

BIOMI409/VETMI409 Take home exam 1 (open Book)

5 question, each 10 points

Name:

Due in class Thursday 9/22

1. Describe the basic features and the results obtained from the Hershey-Chase experiment with T4 phage, carried out in 1952. What were the fundamental findings of this experiment in relation to our current understanding of the basis of heredity? Compare and contrast the basic structural features of T2 phage and poliovirus.

Based on your knowledge of the structure of poliovirus, predict the results you would obtain if you repeated the Hershey-Chase experimental conditions with poliovirus and a typical suspension culture of human cells.

2. For a typical animal virus, describe the principal features of one assay that measures infectious virus particles, and one assay that measures total virus particles. Explain as much of the practical issues involved, as well as the theory behind the assay.

3. What is the principle of the Baltimore classification of viruses? What common feature of all virus infections does it explain? Name one class of virus in each of the Baltimore classes (I-VI), and briefly explain in each case why this virus is assigned to this particular Baltimore class.

4. Poliovirus and Tobacco Etch Virus are both in the 'Picornavirus Superfamily'. Both viruses have single-strand RNA genomes of similar sizes (Poliovirus genome ~8000 bases, Tobacco Etch Virus genome ~9000 bases) and both utilize the same replication strategy. The main differences between Poliovirus and Tobacco Etch Virus are that Poliovirus is an animal virus with an icosahedral capsid, whereas Tobacco Etch Virus is a plant virus that has a helical capsid.

You want to construct a virus vector that can form infectious virions, which will express the human kinesin receptor KTN1 when the appropriate cells are infected. The KTN1 full-length mRNA is 4457 bases in length. Would you chose Poliovirus or Tobacco Etch Virus to construct your virus vector? Explain your reasoning.

5. What is known about the molecular nature of the SARS coronavirus receptor? SARS is placed in a novel taxonomic group within the Coronaviridae. How does the information on the SARS receptor compare with the more well-established viruses in the group 1 and group 2 coronaviruses? Focus your answer on the molecular nature of the receptor, and not on the receptor's possible role in pathogenesis.