

SCIENCE

An Introduction to the Biology of Infectious Disease

- I. OVERVIEW OF INFECTIOUS DISEASE 30%
 - A. Background
 - 1. Key Definitions
 - 2. The Burden of Infectious Disease Worldwide
 - B. History
 - 1. Diseases of Historic Proportions
 - 2. Milestones in the Research on and the Treatment and Control of Infectious Disease
 - a. Antibiotics
 - b. Vaccines
 - C. Infection-Causing Microbes
 - 1. Basics of Microbiology
 - 2. Pathogenic Microorganisms
 - a. Parasites
 - b. Fungi
 - c. Bacteria
 - d. Viruses
 - D. Transmission of Infectious Disease
 - 1. Route of Transmission
 - 2. Reservoirs
 - E. Pathophysiology of Infectious Disease
 - 1. The Stages of Infection and Disease
 - 2. Host Defenses
 - 3. Clinical Outcomes
 - 4. Key Characteristics of Pathogens
 - F. Treatment and Prevention
 - 1. Medical Treatments
 - 2. Prevention and Public Health
 - 3. Looking Ahead: Emerging and Re-emerging Infectious Diseases

- II. HIV 30%
 - A. History
 - B. Epidemiology
 - 1. Worldwide
 - 2. The United States
 - 3. Sub-Saharan Africa
 - 4. Key Populations
 - C. Transmission
 - 1. Routes of Transmission
 - 2. Transmission of HIV through Sexual Contact
 - 3. Drug Injection
 - 4. Vertical Transmission

- D. Risk Factors for Infection
- E. Biology/Pathophysiology
 - 1. HIV Structure and Classification
 - 2. The Mechanisms of Action
 - a. The basics of DNA, RNA, and protein synthesis
 - b. The HIV life cycle
- F. Disease Process
 - 1. The Stages of HIV Infection
 - 2. Opportunistic Infections
- G. Treatment and Prevention
 - 1. HIV Testing
 - 2. Diagnosis
- H. Monitoring Disease Progression
 - 1. Antiretroviral Therapy
 - 2. Pre-Exposure and Post-Exposure Prophylaxis
- I. Major Public Health Interventions
 - 1. HIV Screening
 - 2. Condoms
 - 3. Prevention of Mother to Child Transmission (PMTCT)
 - 4. Needle Exchanges
- J. Current Research and New Developments
 - 1. New Interventions
 - a. Male circumcision
 - b. Treatment as Prevention (TasP)
 - c. Vaginal ring
 - 2. Looking Ahead
 - a. Expanding treatment
 - b. The HIV vaccine
 - c. Finding a cure

III. MALARIA

20%

- A. History
 - 1. Beneficial Plants
 - 2. Notable Scientific Discoveries
 - 3. The Panama Canal
 - 4. Malaria Elimination in the United States
 - 5. Global Malaria Elimination
- B. Epidemiology
- C. Transmission
 - 1. Routes of Transmission
 - 2. Risk Factors for Transmission
 - 3. Agent and Vector
 - 4. The Environment
 - 5. The Host
- D. Biology
 - 1. Classification

2. *Plasmodium* Life Cycle
 - a. The liver stage
 - b. The blood stage
 - c. The mosquito gut stage
3. Pathophysiology
- E. Treatment and Prevention
 1. Diagnosis
 2. Antimalarials
 - a. Antimalarial resistance
 3. Prevention
 - a. Vector control
 - b. Prevention through treatment
 - c. The impact of malaria treatment and prevention
- F. Looking Ahead
 1. New Interventions
 - a. Rapid diagnostic tests
 - b. Long-lasting insecticide-treated nets (LLITNs)
 2. Promising New Developments
 - a. Genetic modification of malaria vectors
 - b. Malaria vaccine
 - c. Malaria eradication

IV. EBOLA

20%

- A. History
 1. The 2014–16 Ebola Outbreak
- B. Epidemiology
- C. Transmission
 1. Introduction to Human Populations
- D. Human-to-Human Transmission
 1. Healthcare Workers
 2. Family Members of Infected People
 3. Mourners Involved in Burial Rituals
- E. Biology and Pathophysiology
 1. Classification
 2. Mechanisms of Action
 3. Progression
 4. Pathogenesis
 5. Recovery
- F. Treatment and Prevention
 1. Diagnosis
 2. Treatment
 3. Prevention
 4. Outbreak Investigations
- G. Looking Ahead
 1. Ebola Treatments
 2. Ebola Vaccine

3. Preparing for the Next Outbreak