

令和5年度医科学専攻（修士課程）入学者選抜第2次募集 小論文

出題意図

本入試問題は、Rhys Hamon and Miranda P. Ween: E-Cigarette Vapour Increases ACE2 and TMPRSS2 Expression in a Flavour- and Nicotine-Dependent Manner. *Int J Environ Res Public Health*. 2022 Nov; 19(22): 14955.より、論文の一部を抜粋し改変して出題に使用した。とくに、内容に関しては新型コロナウイルス感染症拡大に関する内容であり、医療従事者にとっては比較的馴染みの深い内容をテーマとして取り上げ、さらに比較的平易な英文法による、語句および表現を用いた文章内容と考えられた。文章量もとりわけ多くない。

出題に関しては、特別な医学的な専門的知識を必要とせず、本学術論文の文脈および前後関係を理解することで、すべての回答は文章中の表現をそのまま用いるか、もしくはごく限られた単語及び表現を変更するのみで正しい回答を導き出せるように工夫を試みた。すなわち、大学院修士課程において研究を実施するにあたり、関連する学術論文を総論的に内容の全体理解を進められる考察力と、適切に各論的な表現や語句に注意をはらい、それらを的確に咀嚼して理解し、英語で回答することにより、その読解力と表現力に関して本出題を通して問うこととした。

Example Answers/ 解答例

いずれの回答も、原則英語である。

Question. 1: Please describe how does SARS-CoV-2 appear to gain access to human critical organs.

(15 点)

SARS-CoV-2 appears to initially infect the host through the respiratory tract, gaining access to other critical organs through the circulatory system, such as the liver, kidneys, heart, and gastrointestinal tract, leading to potential multi-organ failure.

Question. 2: Please explain angiotensin-converting enzyme 2 (ACE2).

(15 点)

Angiotensin-converting enzyme 2 (ACE2) is an enzyme attached to the surface of cells. In normal physiology, it is a key player in the renin–angiotensin–aldosterone system (RAAS), which is a critical regulator of blood volume and systemic vascular resistance.

Question. 3: Please explain the function of the S glycoprotein of SARS-CoV-2.

(15 点)

The S glycoprotein of SARS-CoV-2 harbours a Furin cleavage site that must be enzymatically cleaved to mediate entry into host cells, making it unique to SARS-CoVs and SARS-related coronaviruses.

Question. 4: Please describe how may macrophages play a role in the transition of SARS-CoV-2 from the lungs to other tissues.

(20 点)

Macrophages may play a role in helping to deliver other coronaviruses to tissues beyond the lungs, although this has not yet been proven to be the case with SARS-CoV-2. Also, macrophages may be one way that the virus could transit from the lungs to the rest of the body, and it may play a role in hyper-inflammation seen in patients with severe disease, including by producing T cell chemoattractant chemokines.

Question. 5: Please describe one possible cause of the reason why smokers may increase the severity of COVID infections.

(15 点)

One possible cause that was identified for this was increased ACE2 in the epithelial cells in the airways of smokers vs. non-smokers.

Question. 6: Please describe One limitation.

(20 点)

It is difficult to obtain an accurate history from patients who are either intubated or in respiratory failure.