Homework 2

Part I:

Drug Resistance and the Three Great Pandemics

Drug-Resistant Malaria

1a) According to the report, which species of *Plasmodium* parasites have developed drug resistance?

1b) Which region of the world is experiencing the most significant problem with drug resistance?

Drug-Resistant Malaria

2a) What would be the yearly cost of treating every malaria infection on earth with the least expensive single-agent antimalarial? (Note: use the WHO’s low-end estimate of global incidence, and assume that one treatment per patient will suffice)

2b) And the yearly cost for the least expensive combination therapy?

3) In one sentence each, describe three strategies to prevent anti-malarial drug resistance.

Drug-Resistant HIV

The use of combinations of antiretroviral drugs has proven remarkably effective in controlling the progression of human immunodeficiency virus (HIV) disease and prolonging survival, but these benefits can be compromised by the development of drug resistance. Resistance is the consequence of mutations that emerge in the viral proteins targeted by antiretroviral agents. In the United States, as many as 50 percent of patients receiving antiretroviral therapy are infected with viruses that express resistance to at least one of the available antiretroviral drugs. *NEJM* 350:1023-35, 2004.

Drug-Resistant HIV

One new technology developed to decrease the development of resistance is described in the following NPR report: http://www.npr.org/templates/story/story.php?storyId=5554167

4) How might this particular development reduce the risk of drug resistance in the developing and developed world?
Drug-Resistant TB

5a) Define MDR and XDR tuberculosis.

5b) In 2004, which two regions of the world had the highest percentage of TB isolates classified as Multi-Drug Resistant?

5c) In 2004, which countries had more MDR isolates classified as XDR than any other?

Drug-Resistant TB

6) How does one attempt to treat MDR-TB? (Hint: Refer to the Weekly Report’s Editorial Note and to your lecture notes).

Cardiovascular Disease

7a) What was the initial purpose of the Framingham study?

7b) List 5 definite risk factors for heart disease, and the year in which they were found to be associated with an increased risk.
Cardiovascular Disease

- For the final question, you will need to complete the interactive tutorial on Coronary Artery Bypass Graft (CABG) surgery: http://www.nlm.nih.gov/medlineplus/tutorials/coronaryarterybypassgraft/htm/index.htm

8a) What non-surgical therapies are recommended before resorting to CABG?

8b) What unclogged vessels are used to form the “bypass”? What are the specific side effects associated with harvesting these vessels?

8c) How does the patient remain alive while the heart is stopped for surgery?