

Chapter Fourteen: Protecting Against Infectious Diseases and STIs, plus special section on Reducing Risks for Chronic Diseases and Infections - Dr. Dave Shrock

## Chapter Fourteen

*Protecting Against Infectious Diseases and Sexually Transmitted Infections*

**13<sup>th</sup> edition: pages 407-438**  
**12<sup>th</sup> edition: pages 397-427 (chap. 13)**  
*Special section: Reducing risks and coping with chronic diseases and conditions*

**13<sup>th</sup> edition pages 439-449**  
**12<sup>th</sup> edition: pages 428-437 (chap. 13)**

*we live in a filthy world!*  
 13<sup>th</sup> pp. 408-409; 12<sup>th</sup> pp. 397-98

- \* **pathogens or infiltrates constantly embattle our body**
- \* **some stay with us continually, lying low until our immune system is more susceptible through:**
  - \* stress
  - \* poor life choices
  - \* wear and tear
  - \* advancing age.



pathogens on a human tongue

pathogens: routes of transmission  
 13<sup>th</sup> p. 409; 12<sup>th</sup> p. 399-400

- \* **airborne:** *inhaling*
- \* **foodborne:** *food prep. and consumption*
- \* **Vector borne or animal borne:** *bites, ticks/insects, contact*
- \* **waterborne:** *drinking, food prep. and cleaning*
- \* **people borne & contact:** *hands, phones, keyboards, doors, money, documents, sexual contact*
- \* **Preinatal:** *occurs in uterus when baby passes through birth canal.*



risks we can control  
 13<sup>th</sup> p. 409-410; 12<sup>th</sup> pp. 399-400

- \* **stress:** *chronic stress weakens our immune system*
- \* **nutrition:** *fresh foods are rich in antioxidants and necessary compounds to keep our bodies healthy...also preparing foods correctly is important*
- \* **physical activity:** *bolsters our immune system, keeps our body healthy*
- \* **sleep:** *we need an ave. of 7-8 hours each night*
- \* **drug use:** *effects our body's resilience and immune system*
- \* **personal hygiene:** *cleanliness of self and environment...hand washing!*
- \* **Fact:** *70% of diseases are the result of poor life choices.*



hard to control risk factors  
 13<sup>th</sup> p. 408-409; 12<sup>th</sup> pp. 399-400

- \* **heredity:** *single greatest factor influencing our longevity*
- \* **aging:** *after 40, our immune system begins to wear down*
- \* **environmental conditions:** *pollution, waste, general filth around us*
- \* **organism resistance:** *particularly virulent or mutated organisms overwhelm our immune system*
- \* **Epidemiological Triad of Disease:** *all must be conducive to overcoming the body's defense system.*

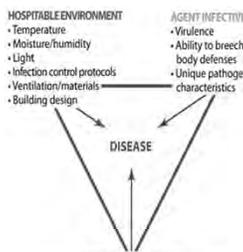
**HOSPITABLE ENVIRONMENT**

- Temperature
- Moisture/humidity
- Light
- Infection control protocols
- Ventilation/materials
- Building design

**AGENT INFECTIVITY**

- Virulence
- Ability to breach body defenses
- Unique pathogen characteristics

**DISEASE**



**HOST SUSCEPTIBILITY**

- Genetics
- Smoking
- Age
- Diabetes
- Stress
- Lack of sleep
- HIV or AIDS
- Presence of other diseases
- Organ transplants
- Nutritional status
- Chemical exposures
- Long-term use of steroids
- Chemotherapy

types of pathogens and how our body fights back  
 13<sup>th</sup> pp. 412; 12<sup>th</sup> pp. 400-402, (figure 14.2)







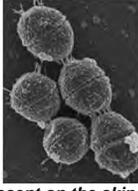


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## types of pathogens

13<sup>th</sup> pp. 415-416; 12<sup>th</sup> pp. 404-06

- × **Bacteria: single celled plant like organisms**
- × several thousand species, only approx. 100 cause diseases in humans
- × often not the bacteria, but the toxins they give off make us sick
- × Staphylococci, 'staph infections': always present on the skin when there is break in the skin, they can enter
- × Streptococcal, 'strep infections': five types of micro-organisms...pharyngitis or strep throat is the most common
- × Pneumonia: once was leading cause of death in the US until antibiotics...still a threat world wide
- × Tuberculosis, 'TB': bacterial infiltration often reparatory system once a major killer...still a threat worldwide.



## types of pathogens

13<sup>th</sup> p. 419-420; 12<sup>th</sup> pp. 409-10

- × **Viruses: 1/500<sup>th</sup> the size of bacteria**
- × not identified until 20<sup>th</sup> century...over 150 cause disease in humans
- × takes over a host cell...difficult to treat
- × common colds: responsible for the most days off work. Colds are 'endemic'...always present until the immune system wears down...most contagious during the first 24 hours
- × influenza 'flu': more severe than a cold. Cold like symptoms, children under 5 yrs. and elderly often are in danger
- × mononucleosis 'mono': starts like a cold and progresses to lymph nodes, jaundice, aching joints. Treatment is lengthy
- × Hepatitis: three stains now: A B C cause inflammation of the liver, fever, headaches, jaundice. Passed through food, water, and Type B through body fluids...unprotected sex
- × measles: viral infection in young children passed via inhalation.



## is it a cold or the flu?

13<sup>th</sup> pp. 419-420; 12<sup>th</sup> pp. 409, (diagram not in book-also on class website)

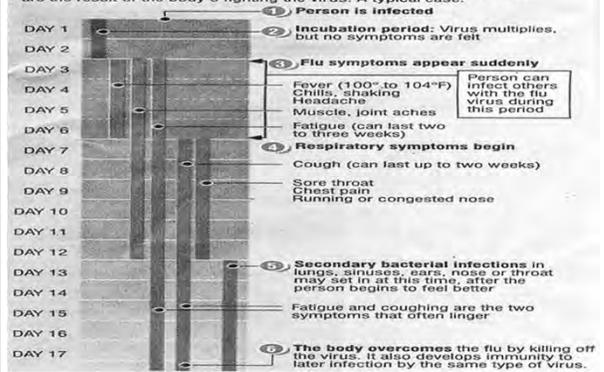
SYMPTOMS	COLD	FLU
Fever	Rare	Characteristically high (102-104°F); lasts 3-4 days
Headache	Rare	Prominent
General aches/pain	Slight	Usual; often severe
Fatigue, weakness	Quite mild	Can last up to 2-3 weeks
Extreme exhaustion	Never	Early and prominent
Stuffy nose	Common	Sometimes
Sneezing	Usual	Sometimes
Sore throat	Common	Sometimes
Chest discomfort, cough	Mild to moderate; hacking cough	Common; can become severe
Nausea, vomiting	Not common	Sometimes
COMPLICATIONS	Sinus congestion, sinus infection, or earache	Bronchitis, pneumonia; can be life threatening
PREVENTION	None; avoid contact with infected persons; wash hands; cover mouth when sneezing	Annual vaccination; amantadine or rimantadine (antiviral drugs)
TREATMENT	Palliative, temporary	Amantadine or rimantadine within 24-48 hours of symptoms

don't go to the doctor or emergency rooms unless you have lengthy symptoms... rest - fluids - sleep - time are the best cures

not in books

## A CASE OF FLU: FROM BEGINNING TO END

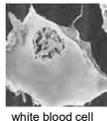
Influenza is a viral infection of the respiratory tract that is more severe than the average cold and highly contagious. Symptoms such as fever are the result of the body's fighting the virus. A typical case:



## how our body's fight back

13<sup>th</sup> pp. 410-412; 12<sup>th</sup> pp. 401-04

- × **epithelial cells or skin:** first line of defense
- × **'antigens'** or a pathogen invades our body, causing a reaction of 'antibodies'
- × some antibodies or **lymphocytes** are produced in our lymph nodes
- × **white blood** cells also are a key defense
- × when our bodies are attacked, it builds memory or 'immunity'
- × auto immune diseases are when the body's defenses turn on itself by mistake...HIV, lupus, rheumatoid arthritis.



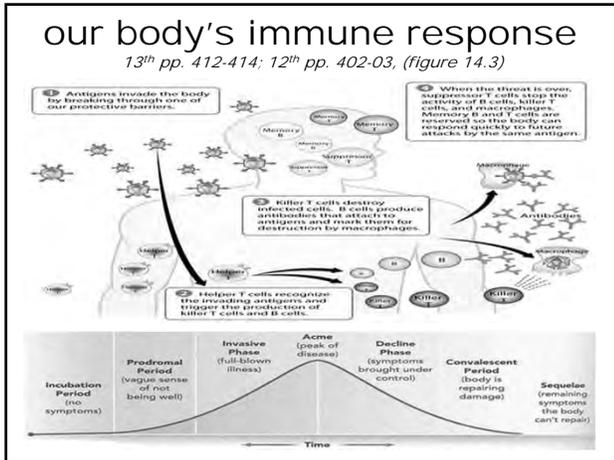
## how our body's fight back, con't

13<sup>th</sup> pp. 410-412; 12<sup>th</sup> pp. 401-04

- × **fever:** our body's temperature rises from 98°F because of the toxins given off by the pathogen, but also is a protection, destroying some pathogens
- × **pain:** direct pain occurs at the site, or referred pain is where the source may be somewhere else...a warning mechanism that the body's under siege or hurt
- × **sneezing:** our body's violent attempt to expel pathogens
- × **vaccines:** principle of acquired immunity where you have a small amount of the pathogen is injected in your body and by destroying a manageable amount, builds a memory or immunity.



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13<sup>th</sup> pp. 410-412; 12<sup>th</sup>, pp. 399

### Keeping Defenses Healthy

<ul style="list-style-type: none"> <li>Limit exposure to germs</li> </ul>	Limit contact with those who are getting colds or have symptoms. Wash your hands and avoid touching hands to eyes and mouth. Avoid antibacterial soaps, which contribute to germ resistance.
<ul style="list-style-type: none"> <li>Exercise regularly</li> </ul>	Exercising raises core body temperature, which kills many invaders.
<ul style="list-style-type: none"> <li>Get enough sleep</li> </ul>	Refresh your body regularly. Take time out and time off. Experience your spiritual side.
<ul style="list-style-type: none"> <li>Eat healthy foods</li> </ul>	Follow established guidelines, consuming adequate amounts of water, protein, carbohydrates, fats, vitamins, and minerals. Moderation in using supplements is recommended.
<ul style="list-style-type: none"> <li>Don't overuse antibiotics</li> </ul>	"Use it and lose it" is a phrase that aptly describes what has happened as antibiotics are used over and over again and bacteria adapt to become more resistant to them. Many antibiotics are used inappropriately because patients demand them.
<ul style="list-style-type: none"> <li>Manage stress</li> </ul>	Use strategies such as exercise and relaxation techniques to lower stress levels in your life.

## who's at highest risk

not in books

The viruses responsible for the most common infectious illnesses tend to pick on those least capable of fighting back:

- Children and their families** - Youngsters are not only more vulnerable to infections, they are also more prone to certain complications, particularly ear infections.
- The elderly** - Statistically, fewer older men and women are likely to catch a cold or flu, yet when they do, they face greater danger than the rest of the population.
- Smokers and those with respiratory problems** - Smoke directly destroys the cells in the airways that normally protect against bacteria and viruses.
- Those who live or work in close contact with someone sick** - Health-care workers, who treat high-risk patients, nursing home residents, and others living in close quarters, such as students in dormitories, face greater odds of catching colds and flus.
- Residents or workers in poorly ventilated buildings** - Both recirculated air and poor indoor air quality in the winter may be closely linked with disease transmission.

## emergent-resurgent disease dangers

13<sup>th</sup> pp. 420-422; 12<sup>th</sup> pp 411-12

**new threats are evolving due to:**

- \* **mushrooming world population and growing poverty**
- \* **disintegration of health care on a global basis**
- \* **highly mobile populace due to less expensive travel**
- \* **pathogens mutating at faster rates, more resistant**
- \* **risky human behavior: drugs, sexual practices**
- \* **aging world population**
- \* **growing antimicrobial resistance: mutating bacterial infections challenging antibiotics due to over use in food production, unnecessary prescriptions, over use of soaps and cleansers.**

over crowded slums

## emergent-resurgent disease dangers

13<sup>th</sup> pp. 420-422; 12<sup>th</sup> pp 411-12

- \* **Ebola:** originated in Central Africa, and killed over 10,000 this past year
- \* **e-coli:** a digestive enzyme in an animal's stomachs, passed to humans through incorrect slaughter methods
- \* **Lyme Disease:** infection contracted from ticks, prevalent in grassy areas/foothills
- \* **SARS (Severe Acute Respiratory Syndrome)** viral respiratory illness
- \* **West Nile virus:** spread from infected mosquitoes
- \* **MRSA:** antibiotic resistant staph infection sweeping across US
- \* **Valley Fever:** Central Valley and Arizona – air borne fungus causing respiratory illness and wide spread infection
- \* **bioterrorism:** not new, but a mobile threat
- \* **Growing number of children not being vaccinated:** 1998 proven false article claiming increased rates of autism spooked many parents to not immunize childhood diseases, resulting in rise in measles (article on p. 423).

Geographic Range of Valley Fever Potential

## sexually transmitted infections

13<sup>th</sup> pp. 424-425; 12<sup>th</sup> pp. 412-27

- \* **STI's or STD's have plagued humans from earliest times**
- \* **today there are 20 known types...**
- \* **65 million in the US have an incurable STI**
- \* **25% of active 16-25yr olds have an STI**
- \* **most are preventable!**
- \* **modes of transmission:**
  - \* unprotected sexual intercourse
  - \* oral genital contact
  - \* genital to hand contact
  - \* mouth to mouth contact.

Male latex condom

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## symptoms of STI's

*13<sup>th</sup> pp. 424-425; 12<sup>th</sup> pp. 412-27 (diagram not in texts)*



**Men Only**

- A drip or drainage from penis

**Men and Women**

- Sore bumps or blisters near sex organs or mouth
- Burning or pain when urinating
- Swelling or redness in throat
- Fever, chills, aches
- Swelling of lymph nodes near genitals or swelling of genitals
- Feeling the need to urinate frequently



**Women Only**

- Vaginal discharge or odor from the vagina
- Pain in the lower pelvis or deep in the vagina during sex
- Burning or itching around the vagina
- Bleeding from the vagina at times other than the regular menstrual periods

**Excellent chart in books:**

**STI Attitude and Belief scale:**

**13<sup>th</sup> p. 425**

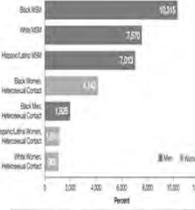
**12<sup>th</sup> p. 424**

## HIV-AIDS

*13<sup>th</sup> pp. 431-434; 12<sup>th</sup> pp. 412-27*

### HIV/AIDS: a shifting epidemic

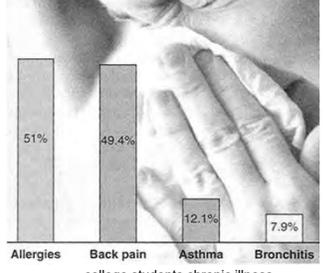
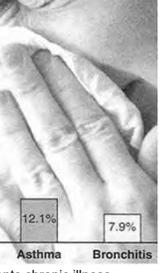
- human Immunodeficiency virus, the virus which causes AIDS: acquired immune deficiency syndrome
- since 1981 when AIDS was first recognized, 78 million have become infected, with 5 million new cases worldwide each year
- 21 indicator diseases, main indicator is the drop in the body's immune system
- HIV gains entry into the body via fluids: semen, vaginal secretions, blood, sharing of needles, etc.
- Potential vaccine:** Pre-Exposure Prophylaxis (PrEP) has had promising results lessening contraction of HIV...expense of \$1300 per month is a limiting factor.
- Possible cure:** drug called Selzentry prevents the HIV virus from entering the T-cells of our immune system developed from mutated human genes.




## Focus On: Reducing Risks and coping with Chronic Diseases and Conditions

*13<sup>th</sup> edition pp. 349-449*

*12<sup>th</sup> edition: pp. 428-437*

college students chronic illness

## asthma

*13<sup>th</sup> pp. 441-442; 12<sup>th</sup> pp. 430-31*

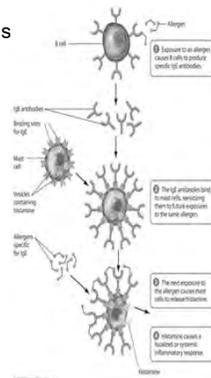
- a long term chronic reparatory inflammatory disorder blocked or restricted airflow to the lungs
- cause by pollutants, particulate matter in the environment, exercise, cold dry weather, and smoke can trigger an attack
- most common chronic disease of childhood 13% of all student have asthma, 21% in the central valley. More than 5,000 die annually each year, and asthma cases have risen since 1985
- many medications on the market, inhalers help bring quick relief by opening airways.




## allergies

*13<sup>th</sup> pp. 442-443; 12<sup>th</sup> pp. 431-32*

- allergies are the body's hypersensitivity reaction to relatively harmless pathogens called allergens
- most common allergens are molds, animal dander, pollens, ragweed, and dust
- the central valley is one of the worst locales in the U.S. for allergens and asthma
- the body often produces 'histamines' a chemical which dilates the blood, increases mucus, swells tissue, and effects there reparatory system
- allergies can begin as a child, but often grow worst with age
- studies now show that overly clean homes may cause children to be more sensitive to allergies and asthma.



## headaches

*13<sup>th</sup> pp. 44-445; 12<sup>th</sup> pp. 432-33*

**25% of ER visits are headache related visits. Ages 18-44 years are more likely to visit ER's than any other group**

- Tension Headaches:** 90% of women, 70% of men suffer form tension headaches at some point in their lives. Caused by muscle contractions or tension. Last 30min to one week. Triggers are stress, depression, poor posture, lack of sleep. OTC pain relievers are most common treatment
- Migraine Headaches:** 1 in 7 Americans, mostly women suffer from these vascular headaches. Thought to be genetically related, vascular problems, hormones main are triggers. Stress management, trigger reduction, hormone therapies are remedies.
- Cluster Headaches:** Adult males in their 20's are susceptible to these rare type of headache causing excruciating pain. Last 40-90min during REM Sleep. Oxygen therapy, drugs, even surgery are remedies.



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## digestion related disorders

13<sup>th</sup> pp. 445-446; 12<sup>th</sup> pp. 433-35

- ✦ **Irritable Bowl Syndrome:** Symptoms are pain, bloating, abdominal discomfort. Causes could be stress, food sensitivities, hormones. Treatment involves diet, medication, relaxation and stress management. 10-15% of adults in U.S. suffer from IBS
- ✦ **Crohn's Disease:** Chronic inflammation of the small intestine. Genetic, environmental, and autoimmune reactions are primary causes effecting primarily young adults. Symptoms include diarrhea, abdominal pain, weight loss, fatigue. Diet and medication are primary management tools.
- ✦ **Ulcerative Colitis:** Often first flares in teens, though grows increasingly worst and can continue for life. Nausea, vomiting, fever are primary symptoms. Diet modification, anti-inflammatory drugs are used. Higher risks of colon cancer are also linked.

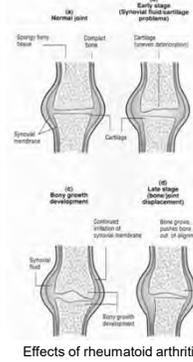
## arthritis

13<sup>th</sup> p. 446; 12<sup>th</sup> pp. 434

nations primarycrippler: nearly 23%, or 55.4 million Americans suffer

**Osteoarthritis:** a degenerative joint disease associated with wear and tear on the body, aging, diet, weight, and posture are contributors

**Rheumatoid Arthritis:** an autoimmune disease involving chronic inflammation. Occurs at any age, though often between 20-45, and more often in women. Symptoms range from stiffness, swelling of joints, and can be progressive or sporadic. Those inflicted also suffer from a greater risk of CVD ailments.



## lower back pain

13<sup>th</sup> p. 446-447; 12<sup>th</sup> pp. 434-35

85% of all Americans experience lower back pain at some time in their lives. The major cause of disability for those between 20-45 in the U.S. 90% occur in the lower lumbar spine

tips to moderate or avoid lower back pain:

- ✦ maintain an ideal weight
- ✦ exercise and maintain good abdominal strength and balance
- ✦ get a good work station chair and mattress
- ✦ left objects properly respecting your back
- ✦ avoid high heels and wear supportive shoes
- ✦ be flexible... try yoga or Pilates as a component of your fitness programme.



## Repetitive Motion Disorders

13<sup>th</sup> pp. 447-448; 12<sup>th</sup> pp. 435

- ✦ group of physical ailments such as carpal tunnel syndrome, bursitis and tendonitis
- ✦ symptoms often are intense burning pain when typing or moving of the hands, wrists, elbows, shoulders, and sometimes knees, neck, hips or back
- ✦ caused by repetitive movement done incorrectly or with poor positioning or support
- ✦ education showing proper movement, correct 'ergonomic' work stations (chairs, desks, keyboards), physical therapy, varying tasks, and taking breaks often help relieve and/or prevent RMD's.



## promise of Stem Cells

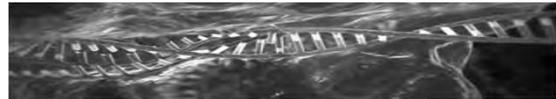
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- ✓ Controversial harvesting of cells from discarded In vitro fertilization processes
- ✓ The use of human cells or human fetal tissue troubles many people on ethical grounds. Under the Bush administration, the federal government limited research on pre-existing harvested stem cells
- ✓ California OK'd a multi-million proposition for stem cell research in the fall of 2004. Huge research lab at UC Davis built in 2008.

## new advancement - CRISPR

not in texts



- ✓ First identified in 2012, CRISPR is a naturally occurring bacterium that defends our bodies against invading pathogens
- ✓ Now being harnessed to edit strands of living genomes, in addition to modifying damaged DNA by adding new DNA
- ✓ Implications for agriculture and eventually editing the human genomes sequences to edit out identified mutated genome sequences that cause disease. Controversial as this could also be used to create 'designer humans'
- ✓ CRISPR could be the most significant medical breakthrough since introduction of antibiotics in the 1930's.