

Essay Questions (12 points Each)

1. To verify the effects of a herb extract on cell viability, student Aplus treated a cancer cell line with this herb extract and investigated the *bcl-2/bax* ratio by qPCR. Why did Aplus study this ratio?
2. Actin filaments have a dynamic behavior called “treadmilling”, which is critical in regulating its structure and function. Explain what treadmilling is and how treadmilling regulates the homeostasis of actin filaments.
3. Microscopy is a very important technique for cell biologist. Please illustrate the advantages and disadvantages of electron microscopy, super-resolution microscopy, and cryo-electron microscopy.
4. What is CAR-T cell therapy (CAR: chimeric antigen receptor)? How CAR-T cell therapy is applied to treat cancer patients?
5. Describe how neurons control the membrane potential, at rest and action.

Explain the following terms (5 points each)

6. Pluripotency
7. Late endosome
8. Receptor tyrosine kinases
9. Plastids
10. Malignant tumor
11. “signal sequence” of a protein
12. Microtubule-organizing center
13. Focal adhesion

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