

Niigata University Graduate School of Medical and Dental
Sciences (Doctoral Program) (Med.Field)
Admission in April 2025
Special entrance examination for international students

Notes

◆ Please do not leave anything on the desk other than the admission ticket, writing implements, and dictionaries that are allowed to be brought in. Electronic dictionary and medical dictionary are not allowed to be used. Please turn off the power of the cellular phone and put away in your bag. Do not wear it on your body.

受験票、筆記用具、持込が許可されている辞書以外のものを机の上に置かないでください。なお、電子辞書及び医学辞書の使用は認めません。また、携帯電話等を持っている人は、電源を切ってからカバン等に入れ、身につけないでください。

◆ Please do not open the examination paper until the start of the examination is announced.

試験問題・解答用紙は、試験開始の合図があるまで開かないでください。

◆ The start of the examination is 10:00.

The end of the examination is 11:30.

試験開始時刻は、10時です。試験終了時刻は、11時30分です。

◆ There are 10 examination sheets. You can't remove staples used for stapling.

問題・解答用紙は、1～10ページの10です。なお、ホチキス止めは外さないでください。

◆ If you find any lack of question and answer sheets or printing failure, please offer after the test starts.

問題・解答用紙の不足、印刷不鮮明の箇所がありましたら、試験開始後に申し出てください。

◆ After the test starts, make sure to fill your examinee's number and name on all pages. Question and answer sheets will be collected after the examination.

問題・解答用紙は試験終了後にすべて回収しますので、試験開始後に問題・解答用紙のすべてのページに受験番号・氏名を必ず記入してください。

受験番号 (No) _____ 氏名 (Name) _____

1. Read the following review of senescence of neurons in the brain and answer the questions in English.

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(Modified from Science 384(6703) 1404-1406, 2024)

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- 1) Briefly explain what “senescence” is by reading the 1st paragraph.
- 2) List three factors that induce senescence in neurons.
- 3) Briefly explain three examples of neuron types that express senescent markers.
- 4) Select the one that can inhibit cellular senescence from the following options.
 1. ROS
 2. DNA double-strand breaks
 3. Autophagy
 4. SASP
 5. Biosynthetic glycolytic intermediates

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- 5) Select the one that is NOT the evidence that neuronal SASP affects neighboring cells in brain disease from the following list.
1. p16-expressing neurons and glial cells accumulate significantly around p16 positive neurons in aged human brains.
 2. SASP factors attract immune cells.
 3. Microglia are activated by senescent neurons in human iPSC–derived Parkinson’s disease neurons in vitro or DSB-containing neurons in mice.
 4. Changes in nuclear size and structure, and epigenetic restructuring are prominent in neuronal senescence, indicated by the presence of DSB marker phosphorylated histone H2AX (γ-H2AX).
 5. Media taken from cultures of senescent neurons induce a reactive phenotype in astrocytes.

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2. Read the following interview with Dr. Yamanaka, who studies iPS cells,
and answer the questions in English.

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(Modified from Cell 187, 3229-3230, 2024)

- 1) Briefly explain what surprised Dr. Yamanaka during his research on iPS cells.
- 2) Briefly describe three examples of research fields in which iPS cells are applied, as mentioned in this interview.

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3) Briefly explain the problem that needs to be overcome in order to use iPS cells for clinical applications.

4) Explain what advice Dr. Yamanaka gave to the next generation of scientists, including the reasons based on his early career experiences in research.

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3. Describe your research plan in the doctor course in English.