Introduction and Disclaimer

These mock examination questions span diverse disciplines and are designed for your practice in preparation for the International Research Olympiad (IRO) 2024. Endeavor to answer them to the best of your ability, utilizing this opportunity to enhance your skills and knowledge. For additional practice, it is advisable to engage in extensive reading of various papers; such efforts will contribute to a more comprehensive and nuanced understanding of the subject matter.

Try your best, and good luck! -International Research Olympiad 2024

Mock Examination Answer Key 7
Bolded answers are correct.

Paper 7: Neurology

Question 1

Question: Regarding the motivations behind the paper, which of the following examples are noted to specifically demonstrate the importance of high cell viability?

a) The inadequate release of molecules regulating immune functions.

- This is a consequence of poor cell viability, but not the primary focus of demonstrating its importance in the paper.

b) Poorly dissociated cell mixtures with clumps and debris.

- This indicates a technical issue in the dissociation process, which indirectly affects cell viability but is not a direct measure of it.

c) **Assays that require feasible single cells.**

- **High cell viability is crucial for the accuracy of assays that depend on single, viable cells, as stated in the paper.**

d) Clinical applications for vaccinations.

- While high cell viability is important for clinical applications, it is not specifically mentioned in the context of vaccinations in the paper.

Question 2

Question: What was the primary reason for testing different enzymes, including neutral protease (NP), in the dissociation of brain tumor tissues?

a) To find the enzyme that is least expensive.

- Cost is a factor but not the primary reason for testing different enzymes.

b) **To identify the enzyme that produces the highest mean cellular viability.**

- **The correct answer as the paper aims to identify an enzyme that maintains high cellular viability, particularly NP which showed the best results.**

c) To compare the speed of dissociation among different enzymes.

- Speed of dissociation is important, but the paper focused more on the viability and quality of dissociation rather than speed alone.

d) To analyze the effects of enzymes on protein structures in cells.

- This is an aspect of enzyme selection but not the primary reason for testing different enzymes as per the paper's focus.

Question 3

Question: According to the paper, which of the following is the best way to describe how the tissue samples are prepared in the step preceding enzymatic testing?

a.) **Removing interfering tissues and blood clots.**

- **Correct. The specimens were cleansed of blood clots and necrotic areas before being cut into pieces.**

b.) Using mechanical dissociation techniques.

- Partially correct. Mechanical dissociation via trituration with a Pasteur pipette was used, but this occurred after the initial cleansing and cutting of the tissue.

c.) Staining with trypan blue dye to distinguish between alive and dead cells.

- Incorrect. Staining with trypan blue was part of the post-enzymatic testing to evaluate cell viability, not during sample preparation.

d.) Mixing the portioned samples with a plastic Pasteur pipette.

- Incorrect. While a plastic Pasteur pipette was used, it was for trituration, not merely mixing, and it happened after the enzymatic treatment, not during sample preparation.

Question 4

Question: How does the stability of cell viability and dissociation quality over extended periods of time at varying temperatures, as observed with NP, impact the potential for its use in multi-center clinical trials and neuro-oncology research?

a.) It suggests that NP can only be used in single-center trials.

- Incorrect. The paper does not imply that NP is limited to single-center trials.

b.) It indicates that NP is not suitable for long-term cell viability studies.

- Incorrect. The stability of NP-treated tissues suggests it could be suitable for long-term viability

c.) **It implies that NP-dissociated tissues can be transported at ambient temperature, facilitating multi-center trials.**

- **Correct. The observed stability at room temperature supports the feasibility of using NP in settings where tissues need to be transported, such as multi-center trials.**

d.) It shows that NP is effective only at a specific temperature, limiting its use in varied clinical settings.

- Incorrect. The paper does not restrict the effectiveness of NP to a specific temperature.