Infectious and Noninfectious Conditions
The Process of Infection and Your Body’s Defenses

- **Pathogen**
  - A disease-causing agent

- **Epidemic**
  - Disease outbreak that affects many people in a community or region at the same time

- **Pandemic**
  - Global epidemic of a disease

- **Virulent**
  - Strong enough to overcome host resistance and cause disease

- **Immunocompromised**
  - Having an immune system that is impaired
The Body’s Defenses against Disease-Causing Pathogens

**TEARS**
Wash away irritating substances and microbes
Lysozyme kills many bacteria

**STOMACH**
Acid kills organisms

**BLADDER**
Urine washes microbes from urethra

**IMMUNE SYSTEM**
B cells produce antibodies in response to specific antigens (humoral immunity)
T cells attack and destroy foreign cells or cells that have been infected by foreign antigens (cell-mediated immunity)
Memory cells remain to mobilize quick response to future invasion by the same pathogen

**SALIVA**
Washes microbes from the teeth and mucous membranes of the mouth

**SKIN**
Provides a physical barrier to the entrance of microbes
Acidic pH discourages the growth of organisms
Sweat and oil gland secretions kill many bacteria

**RESPIRATORY TRACT**
Mucus traps organisms
Cilia sweep away trapped organisms

**LARGE INTESTINE**
Normal bacterial inhabitants keep invaders in check
The Process of Infection and Your Body’s Defenses

- **Risk Factors You Typically Cannot Control**
  - Heredity
  - Aging
  - Environmental conditions
  - Organism virulence and resistance
The Process of Infection and Your Body’s Defenses

- Risk Factors You Can Control
  - Exposure - Stay away from anyone who is sick
  - Stress
  - Nutrition
  - Fitness level
  - Sleep
  - Drug use
  - Personal hygiene
  - High-risk behaviors
  - Exposure to products and services that increase risk
Routes of Disease Transmission

Contact

- Direct - person to person via skin or sexual contact
  - Herpes
  - Scabies

- Indirect - infected blood or touching an object that is infected such as pink eye
  - Bacterial conjunctivitis "Pink Eye"
Routes of Disease Transmission

- **Food or Waterborne** - eating, drinking or coming in contact with contaminated food or water

  - **Salmonella**
  - **Hepatitis A**

*Image of a liver and its possible ill effects with symptoms such as fever, abdominal pain, and other symptoms.*
**Routes of Disease Transmission**

- **Airborne** - Inhalation spread from droplets as in sneezing, coughing, or talking.

![Diagram of the respiratory system with labels for normal, bronchial, and pneumonic stages, along with images of a young child with red spots on their face and a vintage measles poster.]
INFLUENZA ‘FLU’

- Fever
- Aches
- Cough
- Temp.
- Sore throat

Annual Flu Vaccine
Routes of Disease Transmission

- **Vectorborne** - transmitted by an animal, such as a mosquito, tick, snail or bird, by its secretions, biting, sting or egg laying.

Rocky Mountain Spotted Fever

Lymes Disease
LYME DISEASE ALERT

Do a thorough body check for ticks after being outdoors.

How To Remove A Tick

- Using tweezers, grasp tick near the mouth parts, as close to skin as possible.
- Pull tick in a steady, upward motion away from skin.
- DO NOT use kerosene, matches, or petroleum jelly to remove tick.
- Disinfect site with soap and water, rubbing alcohol or hydrogen peroxide.
- Record date and location of tick bite. If rash or flu-like symptoms appear contact your health care provider immediately.

DISEASE RISK IS REDUCED IF TICK IS REMOVED WITHIN 36 HOURS.

New York State Department of Health
Routes of Disease Transmission

- **Perinatal**—Similar to contact infection: happens in the uterus, as the baby passes through the birth canal or via breast feeding.
Reduce Your Risks of Infectious Disease

• Limit Your Exposure: Stay away from anyone sick or infectious

• Get vaccinated - Tdap, Hep A and B, IPOL, Gardisil, flu
Additional Ways to Reduce Your Risks of Infectious Disease

1. Exercise regularly

2. Control and eliminate stress

3. Eat healthy; avoid SODAS and sugar

4. Use bug repellent when camping or outside. (Skin So Soft-by Avon)
Reduce Your Risks of Infectious Disease

If you could see the germs, you’d wash your hands.
The Process of Infection and Your Body’s Defenses

- Physical and Chemical Defenses: Your Body Responds
  - Skin – prevents pathogens from entering
  - Enzymes – sweat, tears, saliva, nasal secretions, cerumen
  - Linings of the body – mucus membranes, cilia
  - Immune system defenses
The Process of Infection and Your Body’s Defenses

The Immune System: Your Body Fights Back

- Immunity – the body’s ability to resist disease and counteract it
- Antigens – any substance triggering an immune response; bacteria, virus, allergy
- Antibodies – substances formed by the body to counteract antigens
- Humoral immune response – the body’s major defense against bacteria and the toxins they produce
- Cell-mediated immunity
  - Lymphocytes – specialized white blood cells, major defenders against viruses, fungi, parasites, and some bacteria
    - Two types of lymphocytes:
      - B – cells
      - T – cells
  - Macrophages – large phagocytic, or cell eating, white blood cells
The Immune Response

1. Antigens invade the body by breaking through one of our protective barriers.

2. Helper T cells recognize the invading antigens and trigger the production of killer T cells and B cells.

3. Killer T cells destroy infected cells. B cells produce antibodies that attach to antigens and mark them for destruction by macrophages.

4. When the threat is over, suppressor T cells stop the activity of B cells, killer T cells, and macrophages. Memory B and T cells are reserved so the body can respond quickly to future attacks by the same antigen.
The Process of Infection and Your Body’s Defenses

- **Inflammatory Response, Pain, and Fever**
  - Rises in temperature can be harmful if extreme
  - High temperatures can destroy some disease-causing organisms
  - Stimulates more white blood cell production
  - Pain most often accompanied by inflammation; pain keeps prevent further injury to the person
The Process of Infection and Your Body’s Defenses

- **Vaccines: Bolstering Your Immunity**
  - Vaccination and T- and B-cell memory
  - Artificially acquired active immunity – through vaccines
  - Naturally acquired passive immunity – passed from mother to infant
  - Naturally acquired active immunity – having the disease or being in contact with a sick person
### Recommended Adult Immunization Schedule, by Vaccine and Age Group, 2010

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>19–26 years</th>
<th>27–49 years</th>
<th>50–59 years</th>
<th>60–64 years</th>
<th>≥65 years</th>
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</thead>
<tbody>
<tr>
<td>Tetanus, diphtheria, pertussis (Td/Tdap)*</td>
<td></td>
<td></td>
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<tr>
<td>Substitute 1-time dose of Tdap for Td booster; then boost with Td every 10 years</td>
<td></td>
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<tr>
<td>Human papillomavirus (HPV)*</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>3 doses (females)</td>
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<tr>
<td>Varicella*</td>
<td></td>
<td></td>
<td></td>
<td>2 doses</td>
<td></td>
</tr>
<tr>
<td>Zoster</td>
<td></td>
<td></td>
<td></td>
<td>1 dose</td>
<td></td>
</tr>
<tr>
<td>Measles, mumps, rubella (MMR)*</td>
<td>1 or 2 doses</td>
<td></td>
<td></td>
<td></td>
<td>1 dose</td>
</tr>
<tr>
<td>Influenza*</td>
<td></td>
<td></td>
<td>1 dose annually</td>
<td>1 dose</td>
<td></td>
</tr>
<tr>
<td>Pneumococcal (polysaccharide)</td>
<td>1 or 2 doses</td>
<td></td>
<td></td>
<td></td>
<td>1 dose</td>
</tr>
<tr>
<td>Hepatitis A*</td>
<td></td>
<td></td>
<td></td>
<td>2 doses</td>
<td></td>
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<tr>
<td>Hepatitis B*</td>
<td></td>
<td></td>
<td></td>
<td>3 doses</td>
<td></td>
</tr>
<tr>
<td>Meningococcal*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 or more doses</td>
</tr>
</tbody>
</table>

*Covered by the Vaccine Injury Compensation Program

For all persons in this category who meet the age requirements and who lack evidence of immunity (e.g., lack documentation of vaccination or have no evidence of prior infection)

Recommended if some other risk factor is present (e.g., on the basis of medical, occupational, lifestyle, or other indications)

No recommendation
Allergies: The Immune System Overreacts

- Antigen or allergen
- Production of antibodies
- Hypersensitive reaction – runny nose, swollen eyes
- Release of histamines – dilates blood vessels, cause tissues to swell, increases mucus

Hay Fever

- “Pollen allergy”
- Most prevalent when ragweed and flowers are blooming
- Sneezing and itchy, watery eyes, and runny nose
- **Avoid environmental triggers**
Types of Pathogens and Diseases They Cause

**Bacteria**—single-celled organisms

- Staphylococcal infections
  - Methicillin-resistant staphylococcus aureus (MRSA)
- Streptococcal infections
  - Strep throat
  - Necrotizing fascitis
- Meningitis – inflammation of the meninges – the membrane surrounding the brain & spinal cord
  - Meningococcal, a virulent form, is on college campuses
    - Sick
    - Stiff neck
    - Headache
    - Vomiting
    - Fever
- Tuberculosis (TB)
- Multi drug-resistant TB (MDR-TB)
- Extensively drug resistant TB (XDR-TB)
- Tick-borne bacterial diseases
Examples of 5 Major Types of Pathogens

**Bacteria:**
- Pneumonia
- Strep throat
- Acne
- Boils
- Abscesses
- Meningitis
- Tick born – Lime disease RMSF
Types of Pathogens and Diseases They Cause

- **Viruses**—Smallest known pathogens
  - The common cold
  - Influenza
  - Hepatitis: three different types
    - A (HAV)
    - B (HBV)
    - C (HCV)
  - Herpes simplex I (HSV I)
  - Herpes simplex II (HSV II)
Types of Pathogens and Diseases They Cause

- **Other Pathogens**
  - Fungi – candida (ringworm), yeast infection, athletes foot
  - Protozoans – tropical diseases, giardia, malaria, trichamoniases
  - Parasitic worms – pinworms, tapeworms – cook food thoroughly
  - Prions – mad cow disease
Sexually Transmitted Infections

- Also called sexually transmitted diseases (STDs), once called venereal diseases (VD)
- More than 20 known types of sexually transmitted infections (STIs)
- Can be eliminated through education, responsible action, simple preventive strategies, and prompt treatment
- **ABC’s: Abstinence, Be Faithful, Condoms**

**What’s Your Risk?**

- Moral and social stigma can keep infected people from seeking treatment – Embarrassment
- Casual attitude toward sex
- Ignorance about infections/symptoms
Sexually Transmitted Infections

- Routes of Transmission
  - Sexual intercourse
  - Oral—genital contact
  - Hand—genital contact
  - Anal
  - Mouth-to-mouth contact
  - Contact with fluids from body sores
Chlamydia

- 2.2 million infected annually in the United States
- Secondary damage can lead to sterility.
- If detected early, it is easily treatable with antibiotics
- Many people display **no symptoms**.
  - In men, symptoms of UTI
  - In women, yellow discharge, spotting between periods, spotting after sex

**Test: Urine**

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Sexually Transmitted Infections

- **Gonorrhea**
  - One of the most common STIs in the United States
  - The “Drip” or the “Clap”
  - Caused by bacterial pathogen *Neisseria gonorrhea*
  - If detected early, it is easily treatable with antibiotics.
  - Complications if not treated
Sexually Transmitted Infections

- **Syphilis**
  - Caused by a bacterial organism
  - Spirochete known as *Treponema pallidum*
  - “Great imitator;” symptoms often resemble other STIs
  - Stages: primary, secondary, latent, tertiary/late
  - Easily treated with Penicillin or doxycycline if allergic to Penicillin except in the latent stage.
Sexually Transmitted Infections

- **Herpes**
  - Herpes simplex type 1
  - Herpes simplex type 2
  - Especially serious in pregnant women; possible to transfer infection to baby during birth
  - Women with herpes have a greater risk for cervical cancer.

HSV 1

HSV 2
Preventing Herpes

- Awareness
- Extreme caution in casual sexual affairs
- Seek medical help
- BE HONEST-Tell your partner
- Abstinence
- Be Faithful
- Condoms
- Deter sex during an outbreak
Herpes

Genital herpes is a highly contagious and incurable STI. It is characterized by recurring cycles of painful blisters on the genitalia.

Oral herpes is also extremely contagious and can cause recurrent painful cold sores or fever blisters around the mouth.
Sexually Transmitted Infections

- Human Papillomavirus (HPV) and Genital Warts
  - There are many types of HPV
  - Infect over 6.2 million Americans each year
  - Certain types of HPV can cause genital warts

- Complications
  - *Dysplasia*—change in cells that may lead to a precancerous condition
  - Cervical cancer

- HPV vaccination
  - Recommended for girls and women aged 9 to 26
  - Men ages 9 to 26
  - Schedule – series of 3 injections
    - 1st vaccine
    - 2nd – 2 months later
    - 3rd – 6 months after the first
Genital Warts
Sexually Transmitted Infections

- **Pubic Lice**
  - Informally called “crabs”
  - Symptoms include itchiness in the pubic hair, bluish gray skin color, and sores in the genital area
  - Treatment includes thorough washing of clothing, furniture, and linens and use of a crème or shampoo such as ________
  - Takes 2 to 3 weeks to kill all larval form
HIV/AIDS

• Acquired Immunodeficiency Syndrome (AIDS)
• Human Immunodeficiency Virus (HIV)
  • At the end of 2008, there were approximately 33.4 million people worldwide living with HIV.
  • 95 percent of people with HIV worldwide live in developing nations.
HIV/AIDS

- How HIV Is Transmitted
  - Engaging in high risk behaviors
    - Exchanging of body fluids
    - Injecting drugs
  - Having received a blood transfusion prior to 1985
  - Mother-to-child (perinatal) transmission
Sources of HIV Infection in Men and Women in the United States

Men
- Male-to-male sexual contact (MMS) 71%
- High-risk heterosexual contact 14%
- Injection drug use (IDU) 10%
- Both MMS and IDU 4%
- Other <1%

Women
- High-risk heterosexual contact 83%
- Injection drug use (IDU) 16%
- Other 1%
Gender & Health

- **Women and AIDS**
  - Women are **4 to 10 times** more likely than men to contract HIV through unprotected sexual intercourse.
  - Cultural barriers can prevent women from being involved in decision making related to sexual matters.
Symptoms of HIV/AIDS

- Incubation time varies greatly
- For HIV positive adults who receive no medical treatment, AIDS will develop in 8 to 10 years.
- Opportunistic infections are characteristic of the disease.
  - Diarrhea
  - Weight loss
  - Frequent infections
HIV/AIDS

- **Testing for HIV Antibodies**
  - Blood test known as ELISA (enzyme-linked-immunosorbent assay) – 3 to 6 months after exposure
  - Western blot test follows 2 positive ELISA tests
  - Whether a person with HIV develops AIDS depends to some extent on the strength of that person’s immune system
  - A cure does not exist
Preventing HIV Infection

- Abstinence or safe sexual practices
- Be Faithful
- Be Honest
- Condoms
- Get Tested
**New Hope and Treatments**

- New drugs slow progression of virus – drugs are used in combination
- Medications are currently very expensive and cause many side effects
- Protease inhibitors and reverse transcriptase inhibitors – act to prevent the production of the virus in chronically infected cells that HIV has already invaded
- Reverse transcriptase inhibitors prevents the virus from entering new cells

**Preventing HIV Infection**

- No vaccine currently available
- Reduce risk by responsible choices and behaviors
- Abstinence or safe sexual practices
Noninfectious Conditions

• There are many noninfectious conditions other than major ailments such as cancer and heart disease.
• Most other chronic conditions can be prevented or the symptoms alleviated.
• Generally they are not transmitted by pathogen or personal contact
• Lifestyle and personal habits are often underlying causes
Chronic Lung Diseases

- Chronic Obstructive Pulmonary Diseases (COPDs) 80 – 90% have a history of smoking
  - Bronchitis – chronic
  - Emphysema
  - Asthma
Chronic Lung Diseases

- **Bronchitis**
  - Inflammation of lining of bronchial tubes
  - Less air is able to flow from the lungs and heavy mucous begins to form
  - Acute bronchitis: when symptoms improve in a few weeks
  - Chronic bronchitis: when the symptoms of bronchitis last for at least 3 months of the year for 2 consecutive years
Chronic Lung Diseases

- **Emphysema**
  - Gradual destruction of *alveoli*
  - Becomes more and more difficult to exhale
  - Victim struggles to take in air
  - Chest cavity expands over time ("barrel chest")
Chronic Lung Diseases

- **Asthma**
  - Long-term chronic inflammatory disorder that blocks airflow to the lungs
  - Air pollutants, particulates, smoke, allergens, and stress can trigger an asthma attack
  - *Extrinsic* (allergic asthma) or *intrinsic* (nonallergic)
  - *Exercise-induced asthma* (EIA)
  - Relaxation techniques and medications can offer relief
Headaches

- **Tension Headaches**
  - Are muscular contraction headaches
  - Treatments: relaxation, hot water, massage, and pain medication

- **Migraine Headaches**
  - Have severe debilitating symptoms
  - Treatments: Imitrex, Caffeine, ergot

- **Cluster Headaches**
  - Are more rare forms; “killer” or “suicidal” pain
  - Treatments: oxygen therapy, drugs, and surgery
Be Eco-Clean and Allergen Free

Making Your Own Cleaners

- For a handy glass and surface cleaner, mix one-half cup white vinegar to 4 cups water.
- Use 2 tablespoons lemon juice to 4 cups water for a surface cleaner.
- Baking soda works as a great deodorizer and cleaner.
- Use a chlorine bleach alternative.
- An all-purpose cleaner can be made of one-half cup borax to 1 gallon of hot water.
- For green air fresheners, add natural essential oils for a more pleasant odor.
Chronic Fatigue Syndrome

- Chronic Fatigue Syndrome (CFS)
  - Symptoms include headaches, fever, sore throat, enlarged lymph nodes, depression, poor memory, general weakness, and nausea
  - No viral cause found; possible psychosocial roots
    - No longer believed to be caused by Epstein-Barr virus
Low Back Pain

- Low Back Pain (LBP)
  - 85 percent of Americans will experience LBP
  - 90 percent of all back problems in lumbar region (lower)

- To Reduce LBP
  - Purchase a high-quality, supportive mattress, and avoid sleeping on your stomach.
  - Avoid high-heeled shoes, and wear shoes with good arch support.
  - Control your weight.
  - Warm up and stretch before exercising.
  - When lifting something heavy, use your leg muscles.
  - Buy a chair with good lumbar support.
  - Move your car seat up so your knees are elevated slightly.
  - Exercise regularly.
Repetitive Motion Disorders

- Carpal tunnel syndrome
- Bursitis
- Tendonitis
- Ganglion cysts

**Prevention**
- Educating yourself about repetitive motion disorders and better ergonomic workplace designs

**Treatment**
- Physical and occupational therapy
  - Surgery
  - Anti-inflammatory medications
  - Steroid injections