10.5F: Emerging and Reemerging Infectious Diseases

An emerging infectious disease is a disease with a rate of incidence that has increased in the past 20 years, and could increase in the near future.

Learning Objectives

• Give examples of emerging and remerging infectious diseases

Key Points

• Emerging infections account for at least 12% of all human pathogens.
• Emerging infections diseases are caused by newly identified species or strains that may have evolved from a known infection or spread to a new population or area undergoing ecologic transformation, or be reemerging infections, such as drug resistant tuberculosis.
• Adverse synergistic interactions between emerging diseases and other infectious and non-infectious conditions leading to the development of novel syndemics are of growing concern.

Key Terms

• emerging infectious disease: An emerging infectious disease (EID) is an infectious disease with an incidence rate that has increased in the past 20 years and could increase in the near future. Emerging infections account for at least 12% of all human pathogens.
• pathogens: A pathogen or infectious agent (colloquially known as a germ) is a microorganism (in the widest sense, such as a virus, bacterium, prion, or fungus) that causes disease in its host. The host may be an animal (including humans), a plant, or even another microorganism.
• **species**: In biology, a species is one of the basic units of biological classification and a taxonomic rank. A species is often defined as a group of organisms capable of interbreeding and producing fertile offspring.

An emerging infectious disease (EID) is an infectious disease whose incidence has increased in the past 20 years, and could increase in the near future. Emerging infections account for at least 12% of all human pathogens. EIDs are caused by newly identified species or strains (e.g., SARS, AIDS) that may have evolved from a known infection (e.g., influenza), or spread to a new population (e.g., West Nile virus), or to an area undergoing ecologic transformation (e.g., Lyme disease). They could also be reemerging infections, such as drug resistant tuberculosis. Of growing concern are adverse synergistic interactions between emerging diseases and other infectious and non-infectious conditions leading to the development of novel syndemics.

### SARS

Severe acute respiratory syndrome (SARS) is a viral respiratory disease in humans which is caused by the SARS coronavirus (SARS-CoV). Between November 2002 and July 2003, an outbreak of SARS in Hong Kong nearly became a pandemic, with 8,422 cases and 916 deaths worldwide (10.9% fatality), according to the World Health Organization (WHO). Within weeks, SARS spread from Hong Kong to infect individuals in 37 countries. The last infected human case of the outbreak occurred in June 2003, and there was a laboratory-induced infection case in 2004. SARS is not claimed to have been eradicated (unlike smallpox), as it may still be present in its natural host reservoirs (animal populations) and may return to the human population. During the outbreak, the fatality of SARS was less than 1% for people aged 24 or younger, 6% for those 25 to 44, 15% for those 45 to 64, and more than 50% for those over 65. For comparison, the fatality of influenza is usually under 0.03% (primarily among the elderly), but rose to 2% during the most severe pandemic to date.

Figure: **Coronaviruses**: Coronaviruses are a group of viruses that have a halo, or crown-like (corona) appearance when viewed under an electron microscope. If you have a cold 10-15% of the time it is caused by a virus like this.

### HIV

Human immunodeficiency virus infection/acquired immunodeficiency syndrome (HIV/AIDS) is a disease of the human immune system caused by the human immunodeficiency virus (HIV). During the initial infection a person may experience a brief period of influenza-like illness. This is typically followed by a prolonged period without symptoms. As
the illness progresses it interferes more and more with the immune system, making people much more likely to get infections, including opportunistic infections, and tumors that do not usually affect people with working immune systems.

Influenza

Influenza, commonly known as the flu, is an infectious disease of birds and mammals caused by RNA viruses of the family Orthomyxoviridae, the influenza viruses. The most common symptoms are chills, fever, sore throat, muscle pains, headache (often severe), coughing, weakness/fatigue and general discomfort. Although it is often confused with other influenza-like illnesses, especially the common cold, influenza is a more severe disease caused by a different type of virus. Influenza may produce nausea and vomiting, particularly in children, but these symptoms are more common in the unrelated gastroenteritis, which is sometimes inaccurately referred to as “stomach flu” or “24-hour flu.”

West Nile Virus

West Nile virus (WNV) is a mosquito-borne zoonotic arbovirus belonging to the genus flavivirus in the family flaviviridae. This flavivirus is found in temperate and tropical regions of the world. It was first identified in the West Nile subregion in the East African nation of Uganda in 1937. Prior to the mid 1990s, WNV disease occurred only sporadically and was considered a minor risk for humans. However, there was an outbreak in Algeria in 1994, with cases of WNV-caused encephalitis, and the first large outbreak in Romania in 1996, with a high number of cases with neuroinvasive disease. WNV has now spread globally, with the first case in the Western Hemisphere being identified in New York City in 1999; over the next 5 years, the virus spread across the continental United States, north into Canada, and southward into the Caribbean Islands and Latin America. WNV also spread to Europe, beyond the Mediterranean Basin. A new strain of the virus was recently (2012) identified in Italy. WNV is now considered to be an endemic pathogen in Africa, Asia, Australia, the Middle East, Europe and in the United States, which in 2012 has experienced one of its worst epidemics.

Tuberculosis

Tuberculosis, MTB, or TB (short for tubercle bacillus) is a common, and in many cases lethal, infectious disease caused by various strains of mycobacteria, usually Mycobacterium tuberculosis. Tuberculosis typically attacks the lungs, but can also affect other parts of the body. It is spread through the air when people who have an active TB infection cough, sneeze, or otherwise transmit their saliva through the air. Most infections are asymptomatic and latent, but about one in ten latent infections eventually progresses to active disease which, if left untreated, kills more than 50% of those so infected.