

Emerging Infections

I. Definitions

The term emerging/re-emerging infections has come into increasingly popular usage in the past 30+ years. It refers to at least three circumstances:

- A. A new, previously unknown infectious agent and disease
- B. A previously described infectious agent presenting
 - a. In a new geographic location
 - b. As a new syndrome
 - c. In a new type of host
 - d. With a new or broader drug resistance pattern
- C. New or previously described infectious agents used as bioweapons

II. Examples of Selected Emerging/Re-Emerging Infections in Past 30 Years

- HIV/AIDS
- Legionnaire's disease
- Lyme disease
- Toxic-shock syndrome
- Hantavirus pulmonary syndrome
- Ehrlichiosis
- Human T-cell lymphotropic viruses I and II
- Human herpesviruses 6 and 8
- West Nile virus
- Ebola virus
- GB virus C
- Transfusion-transmitted virus (TTV)
- Severe acute respiratory syndrome (SARS)
- Avian influenza virus
- H1N1 pandemic influenza virus
- Monkeypox
- Bovine spongiform encephalopathy (vCJD)
- Escherichia coli 0157:H7
- Helicobacter pylori
- Tuberculosis, esp. multidrug resistant (MDR) and extremely drug resistant (XDR) tuberculosis
- Vancomycin resistant enterococci
- Vancomycin intermediate/resistant Staph. aureus
- Community associated methicillin resistant Staph. aureus
- Intentional use of anthrax as a bioweapon

III. Reasons for Emergence/Re-Emergence of Infectious Agents

There are numerous reasons which explain the occurrence of emerging/re-emerging infections. These include ecologic changes (flood, famine), changes in human behavior (population growth, migration, war, sexual practices, injection drug use), international travel and commerce, technologic advances (globalization of food supplies, organ/tissue transplantation, immunosuppressive drugs, antibiotic use), microbial adaptation, breakdown or deterioration in public health measures, and advances in basic science (facilitating new microbe detection).

IV. Steps in Identifying Disease Causation

When faced with a new disease or syndrome and a potential etiologic agent has been identified, one generates a hypothesis of causality and then a series of investigations are undertaken to prove the hypothesis. These include in vitro studies, the development of animal models, and human studies. Ultimately, through these efforts one hopes to fulfill Koch's postulates which are:

- A. The organism is always found with the disease.
- B. The organism is not found with any other disease.
- C. The organism, isolated from one who has the disease, and cultured through several generations, produces the disease (in experimental animals).
- D. Even when an infectious disease cannot be transmitted to animals, the 'regular' and 'exclusive' presence of the organism [postulates A and B] proves a causal relationship.

IV. Examples for Lecture Discussion

- A. HIV/AIDS
- B. Hantavirus pulmonary syndrome
- C. Avian influenza virus
- D. Variant Creutzfeldt-Jakob disease

V. Website Resources for Emerging Infections

- www.cdc.gov
- www.idsociety.org
- www.promedmail.org