question](#)

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## EXPLANATION

### **D. Innate adaptive immune response to the COVID-19 virus**

Viruses do not have to enter the brain to cause damage; they can activate an immune response that triggers subsequent damage within neuronal tissue.

SARS-CoV-2 can cause a massive release of cytokines, a 'cytokine storm', which can lead to neurological injury by endothelial damage, disseminated intravascular coagulation, and disrupted cerebral autoregulation

Nepal et al. Neurological manifestations of COVID-19: a systematic review. Critical Care (2020) 24:421

## QUESTION 3

The **FDA** has approved the COVID-19 vaccine produced by Pfizer-BioNTech. Which of the following statements about this vaccine is **CORRECT**?

Please click on any of the following links to proceed to that question/topic.

**A: [It is a mRNA vaccine made by attenuating the complete RNA of the SARS-CoV2](#)**

**B: [It is a self-amplifying RNA \(saRNA\) vaccine](#)**

**C: [Once injected, the RNA attaches itself to the human DNA to produce immunoglobulin against SARS-CoV2](#)**

**D: [The mRNA is dispensed as lipid nanoparticles](#)**

[Content Outline](#)

[Q1, Q2, Q4, Q5](#)

# Sorry! Incorrect.

## EXPLANATION

**A. It is a mRNA vaccine made by attenuating the complete RNA of the SARS-CoV2**

The vaccine is a mRNA sequence that codes for only the 'spike' protein of the SARS-CoV2. The human cells would read the information on the mRNA and make millions of copies of 'spike' protein, which would serve as antigen and spur the immune system to produce antibodies against the spike protein and protect when the real virus enters the body.

Source: Pfizer, Bloomberg research

Gam-COVID-Vac (*Sputnik V*) is a viral two-vector vaccine based on two human adenoviruses containing the gene that encodes the spike protein of SARS-CoV-2 to stimulate an immune response.

<https://en.wikipedia.org/wiki/Gam-COVID-Vac>

[Return to Question](#)

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## EXPLANATION

### **B. It is a self-amplifying RNA (saRNA) vaccine**

The self-amplifying RNA vaccine is different from the mRNA vaccine in that it contains a code for 'viral replicase enzyme' which helps make multiple copies of the viral RNA within the human cell. Thus, it needs a lower dose.

<https://www.europeanpharmaceuticalreview.com/article/122275/comparison-of-new-vaccine-approaches-covid-19/>

The 'Pfizer-BioNTech' vaccine is a mRNA type, while the 'Imperial College' one is a saRNA type.

# Sorry! Incorrect.

## EXPLANATION

**C. Once injected, the mRNA attaches itself to the human DNA to produce immunoglobulin against SARS-CoV2**

The vaccine contains the mRNA sequence that codes for the 'spike' protein of the SARS-CoV2

The cells of the vaccine recipient would read the information on the mRNA and make millions of copies of 'spike' protein, which would spur the immune system to produce antibodies against them and protect when the real virus enters the body

**The mRNA never enters the nucleus of the cell and hence does not interact with the DNA.** The cell destroys the RNA after it has finished transcription.

The RNA can trigger an inflammatory immune response that is independent of the protein it encodes.

Source: Pfizer, Bloomberg research

[Return to Question](#)

# Great Job!! Correct.

## EXPLANATION

[Next Question](#)

### **D. The mRNA is dispensed as lipid nanoparticles**

The mRNA sequence code for the spike protein is swathed in a lipid layer for delivery

Source: Pfizer, Bloomberg research

[Return to Question](#)

## QUESTION 4

Which of the following statements about neurological manifestations of COVID-19 is CORRECT?

Please click on any of the following links to proceed to that question/topic.

**A: [Anosmia or loss of smell is the most common neurological complication](#)**

**B: [The most common EEG finding in a COVID-19 positive patient was focal epileptiform activity](#)**

**C: [Presence of anosmia \(loss of smell\) indicates continued infectivity](#)**

**D: [Neurological involvement is unique to SARS-CoV2 compared to the other coronaviruses](#)**

[Content Outline](#)

[Q1, Q2, Q3, Q5](#)

# Great Job!! Correct.

## EXPLANATION

[Next Question](#)

### **A. Anosmia or loss of smell is the most common neurological complication**

Five studies assessed the prevalence of smell disorder. An overall average of 59% of patients experienced olfactory disturbance. About 56% had alteration in taste sensation

Myalgia and Headache was seen in about 20-25%

Nepal et al. Neurological manifestations of COVID-19: a systematic review Critical Care (2020) 24:421

[Return to Question](#)

# Sorry! Incorrect.

## EXPLANATION

### B. The most common EEG finding in a COVID-19 positive patient was focal epileptiform activity

Diffuse slowing was the most common EEG finding

In a review of 617 COVID patients with altered mental status (61.7 %), seizure-like events (31.2 %), and cardiac arrest (3.5 %).

3 groups of abnormal EEG findings were seen (n = 543, 88%)

1. Background abnormalities: **diffuse slowing (423, 68%)**, focal slowing (105, 17%), and absent posterior dominant rhythm (63, 10%).
2. Periodic and rhythmic EEG patterns: generalized periodic discharges (35, 6%), lateralized/multifocal periodic discharges (24, 4%), generalized rhythmic activity (32, 5%).
3. Epileptiform changes: focal (35, 6%), generalized (27, 4%), seizures/status epilepticus (34, 6%).

Antony AR, Haneef Z. Systematic review of EEG findings in 617 patients diagnosed with COVID-19 Seizure: European Journal of Epilepsy 2020; 83:234-241

[Return to Question](#)

# Sorry! Incorrect.

## EXPLANATION

### **C. Presence of anosmia (loss of smell) indicates continued infectivity**

The loss of smell is due to direct damage of olfactory nerves and the inflammatory response in the nasal cavity which blocks the binding of odorants to the olfactory receptors.

It takes a long time for the damaged neurons to re-establish synaptic connections with the olfactory bulb, even beyond recovery from COVID symptoms

Hence, this statement is INCORRECT

# Sorry! Incorrect.

## EXPLANATION

**D. Neurological involvement is unique to SARS-CoV2 compared to the other coronaviruses**

Neurological complications is NOT unique to SARS-CoV2

SARS coronavirus has been detected in the CSF of patients with encephalitis and ARDS.

MERS coronavirus can cause a severe acute disseminated encephalomyelitis, vasculopathy and Guillain-Barre syndrome

Kim JE, Heo JH, Kim HO, et al. Neurological complications during treatment of Middle East respiratory syndrome. J Clin Neurol 2017;13:227–233

Neurologic complications of coronavirus infections Avindra Nath, Neurology® 2020;94:809-810

[Return to Question](#)

## QUESTION 5

A 45 y F, BMI-30, with no other comorbidities needs a lumbar disc surgery for mild symptoms of sciatica. However, yesterday she started having fever, cough and shortness of breath, with SpO<sub>2</sub> dropping to 95% but did not need hospitalization. COVID test by RT-PCR was POSITIVE

According to the recent guidelines by ASA & APSF, which of the following statements is INCORRECT?

Please click on any of the following links to proceed to that question/topic.

**A: [She may be considered infectious for at least 10days](#)**

**B: [Once recovered, she may be considered for surgery 6 weeks after onset of symptoms](#)**

**C: [Repeat RT-PCR testing is recommended after 60 days of onset of symptoms](#)**

**D: [Further preoperative evaluation is needed if she has residual fatigue or shortness of breath](#)**

[Content Outline](#)

[Q1](#), [Q2](#), [Q3](#), [Q4](#)

# Sorry! Incorrect.

## EXPLANATION

**A: She may be considered infectious for at least 10days**

This statement is correct

Patients with confirmed COVID-19 with mild to moderate symptoms and who are not severely immunocompromised, isolation can be discontinued, if

- 1) At least 10 days have passed since symptoms first appeared, and
- 2) At least 24 hours have passed since last fever without the use of fever-reducing medications, and
- 3) Other symptoms (e.g., cough, shortness of breath) have improved.

<https://www.asahq.org/about-asa/newsroom/news-releases/2020/12/asa-and-apsf-joint-statement-on-elective-surgery-and-anesthesia-for-patients-after-covid-19-infection#:~:text=Suggested%20wait%20times%20from%20the,who%20did%20not%20require%20hospitalization.>

[Return to Question](#)

# Sorry! Incorrect.

## EXPLANATION

**B: Once recovered, she may be considered for surgery 6 weeks after onset of symptoms**

The timing of elective surgery after recovery from COVID-19 utilizes both symptom- and severity-based categories.

Suggested wait times from the date of COVID-19 diagnosis to surgery are as follows:

- Four weeks for an asymptomatic patient or recovery from only mild, non-respiratory symptoms.
- Six weeks for a symptomatic patient (e.g., cough, dyspnea) who did not require hospitalization.
- Eight to 10 weeks for a symptomatic patient who is diabetic, immunocompromised, or hospitalized.
- Twelve weeks for a patient who was admitted to an intensive care unit due to COVID-19 infection.

<https://www.asahq.org/about-asa/newsroom/news-releases/2020/12/asa-and-apsf-joint-statement-on-elective-surgery-and-anesthesia-for-patients-after-covid-19-infection#:~:text=Suggested%20wait%20times%20from%20the,who%20did%20not%20require%20hospitalization.>

[Return to Question](#)

# Great Job!! Correct.

## EXPLANATION

[Next Slide](#)

**C: Repeat RT-PCR testing is recommended after 60 days of onset of symptoms**

Repeat PCR testing in asymptomatic patients is strongly discouraged before 90 days, since persistent or recurrent positive PCR tests are common after recovery. However, if a patient presents within 90 days and has recurrence of symptoms, re-testing and consultation with an infectious disease expert can be considered.

Once the 90-day recovery period has ended, the patient should undergo one pre-operative nasopharyngeal PCR test ideally  $\leq$  three days prior to the procedure.

<https://www.asahq.org/about-asa/newsroom/news-releases/2020/12/asa-and-apsf-joint-statement-on-elective-surgery-and-anesthesia-for-patients-after-covid-19-infection#:~:text=Suggested%20wait%20times%20from%20the,who%20did%20not%20require%20hospitalization.>

[Return to Question](#)

# Sorry! Incorrect.

## EXPLANATION

**D: Further preoperative evaluation is needed if she has residual fatigue or shortness of breath**

This is CORRECT.

Residual symptoms such as fatigue, shortness of breath, and chest pain are common in patients who have had COVID-19. These symptoms can be present more than 60 days after diagnosis. In addition, COVID-19 may have long term deleterious effects on myocardial anatomy and function.

A more thorough preoperative evaluation, scheduled further in advance of surgery with special attention given to the cardiopulmonary systems, should be considered in patients who have recovered from COVID-19 and especially those with residual symptoms.

<https://www.asahq.org/about-asa/newsroom/news-releases/2020/12/asa-and-apsf-joint-statement-on-elective-surgery-and-anesthesia-for-patients-after-covid-19-infection#:~:text=Suggested%20wait%20times%20from%20the,who%20did%20not%20require%20hospitalization.>

[Return to Question](#)

Return to [Content Outline](#), [Q1](#), [Q2](#), [Q3](#), [Q4](#), [Q5](#)

*Have a safe and wonderfully, normal 2021!*