

## Chapter 16 Summary: Risk, Toxicology & Human Health

### 16-1 Risk, Probability, and Hazards

**Risk** is expressed in terms of probability. After **risk assessment**, the next step is **risk management**.

### 16-2 Toxicology: Assessing Chemical Hazards

**Toxicity** measures how harmful a substance is. This depends upon several factors, including the **dose**, solubility, and persistence of the substance. A substance's harm also can be affected by **bioaccumulation** and **biomagnification**. The body's **response** to a substance may be acute or chronic.

**Poisons** or **toxins** are measured by their **median lethal dose** or **LD50**. Toxicity is estimated by case reports and epidemiological studies. Controlled experiments are used to develop a **dose-response curve**.

### 16-3 Chemical Hazards

**Toxic chemicals** can cause temporary or permanent harm or death. **Hazardous chemicals** are flammable or explosive, irritating, interfere with oxygen uptake, or induce allergic reactions. **Mutagens** cause changes in the DNA. **Teratogens** cause birth defects. **Carcinogens** cause or promote the growth of **cancer**, the growth of malignant tumors that spread by **metastasis**.

Hormonally active agents (HAAs) can affect the endocrine system. They include hormone mimics, hormone blockers, and thyroid disrupters. Most chemicals have not been adequately screened for toxicity or other harmful effects.

Pollution prevention strategies are based on the **precautionary principle**.

### 16-4 Biological Hazards: Disease in Developed and Developing Countries

A **nontransmissible disease** tends to have multiple causes and to develop slowly. A **transmissible disease** is caused by a living organism (a pathogen) and can be spread from one person to another. Antibiotics have reduced the incidence of diseases caused by bacteria. However, bacteria can become resistant to the drugs; the number of resistant strains is increasing.

Tuberculosis is a highly infectious bacterial disease. Currently, the greatest viral threat to health is AIDS, caused by the human immunodeficiency virus (HIV). The other two most dangerous viruses are the flu and hepatitis B.

Malaria is a parasitic disease that kills about 1 million people each year. Mosquitoes usually transmit this disease. Prevention, aimed at reducing mosquito populations, is the best approach to slowing the spread of malaria.

Bioterrorism is a potentially cheap and easy way to injure or kill people. Early detection and environmental monitoring are two weapons against bioterrorism.

## 16-5 Risk Analysis

The risks of older technologies and chemicals can be estimated based on past experience, animal testing, and epidemiological data. The evaluation of new technologies and products requires use of more uncertain statistical probabilities based on models. Risk analysis allows scientists to identify, rank, and determine options for managing risks.

The greatest health risk is poverty.

The more complex a technological system is and the more people needed to design and run it, the more difficult it is to estimate the risks. Human reliability is usually lower than technology reliability and is almost impossible to predict.

*Copyright (c)2005 Wadsworth, a division of Thomson Learning, Inc. Thomson Learning is a trademark used herein under license.*

>