

12/12/08 Microbial diseases as biological weapons, Worms and Flukes

*None of the following material will be on the exam.

Many microbial diseases have the potential to be used as a biological weapon. Microbial diseases make such good biological weapons for many reasons. Some of those reasons include:

- The enhancing potential of pathogens; enhancing pathogens is fairly easy
- Genetic engineering
 - Construction of multi-drug resistant strains
 - Mix and match virulence determinants
 - Creation of super-virulent strains, such as the mousepox virus
 - Creation of stealth viruses, which are viruses that enter the body and appear to be harmless, but are programmed to become pathogenic at some later date
- DNA manipulation
 - Creation of more potent toxins and drug resistant genes
 - Creation of completely novel genomes
 - De nova construction of viral genomes, such as the polio virus
- Sequencing of genomes
 - Identifies bacterial genes
 - >Virulence
 - >Colonization
 - >Immune evasion
 - >Antibiotic resistance
 - >Can exploit human defenses

While it may seem like infection from a microbial disease being used a biological weapon is inevitable, the truth is that you are more likely to die from the flu than to be infected by anthrax. Also, emerging antibiotic resistance in bacteria is potentially greater threat than bioterrorism.

Though worms and flukes are not considered microbial diseases, they are considered a pathogen. If you are infected with a worm, the main treatment is to get the worm out. The best way to do so, especially for patients in developing countries where surgery is not feasible, is to pull the worm out little by little each day through an open wound. The two most common types of parasitic diseases are ascariasis, which infects about 1.427 million people worldwide and has a morbidity rate of 23%, and hookworm infections, which infect about 1.298 million people worldwide and has a morbidity rate of 13%. The best way to prevent getting a worm is to fully cook all pork products and to avoid contaminated water.

Worms go through a complex life cycle that takes them through many other organisms and is different for each worm. The following life cycle is just a general example, not all worms go through this exact cycle. First, a worm egg passes through the feces of a human or animal and ends up in a water system. Then the egg hatches and infects a snail. While inside the snail, the larva goes through three complex changes and leaves the snail as a free swimming adult worm. The worm attaches itself to a water plant and is either eaten by an animal or a human, where it makes its way into the organism and infects it.