10.3A: Predisposing Factors

The spread and severity of infectious disease is influenced by many predisposing factors.

Learning Objectives

- Recognize factors that are classified as predisposing to infectious disease

Key Points

- Some predisposing factors of contracting infectious diseases can be anatomical, genetic, general and disease specific.
- Climate and weather, and other environmental factors that are affected by them, can also predispose people to infectious agents.
- Other factors such as overall health, age and diet are important considerations in the prevention of spreading infectious diseases.

Key Terms

- **cystic fibrosis**: Cystic fibrosis (also known as CF or mucoviscidosis) is an autosomal recessive genetic disorder that affects most critically the lungs, and also the pancreas, liver and intestine. It is characterized by abnormal transport of chloride and sodium across an epithelium, leading to thick, viscous secretions.
- **Chronic granulomatous disease**: Also known as CGD, is a diverse group of genetic diseases in which certain cells of the immune system have difficulty forming the reactive oxygen compounds (most importantly, the superoxide radical) used to kill certain ingested pathogens. This leads to the formation of granulomata (a special type of inflammation) in many organs.
The spread and severity of infectious disease is influenced by many predisposing factors. Some of these are more general and apply to many infectious agents, while others are disease specific. Others can be anatomical. For example, women suffer more frequently from urinary tract infections which can be attributed to their shorter urethra.

Genetics is another contributing factor. Cystic fibrosis is a genetic disease that causes alteration of the mucus in the lungs. This predisposes patients to chronic infections with bacteria which form biofilms in the lungs. The most common infectious agent is *Pseudomonas aeruginosa*. Another example is chronic granulomatous disease which directly affects the ability of the host immune system to fight invaders.

Climate and weather, and other environmental factors that are affected by them, can also predispose people to infectious agents. A long-standing puzzle has been why flu outbreaks occur seasonally. One possible explanation is that, because people are indoors more often during the winter, they are in close contact more often, and this promotes transmission from person to person. Another factor is that cold temperatures lead to drier air, which may dehydrate mucus, preventing the body from effectively expelling virus particles. The virus also survives longer on surfaces at colder temperatures and aerosol transmission of the virus is highest in cold environments (less than 5°C) with low relative humidity. Indeed, the lower air humidity in winter seems to be the main cause of seasonal influenza transmission in temperate regions. Some scientists speculate that the seasonal fluctuations of vitamin D levels can be a factor in the spread of influenza too.

Figure: **Global map of Seasonal Influenza**: Seasonal risk areas: November–April (blue), April–November (red), and year-round (yellow)

Overall health is a very important factor in preventing disease. Some portions of the immune system itself have immuno-suppressive effects on other parts of the immune system, and immunosuppression may occur as an adverse reaction to treatment of other conditions. In general, deliberately-induced immunosuppression is performed to prevent the body from rejecting an organ transplant, treating graft-versus-host disease after a bone marrow transplant, or for the treatment of autoimmune diseases such as rheumatoid arthritis and Crohn’s disease. Of course, the immune system can be weak due to other reasons such as chemotherapy and HIV.

Age is another critical factor. Newborns and infants are more susceptible to infections as are the elderly.

Inadequate diet can raise the risks too. For example, globally, the severe malnutrition common in parts of the developing world causes a large increase in the risk of developing active tuberculosis and other opportunistic infections, due to its damaging effects on the immune system. Along with overcrowding, poor nutrition may contribute to the strong link observed between tuberculosis and poverty.