LS3AO3 Fall 2012
Module 1: Viruses and Disease Eradication

Introductory information and topics:

A virus is a very small infectious agent. It reproduces by invading a host cell and hijacking the replication machinery of the cell. The virus employs the host cell to copy its genome and synthesize its proteins. As it does this, the host cell is usually destroyed. Viruses can then spread from cell to cell in a tissue eventually leading to disease symptoms.

Viruses can be classified based upon their components. Viruses consist of genes (an RNA or a DNA genome) and a protein coat or capsid. So, viral classification is based upon genome type, the mode of replication of the genome (Baltimore classification), and the structure of the capsid. In addition, some proteins have an extra lipid envelope that surrounds the capsid.

The ability of a virus to infect a host cell is dependent upon a specific interaction between the virus and proteins on the surface of the cell. As a result, not all cell types are infected and different viruses are associated with effects on specific tissues. The results are the specific disease symptoms of each virus.

One way of preventing infection is to activate the immune system with a vaccine. A vaccine is commonly an antigen that is similar to a part of the virus. By providing this antigen, antibodies are synthesized that will recognize and attack the virus if it ever enters the body. Vaccines have proven to be an effective preventative measure against many viral infections.

Choose one topic from the following list:

- Topic 1 Hantavirus
- Topic 2: Human papillomavirus
- Topic 3: Marburg virus
- Topic 4: H1N1 virus
- Topic 5: Ebola virus
- Topic 6: Epstein-Barr virus

Discuss your virus in a short essay (500 words). Please address the following questions using a minimum of three primary research articles. Remember to look at the general essay guidelines provided.

Questions:

- What is the effect of the viral infection on human cells? Which cells are typically affected? What are the symptoms of infection? (3 marks)
- Describe the morphology of the virus and provide a figure of an EM with the appropriate primary reference. (3 marks)
- What is the chemical composition of the genome. What is the Baltimore classification? What is known about the genome sequence? (3 marks)
- Have vaccines been developed against this virus? If yes, how effective are they? If not, why not? (3 marks)
- What is herd immunity? Describe how the transmission of this virus may affect the threshold for achieving herd immunity. (3 marks)