Unit VI: Immunity and Diseases

Course
World Health Research

Unit VI
Immunity & Diseases

Essential Question
How does the body defend itself against pathogens and toxic agents?

TEKS
130.209. 1 F, 3 A, 2 A, 3B

Prior Student Learning
Biology &
How to Give a Professional Presentation

Estimated time
4-5 hours

Rationale
Understanding the immune system is vital for comprehending how our bodies respond to diseases and injuries.

Objectives
Upon completion of this lesson, the student will be able to

- Define immunity as it applies to the human body
- Explain ways in which people acquire immunity
- Identify the organs of the immune system
- Analyze the body's three lines of defense
- Distinguish between the function of different types of white blood cells
- Summarize how hormones affect the immune system
- Define "tumor necrosis factor"
- Analyze immunity and vaccinations

Engage
Discuss the following:
Zoologist Ilya Metchnikoff first suggested the idea of cells being directly involved in the defense of the body in 1884. His famous experiment involved pushing the thorn from a rose stem into a starfish larva and observing how phagocytic cells rapidly migrated and clustered around the thorn.
~The History of Immunology Timeline

Key Points
An instructional PowerPoint accompanies this lesson.

I. Immunity literally means "free from burden"
   A. In medicine, when we speak of immunity, we are referring to the body's ability to recognize and defend itself against foreign agents

II. How we acquire immunity
   A. Natural passive immunity (maternal)
      1. Occurs when antibodies travel across the placenta from the maternal blood to the fetal blood (the symbol for antibodies is "Y")
      2. Antibodies are also found in the colostrum (the liquid produced in the breasts for a baby's first meal)
      3. Antibodies received through passive immunity only last several weeks
   B. Active Immunity
      1. Natural active immunity – occurs when a person is exposed

to harmful microbes (infectious diseases)
2. Artificial active immunity
    a. Active immunity is artificially triggered
    b. Occurs when a person is intentionally given a small quantity of an infectious disease (a vaccine)

III. The immune system is our body's defense against foreign agents such as bacteria and viruses

IV. The organs of the immune system are positioned throughout the body. (these organs are also called lymphoid organs because they are home to *lymphocytes*—types of white blood cells)
  A. Primary organs (where lymphocytes develop)
    1. Thymus
      a. Located in the chest between the sternum and heart
      b. The thymus is large during infancy, but atrophies as a child grows
      c. This is where the immune system's T-cells mature
    2. Bone marrow
      a. New blood cells form in marrow then enter the bloodstream
      b. Some white blood cells mature elsewhere in the body
      c. Bone marrow produces all blood cells from stem cells
        i. Called "stem cells" because they branch off and can become many different types of cells
        ii. Stem cells change into actual, specific types of white blood cells
  B. Secondary organs (where immune responses occur—our body's call to action during infections)
    1. Spleen
      a. Located under the left side of the diaphragm (tucked under and protected by the ribs)
      b. Filters out foreign organisms that infect the bloodstream
      c. Also filters out old red blood cells from the bloodstream and recycles them
      d. Serves as a blood reservoir
    2. Lymph nodes
      a. Small, bean-shaped structures strung along a series of vessels (lymphatic vessels which carry lymph fluid)
      b. Lymph nodes store cells that fight infection and diseases
      c. They act as filters, collecting and killing pathogens and/or cancer cells that travel through the lymphatic system
      d. They are clustered in the neck, armpits, abdomen, and groin

C. Lymph nodes (where lymphocytes and macrophages are packed)
    1. Lymphocytes
        a. T-cells – white blood cells that mature in the thymus, and then migrate to other tissues
            i. T-cells respond directly to antigens (foreign agents such as pathogens or toxins)
            ii. Their response involves the destruction of target cells (e.g., virus-infected cells or cancer cells)
            iii. 80% of blood cells are T-cells
        b. B-cells – named for the bone marrow where they are produced
            i. B-cells produce antibodies that incapacitate antigens
    2. Macrophages
        a. White blood cells (WBC) known as “big eaters”
        b. Eat foreign material in the body
        c. Some macrophages are stationed at areas of the body where foreign material commonly enters
        d. Other macrophages patrol the body
    3. All lymphocytes exit the lymph nodes through outgoing lymph vessels
    4. Once in the bloodstream, lymphocytes are transported to tissues throughout the body – they patrol body for foreign antigens then return to the lymphatic system to begin the cycle all over again
    5. Lymphocyte and fluid exchange occurs between blood and lymph vessels
    6. Enables the lymphatic system to monitor the body for invading microbes
    7. The lymphatic system is sometimes considered part of the circulatory system because it transports lymph through the vessels and empties it into the venous blood

V. How the body protects itself when exposed to foreign agents
    A. Markers of “self”
        1. The body has the ability to distinguish between “self” and “non-self”
        2. Every cell in the body carries distinctive surface proteins that distinguish it as self
        3. Foreign cells (bacteria, viruses, etc.) are recognized by the body as non-self and fall under attack by the immune system
        4. Normally your immune cells don’t attack your own body tissues because they carry the same pattern of self-markers, and therefore, coexist peaceably with any cells they recognize as self
    B. The body has built-in defense mechanisms which fight off non-self

cells or tissues
    1. Nonspecific defense mechanisms
        a. Act against all harmful agents and provide nonspecific resistances (skin barrier, body's inflammatory response)
        b. Do not distinguish one infectious microbe from another
    2. Specific defense mechanisms
        a. Only act against certain agents
        b. The backup defense system that has the ability to recognize and target organisms which don't belong in the body (viruses, bacteria, etc.)

VI. The body's three lines of defense
    A. **The first line of defense** (nonspecific defense mechanisms) – the physical and chemical barriers that keep foreign agents at bay
        1. Skin (keratin resists the digestive enzymes of invading bacteria; sweat and body oil lower the pH of skin to between 3 and 5, which is a hostile environment for most pathogens; sweat and sebum contain antiseptic molecules, primarily lysozyme which breaks down bacterial cell walls)
        2. Ciliated mucous membranes and mucus (trap invading pathogens and foreign debris that can then be swept away by cilia)
        3. Nasal passages and sinuses (make nitrous oxide that are toxic to a wide range of infectious microbes)
        4. Tears and saliva (contain lysozyme, an antiseptic enzyme that attacks and breaks down cell the walls of bacteria)
        5. The stomach's hydrochloric acid and good gut bacteria (helps crowd out bad bacteria)
    B. **The second line of defense** (also nonspecific defense mechanisms that do not react to specific intruders) – cells that initiate the inflammatory response (redness, fever, swelling) spring into action if foreign agents succeed in passing the first line of defense and enter body
        1. Phagocytes – ingest and destroy foreign particles
            a. Neutrophils – the "foot soldiers" of white blood cells
                i. Make up about 60 – 70% of all WBCs
                ii. Tend to self-destruct as they destroy invaders
                iii. A person makes about 100 billion every day
            b. Monocytes – develop into macrophages (the largest phagocyte)
                i. Only about 5% of the WBCs
                ii. Voracious eaters at infection sites, readily engulfing invading organisms and cellular debris
                iii. Macrophages can also become involved in "intelligence gathering," collecting various bits and pieces of an enemy and displaying remains like

macabre trophies of war

c. Eosinophils – have limited phagocytic activity
    i. Make up only 1.5% of WBCs
    ii. Can destroy larger parasites such as worm larvae (latch onto the surface of a parasite and release destructive enzymes)
d. Basophils – release histamines, which are part of the inflammatory response
    i. Histamine increases the permeability of capillaries to white blood cells so they can fight foreign invaders in the infected tissues
e. Natural Killer (NK) cells – move throughout blood and lymph
    i. Attack the body's own cells, either those infected by viruses or cancerous cells
    ii. Attack the membranes of target cells causing them to lyse (break open)
f. Complement system – a group of antimicrobial proteins found in plasma that work with (complement) antibodies
    i. Activate when they come into contact with foreign agents
    ii. Insert themselves into the membranes of pathogens, causing the pathogens to swell and lyse

C. **The third line of defense** (specific defense mechanisms) – the immune response
    1. Comes into action when nonspecific lines of defense don't stop foreign agents and an infection becomes widespread
    2. Millions of Y-shaped proteins called antibodies are produced by white blood cells in response to foreign invaders (antigens)
        a. Antibodies are also referred to as immunoglobulins and/or gammaglobulins
        b. Each antibody responds to a specific antigen (bacteria, virus, etc.)
    3. The structure of antibodies
        a. The structures are very similar, but the small regions at the tip of the protein are variable
        b. Each variant tip can bind to a different antigen target

VII. Antigens
A. Anything that antagonizes or stimulates the immune system to produce an immune response, including
    1. Pathogens
    2. Foreign substances or agents (a splinter, etc.)
    3. Tissues or cells from another person (except an identical

twin)
4. Explains why transplanted organs and tissues are sometimes "rejected"

B. Antigens carry marker molecules that identify them as foreign

VIII. Hormones
- A. Several hormones are generated by the components of the immune system
- B. These hormones are known as lymphokines, which enhance the function of leukocytes
- C. Certain hormones, such as steroids and corticosteroids, suppress the immune system

IX. Tumor Necrosis Factor (TNF)
- A. An immune cell protein produced by macrophages
- B. Kills cells that appear abnormal
- C. Inhibits the growth of tumor cells but causes inflammation
- D. Promotes the creation of new blood vessels (important to healing)

X. Interferon
- A. Proteins produced by the immune system in response to an attack by a virus
- B. Helps to protect other healthy cells from the attack

XI. When the immune system mistakes "self" for "non-self"
- A. Sometimes the immune system launches chronic attacks against the body's own cells or tissues
- B. These attacks are called autoimmune diseases
- C. Examples of autoimmune diseases
  1. Rheumatoid arthritis
  2. Systemic lupus erythematous
  3. Myasthenia gravis
  4. Diabetes I

XII. Allergens
- A. In some cases the immune system responds to harmless foreign agents
  1. Dust, ragweed, and certain foods
- B. The result is an allergic reaction
  1. The antigens that cause it are called allergens

Activity

I. Student groups will investigate an immunity-related topic, then create and present a PowerPoint presentation over their research.

Assessment
Successful completion of CheckPoint test
Evaluation Rubric

Materials
Immunity and Disease Terms handout
Instructional PowerPoint: Immunity and Disease
CheckPoint Test Key
Teacher Instructions for Investigation Activity
Student Instructions for Investigation handout
Group Investigation Cards
Evaluation Rubric
Student computers

Accommodations for Learning Differences
For reinforcement, the student will develop flash cards for the key terms.

For enrichment, the student will view the following online videos and develop a multimedia presentation:
Disease Defense: The Immune System (4 min.)
Disease Defense: Immunity and Vaccination (3 min.)
Autoimmune Inflammatory Disease (23 min.)

National and State Education Standards
National Health Science Cluster Standards
HLC01.01
Health care workers will know the academic subject matter required (in addition to state high school graduation requirements) for proficiency within their area. They will use this knowledge as needed in their role.

HLC02.01
Health care workers will know the various methods of giving and obtaining information. They will communicate effectively, both orally and in writing.

TEKS
130.209. (c) 3A describe technologies that support the prevention and treatment of infectious diseases; 3B explain the implication of vaccines on the immune system.

Texas College and Career Readiness Standards
English Language Arts
II. A. Locate explicit textual information and draw complex inferences, analyze, and evaluate the information within and across texts of varying lengths.
III. B. Develop effective speaking styles for both group and one-on-one

situations.
IV. A. Apply listening skills as an individual and as a member of a group in a variety of settings (e.g., lectures, discussions, conversations, team projects, presentations, interviews).
V. B. Select information from a variety of sources.

Science
III. B. 1. Read technical and scientific articles to gain understanding of interpretations, apparatuses, techniques or procedures, and data.
III. B. 3. Recognize scientific and technical vocabulary in the field of study and use this vocabulary to enhance clarity of communication.
VI. F. 1. Know that organisms possess various structures and processes (feedback loops) that maintain steady internal conditions.

Cross-Disciplinary
I. A. 1. Engage in scholarly inquiry and dialogue.
I. B. 4. Support or modify claims based on the results of an inquiry.
I. C. 3. Collect evidence and data systematically and directly relate to solving a problem.
I. E. 2. Work collaboratively.
II. C. 2. Explore a research topic.
II. C. 4. Evaluate the validity and reliability of sources.
II. C. 5. Synthesize and organize information effectively.
II. C. 6. Design and present an effective product.
II. C. 7. Integrate source material
II. C. 8. Present final product.
II. E. 1. Use technology to gather information.
II. E. 2. Use technology to organize, manage, and analyze information.
II. E. 3. Use technology to communicate and display findings in a clear and coherent manner.

Immunity and Disease Terms

1st line of defense – physical defense to protect the body against pathogens (skin, tears, mucous membranes)

2nd line of defense – inflammatory response that protects body against infection

3rd line of defense – immune response in which antibodies take action against foreign cells

Active immunity – immunity to disease from either exposure to a pathogen or vaccination

Allergens – any substance that causes an allergic reaction

Antibodies – a protein produced by B-cells in response to the presence of an antigen (bacterium or virus)

Antigens – a protein on the surface of a pathogen that stimulates the production of antibodies

Autoimmune disease – a chronic disease which occurs when the body fails to recognize its own "self" tissue and launches an attack, causing repeated inflammation

B-cells – a type of white blood cell that forms in the bone marrow and creates antibodies in response to specific antigens

Bacteria – single-celled, often parasitic microbes without distinct nuclei; cause a variety of infections

Bone marrow – a soft reddish substance inside flat bones that is involves in the production of blood cells

Cell markers – surface proteins on cells that distinguish them as "self" or "non-self"

Complement system – a group of proteins that assist antibodies in the fight against pathogens

Fever – body temperature that is abnormally high, usually caused by bacterial or viral infections

Immune response – overall activity of the body's immune system following the arrival of a disease-causing agent

Immune system – a combination of cells and organs that defends the body against attacks from foreign substances and agents

Immunity – the body's ability to resist a particular disease, whether existing naturally or as the result of a vaccination or previous infection

Immunoglobulins (gammaglobulins) – proteins that act like antibodies and are produced by white blood cells during an immune response

Inflammatory response – (Latin: “inflammation” – to set on fire) the process by which the body responds to invasion by harmful organisms or substances. During inflammation the body attempts to wall off or contain the invasion at the point of entry. Blood flow to the area increases. White blood cells move in and attempt to ingest and disable the invader

Interferon – a complex protein that is produced in response to attack by a virus

Kinins – blood proteins that help inflammation, blood pressure control, coagulation, and pain

Lyse – burst

Lymph – the fluid-like plasma in blood that contains the lymphocytes of the immune system

Lymph nodes – small, bean-shaped structures strung along the lymph vessels that store cells, and fight infection and diseases

Lymph vessels – the network of vessels that transport lymph all over the body

Lymphocytes – small white blood cells that are major components of the immune system; the main types are T- and B-lymphocytes

Lymphokines – hormones released during immune response which enhance the function of leukocytes

Macrophages – large white blood cells present in the blood, lymph, and connective tissues; remove waste, harmful microbes, and foreign material

Memory B-cells – B-cells that live longer, thus “remember” specific antigens responded to in the past

Microbe (microorganism) – an organism too small to be seen with the naked eye. Bacteria, protozoans, viruses, microscopic algae, and some types of fungi are microorganisms

Natural cell killers – a type of cytotoxic leukocyte; plays a major role in the rejection of tumors and cells infected by viruses. The cells kill by releasing small cytoplasmic granules of proteins that cause the target cell to die by bursting or necrosis

Natural maternal immunity – antibodies passed from maternal blood to fetal blood or through the colostrum from baby’s first breastfeeding

Parasite – an animal or plant that lives in or on a host (another animal or plant); it obtains nourishment from the host without benefiting the host

Parasitic worms (helminthes) – worm-like organisms that live and feed off living hosts, receiving nourishment and protection while disrupting their hosts' nutrient absorption, and causing weakness and disease; unlike external parasites such as lice and fleas, they live inside their host

Passive immunity – immunity from disease acquired by the transfer of antibodies from a pregnant mother to her fetus through the placenta

Pathogens – microbes that can cause disease (viruses, bacteria, fungi, parasites)

Phagocytes – white blood cell that engulf and ingest foreign particles, cellular debris, and microbes

Phagocytosis – the process of engulfing and ingesting microbes and cellular debris

Plasma cells – large B-cells that have been exposed to antigens, and produce and secrete large amounts of antibodies which assist in the destruction of microbes by binding to them and making them easier targets for phagocytes

Primary lymphoid organs – the bone marrow and thymus (where lymphocytes develop)

Secondary lymphoid organs – the spleen and lymph nodes (where immune responses occur)

Spleen – a vascular, ductless organ tucked under the diaphragm and protected by the ribs on the upper left abdomen; it is a reservoir of blood that removes old red blood cells and helps fight infection

Stem cells – "generic" cells that have the ability to produce specialized cells for various tissues in the body, such as heart muscle, brain tissue, liver tissue, etc.

T-cells – white blood cells, derived from the thymus, that are involved in rejecting foreign tissue

Thymus – a mass of glandular tissue (lymphoid organ) found in the upper chest under the sternum; concerned with the production of functional T-lymphocytes in infancy and childhood

Tumor necrosis factor – a substance given off by activated white blood cells that can cause the death of tumor cells; plays a role in the development of rheumatoid arthritis

Vaccination – inoculation; a form of immunization in which dead or weakened microorganisms are placed into the body, where antibodies against them are developed

Virus – acellular infectious agents that cannot grow or reproduce outside of living cells; invade living cells and use their chemical machinery to keep themselves alive and replicate

Online Flashcards to test your knowledge!

☑Check Test: Disease & Immunity

1. Immunity literally means
   a. resistance to foreigners
   b. free from burden
   c. exempt from harm
   d. insusceptibility

2. What is the symbol for antibodies?

3. Name one way a person develops active immunity.

4. Name one way a person develops passive immunity.

5. Name the two primary organs where lymph cells develop.

6. How was the name “stem cells” derived?

7. Name the organ that serves as a blood reservoir, which filters old red blood cells from the bloodstream, and then recycles them.
   a. thymus
   b. lymph nodes
   c. spleen
   d. liver

8. Where is the thymus located?

9. What is the function of the lymph nodes?

10. Which cells produce and secrete large amounts of antibodies?
    a. T-cells
    b. plasma cells
    c. memory B-cells

11. Which of the following cells directly attack antigens?
    a. T-cells
    b. B-cells

12. Name one foreign agent other than a pathogen that can initiate an immune response.

13. True or False: After patrolling the body for foreign antigens, lymphocytes travel to the thymus where their toxins are removed.
    a. True
    b. False

14. Every cell in your body carries distinctive surface proteins that distinguish you as _____.

15. Name one non-specific barrier.

16. How does fever aid the fight against pathogens?

MATHCHING

17. monocytes	a. destroy larger parasites
18. eosinophils	b. foot soldiers of WBCs
19. neutrophils	c. develop into macrophages

20. True or False: Natural killer cells attack the body's own cells.
    a. True
    b. False

21. What does the medical term "lysing" mean?

22. Which WBCs release histamine?
    a. eosinophils
    b. basophils
    c. neutrophils

23. What activates the complement system proteins?

MATCHING: *Select all that apply.*

24. 1st line of defense	a. specific defense
25. 2nd line of defense	b. nonspecific defense
26. 3rd line of defense	c. inflammatory defense
	d. antibody/immune defense
	d. physical defense

27. What are the “Y-shaped” proteins produced by WBCs in response to the presence of pathogens?
    a. antigens
    b. antibodies
    c. lymphokines

28. True or False: Immunoglobulin is another term for antibody.
    a. True
    b. False

29. When the immune system launches attacks against the body’s own tissues this is referred to as a/an _____ disease.

30. Antigens that cause an allergic reaction:
    a. allergens
    b. antibodies
    c. asthma
    d. phagocytes

31. The hormones that suppress the immune system are:
    a. steroids
    b. luteinizing hormone
    c. lymphokines

☑CheckPoint Test: Disease & Immunity
Key

1. Immunity literally means
   a. resistance to foreigners
   b. free from burden
   c. exempt from harm
   d. insusceptibility

2. What is the symbol for antibodies? **Y**

3. Name one way a person develops active immunity. **infection or vaccination**

4. Name one way a person develops passive immunity. **passed across the placenta from maternal blood to fetal blood; colostrum from baby's first meal**

5. Name the two primary organs where lymph cells develop: **thymus and bone marrow**

6. How was the name "stem cells" derived? **called stem cells because they can branch off and become many different types of cells**

7. Name the organ that serves as a blood reservoir, which filters old red blood cells from the bloodstream, and then recycles them.
   a. thymus
   b. lymph nodes
   c. spleen
   d. liver

8. Where is the thymus located? **in the chest between the sternum and heart**

9. What is the function of the lymph nodes? **filter and kill pathogens**

10. Which cells produce and secrete large amounts of antibodies?
    a. T-cells
    b. plasma cells
    c. memory B-cells

11. Which of the following cells directly attack antigens?
    a. T-cells
    b. B-cells

12. Name one foreign agent other than a pathogen that can initiate an immune response. **splinters, toxins, tumor or cancer cells**

13. True or False: After patrolling the body for foreign antigens, lymphocytes travel to the thymus where their toxins are removed.
    a. True
    b. False

14. Every cell in your body carries distinctive surface proteins that distinguish you as **self.**

15. Name one non-specific barrier. **any of the 1st or 2nd lines of defense barriers/responses**

16. How does fever aid the fight against pathogens? **stimulates inflammatory response**

MATHCHING

17. monocytes **c.**	a. destroy larger parasites
18. eosinophils **a.**	b. foot soldiers of WBCs
19. neutrophils **b.**	c. develop into macrophages

20. True or False: Natural killer cells attack the body's own cells.
    a. True
    b. False

21. What does the medical term "lysing" mean? **bursting, destroying**

22. Which WBCs release histamine?
    a. eosinophils
    b. basophils
    c. neutrophils

23. What activates the complement system proteins? **foreign agents and antibodies**

MATCHING: *Select all that apply.*

24. 1st line of defense **b. e.**	a. specific defense
25. 2nd line of defense **b. c.**	b. nonspecific defense
26. 3rd line of defense **a. d.**	c. inflammatory defense
	d. antibody/immune defense
	d. physical defense

27. What are the "Y-shaped" proteins produced by WBCs in response to the presence of pathogens?
    a. antigens
    b. antibodies
    c. lymphokines

28. True or False: Immunoglobulin is another term for antibody.
    a. True
    b. False

29. When the immune system launches attacks against the body's own tissues this is referred to as a/an _**autoimmune**_ disease.

30. Antigens that cause an allergic reaction:
    a. allergens
    b. antibodies
    c. asthma
    d. phagocytes

31. The hormones that suppress the immune system are:
    a. steroids
    b. luteinizing hormone
    c. lymphokines

Teacher Instructions: Investigation Activity

***Note**: Student computers are needed for this activity.*

- Divide the students into groups (3 to 5 per group).
- Give each group a **Student Instructions** handout**,** an **Investigation Card**, and an **Evaluation Rubric**.
- Go over the **Student Instructions** with the class.
- Remember that this is a student inquiry exercise and refrain from "helping" groups with their investigations.
- Travel from group to group to make sure they are on task and every member is engaged in the project.
- Students can refer to the **Evaluation Rubric** so that they know exactly what is expected and how they will be graded.
- Make sure students practice presenting their project before the actual presentation.
- Presentations should be approximately 10 minutes (not including Q & A time and the post-test).
- Use **Evaluation Rubrics** to assess teamwork and project presentations.
- During each presentation, the student audience needs to have 4 to 5 sheets of notebook paper on their desks to take each group's post-test. This test must be turned in to the presenting group for grading as soon as the last test question is answered.
- Make sure that student groups grade their own post-tests and turn them in to you when that day's presentations are completed.

Student Instructions: Investigation Activity

Your group will investigate an assigned topic, create a PowerPoint presentation over the subject, and present it to the class.

What your group will need:

- Student computers
- Notebook paper or index cards
- Pencils
- Investigation Card
- Evaluation Rubric

Instructions:

- Working as a team, you will investigate and answer each question on your Investigation Card.
- If you have questions during the investigative process (and you will!), you and your team must research and work through these questions **without** the assistance of the teacher. This is an exercise in teamwork and problem solving.
- As you research your topic, try and anticipate questions your classmates may ask after the presentation during your Question and Answer period. This will help develop an understanding of the scope and depth of your topic, and ultimately drive the inquiry process.
- After completing the research, begin creating your PowerPoint presentation. You will want to refer to and follow the steps of the Evaluation Rubric when making the PowerPoint. The same rubric will be used to grade your presentation.
- Each PowerPoint presentation must include a 10 question Post-Test on the last slide, which you will give to your audience upon completion of your presentation. Test questions should not be difficult nor should they be “giveaway” questions. They should simply insure that your audience was paying attention to your presentation.
- Once the PowerPoint is complete, practice giving the presentation. Each group member must take an equal part in the presentation.
- Your presentation should be approximately 10 minutes (this does not include your question and answer period or post-test).
- Make sure your group clarifies and answers questions before giving the post-test.
- Once your classmates have completed their tests, pickup, grade, and turn them in to teacher.

Group Investigation Cards

Group I: Antibiotic resistance

1. What is antibiotic resistance?
2. How many people does it affect?
3. What causes it?
4. What are the most common antibiotic resistant diseases?
5. Who is at risk?
6. How can it be prevented?

Group II: Vaccines

1. What are vaccines and how do they work?
2. What is the difference between live attenuated vaccines and dead (inactivated) vaccines, and how are they administered?
3. What ingredients are in vaccines?
4. Why aren't vaccines available for all diseases?
5. What diseases around the world have dramatically decreased due to global vaccine programs?
6. Can vaccines give the disease they are supposed to prevent?

Group III: Autoimmune Diseases/Disorders

1. What are autoimmune diseases?
2. How common are these diseases?
3. Who tends to get autoimmune diseases?
4. Are chronic fatigue syndrome and fibromyalgia autoimmune diseases?
5. What are ten of the most common autoimmune diseases and how do they affect the human body?
6. What treatments are available for autoimmune diseases?

Group IV: Allergies & the Immune System

1. What are allergies?
2. What is the allergic cascade?
3. What are the most common allergy symptoms?
4. What is a systemic reaction and why is it dangerous?
5. Why is anaphylactic shock life threatening, and what is the only effective treatment?
6. What treatments are available for allergy sufferers?

Group V: Viruses

1. What are viruses and what do they look like? Give examples.
2. How do viruses attack cells, and what is the lytic cycle?
3. Once in an organism, are viruses “cell specific”?
4. Why do some viruses “run their course” and others not?
5. Why are some viruses latent for periods of time? Give an example of two.
6. What treatment is available for viruses?

Group VI: Stress & the Immune System

1. What is the stress response?
2. What is the cascade of physical changes that accompany stress?
3. Which hormones can suppress the immune system?
4. What is interleukin-6 and how is it affected by chronic stress?
5. Is there a connection between chronic stress and cancer?
6. Can stress have any positive effects?

Immunity & Disease Evaluation Rubric

Topic _____ Period _____ Date _____

Group Member's Names _____

_____

Criteria	Excellent 90-100	Very good 80-89	Average 75-79	Marginal 70-74	Failed to meet basic requirements 60 ↓
TEAM WORK:					
1. Team worked amicably					
2. Each member was engaged in the project					
3. The team stayed focused on the project					
4. The team completed the project in the allotted time					
POWERPOINT:					
1. Title slide that included team member names					
2. Index slide of topics (2nd slide)					
3. Font size was readable from the back of the room (at least 32 pts)					
4. Used no more than 4 to 5 sentences or bullet points per slide					
5. Use of point form (not complete sentences)					
6. Each line was animated (enters one bullet at a time)					
7. Background color continuity					
8. Text color was readable against background color					
9. Slides were symmetrical and well-balanced					
10. Pictures or clip art was clear and relevant					
11. Text was spellchecked					
12. If graphs or maps were used, they were titled and readable to the audience					
13. Summary slide (brief wrap up)					
14. "Questions for classmates" slide (before the post-test!)					
15. Post-test slide(s) – 10 questions (classmates will write their answers on notebook paper and turn them in after the test)					

ORAL PRESENTATION:					
1. Lead speaker introduced the team members and title of the presentation					
2. Speakers held the audience's attention					
3. Group members spoke clearly and projected their voices					
4. Speakers faced the audience (not the projector screen)					
5. Each member took an equal part in the presentation					
6. Group knew the topic & didn't read it exclusively from index cards or slides					
7. The presentation was organized and smooth					
8. The team addressed each question on their Investigation Card					
9. Members were able to reasonably answer questions during the Q&A					
10. Post-test questions were appropriate (not "giveaway" or picky questions)					

Give points for each grade category and average. Grade _____

Teacher Comments: