SAMPLE – GENERAL TYPES OF EXAM QUESTIONS

Example from past exams:

• Describe two reasons to study neural stem cells and/or adult neurogenesis, with examples of how this knowledge can be applied to better understand human health and disease.

• In the adult male mouse, GDNF is essential for maintaining numbers of spermatogonial stem cells and progenitor spermatogonia. How was this shown in vivo?

• What are the unique features of adult stem cells?

• Imagine that there is a tissue maintained by adult stem cells, and this tissue turns over every 10 days. You can use a technique that allows you to randomly label one cell at a specific time (t=0) in this tissue in large numbers of animals (e.g. 99). You will dissect the tissue from one-third of the animals at t=7 days, one-third of the animals at t=14 days, and one-third of the animals at t=21 days. Answers the following questions: A) At which time point(s) will you know that the labeled clone of cells originated from a labeled stem cell? B) Explain why. C) Which of the time point(s) will have the largest proportion of animals with labeled clones in the tissue you dissected? D) Explain why.

• Define the terms totipotent, pluripotent, multipotent, and unipotent. Give one example for cells in each category.

• What is the ideal test of whether or not you have purified a spermatogonial stem cell or a hematopoietic stem cell? Explain.

Other potential types of questions that might be asked:

• To describe how a key finding in one of the discussion papers was experimentally demonstrated.

• To design an experiment to test something along the lines of what one of the discussion papers may have described.

• To described the main cell types and signaling pathways that are in one of the stem cell systems you learned about.