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Infectious Diseases and the Immune System

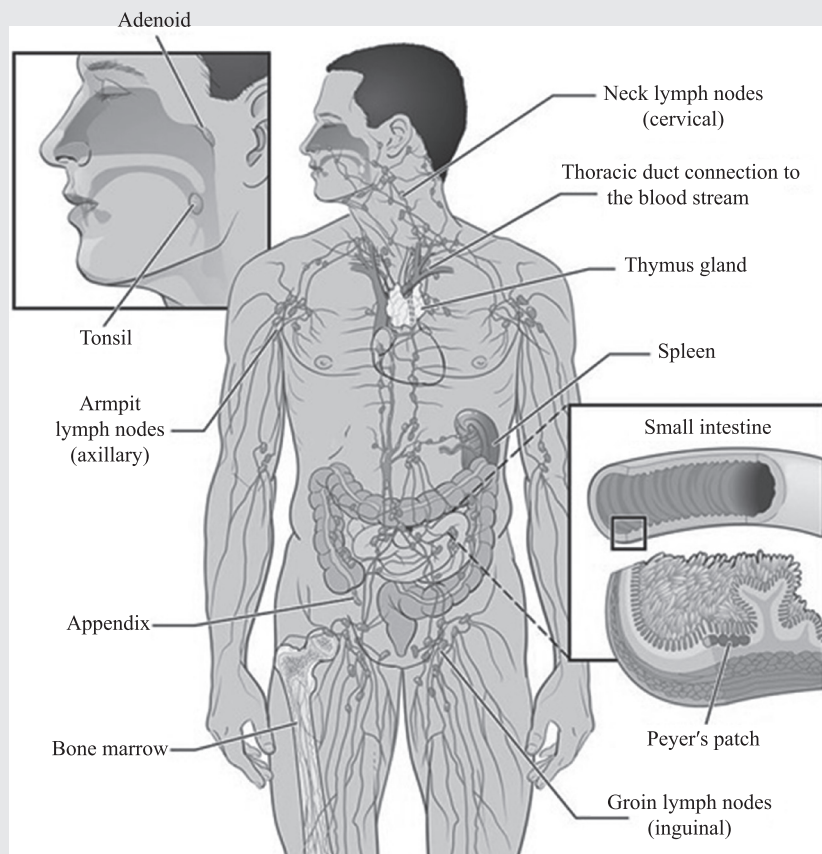


Chapter 1

Infectious Diseases and the Immune System

Overview and Objectives

From coronavirus to Ebola, the infectious diseases cause illness and economic setbacks around the world. The disease-causing **microbes** and viruses can be easily spread and the immune system's role is to protect the body from infection. As illustrated below, this system involves many parts of the body and it is made up of a complex network of cells, chemicals, tissues and organs.



The overall function of the immune system is to prevent or limit infection, but overactivity of the system is related to disorders such as **allergies** and **autoimmune** diseases. Therefore, it is essential to develop a deeper understanding of how microorganisms attack our immune system and how the system works in our body.

In this chapter, the readers will learn about the immune system, infectious diseases, and how the system functions to protect the body. Meanwhile, exercises and vaccines as outside interventions are also introduced. The readers are supposed:

- to comprehend and practice the basic expressions in the immune system and infectious diseases;
- to understand the accurate usage of relevant words and improve output proficiency in both general and medical contexts;
- to have a more profound understanding of the immune system, infectious diseases and inflammation, and the basic methods to boost the immune system in daily life.

Part 1 Pre-reading Tasks



Task 1 Topic Discussion Before Reading

Directions: Please read the following instructions and initiate corresponding discussions with your partner.

1. The novel coronavirus respiratory illness (COVID-19) is a public health emergency of global concern. These years researchers have been trying to understand how the immune system responds to COVID-19, and vaccination is suggested to protect people from the virus. Evidence suggests the currently approved or authorized COVID-19 vaccines are highly effective against hospitalization and death. If you were a policy maker in the Center for Disease Control and Prevention (CDC), what will you do to promote the vaccination rate and immunization coverage in your region?



2. Antibiotics were developed to kill or disable certain bacteria, but they don't work for infections caused by viruses. However, many people have a widespread misunderstanding about antibiotics. According to some statistics, four in ten people take antibiotics for a cough or runny nose despite both conditions usually clearing up without treatment. People surveyed also mistakenly believed antibiotics can be used for **fungal** infections and **allergic** reactions. As a result of the misuse of antibiotics, bacteria will become resistant to antibiotics, and many common infectious diseases will no longer be curable. Today, antibiotic resistance and its associated **over-prescription** have been one of the biggest global public health crises. If you were a community practitioner, how would you tell your patient about the correct use of antibiotics in an appropriate manner?
3. In Chinese culture, people are usually unwilling to openly discuss issues of sex. However, adolescents' attitude is changing compared to their previous generations. The change in sexual attitude also leads to issues like premarital sex, unplanned pregnancies, and even sexually transmitted diseases. However, some parents are quite ignorant of the importance of sex education for their children who are turning into adolescents. If you were a senior high school principal, what would you do to promote sex education, especially AIDS prevention for adolescents at school?

Task 2 Language Exercises Before Reading

Directions: Please read the following instructions and finish the language tasks.

1. Persuasion and decision-making are fundamental in healthcare settings. Doctors usually persuade visitors to adopt the medical suggestions that are most suitable to them. Suppose you were a physician and encountered Anita Miranda, a 73-year-old woman. The setting is as follows:

Anita Miranda visits a new primary care provider for a routine appointment. You inform Mrs. Miranda that it is time for her annual influenza vaccine and offer to have a staff member administer it before she leaves. "Oh, I'm not too worried about getting the flu," Mrs. Miranda replies. "But do you have a shot that works for Zika virus? That's all I hear about lately, and I'm really getting scared!"

As we know, flu is a severe illness for older adults who are at much greater risk of serious complications requiring hospitalization. The CDC usually recommends various vaccines for adults based on age, underlying medical conditions, and other considerations. Please share with your partner how you would

persuade Anita Miranda to adopt your suggestion to take the influenza vaccine.

2. Traditional Chinese medicine (TCM) has a long history in China and is used to prevent and treat various diseases. The rising interest in TCM worldwide in recent years can be seen in both market and scientific research. Previous studies reveal the role of TCM in immune regulation and propose a promising future in **immunomodulatory** therapies. In your previous medical learning, have you ever learned the idea that TCM can improve one's immune system? Please write a note at the length of about 150 words to introduce the helpful ways in TCM that strengthen the immune system to your international friends.

Part 2 Text Reading and Analysis



Text 1



How Your Immune System Reacts to the Common Cold?

1 When you catch a cold, your immune system jumps into action. Its first job is to fight the **infection**. The **telltale** symptoms of the common cold, like a cough and **stuffy** nose, are not from the virus itself. Those symptoms appear because of the things that are happening in your body as it responds to the virus.

2 As you start feeling better, your immune system is still working. Its next job is to get your body ready to fight off the virus in the future. This job is harder than the first because many different viruses can cause colds. Your body might learn to fight off one, but there are still others that could make you sick.

3 Let us see what happens in your body when you catch a cold. You will learn about how your immune system fights off cold-causing viruses and how it tries to prevent you from getting sick again.





What Happens in Your Body when You Catch a Cold?

4 Viruses that cause the common cold attach themselves to the cells inside your nose in your **nasal passages** and **sinuses**. After they get inside, the cells start to make copies of themselves. This is called **replication**.

5 It takes about two days for the cells to trigger your immune system to start fighting. They do this by releasing chemical messengers called **cytokines**. Your body responds to the cytokines in a few ways.

6 First, your blood **vessels** will **dilate** to allow infection-fighting white blood cells to get to where the virus is. When the vessels swell, it can make your nose and airway feel stuffy or achy.

7 The white blood cells also release chemicals to help fight off the virus. The chemicals can cause these spaces to get **inflamed**. Fluid can also collect in them, giving you a runny nose and cough.

8 Cold viruses do not damage cells the way that **influenza** viruses do. The symptoms you feel when you have a cold happen because your body is fighting so hard, not because the virus is hurting your cells. When your immune system fights harder than it needs to, it's called overreaction.

Fighting off Future Colds

9 While they're fighting, your white blood cells will get used to the virus making you sick. This is called **sensitization**. Then, your body will start making **proteins** that attach to proteins on the virus and tell your white blood cells to destroy it. These are called **antibodies**.

10 Once you get over a cold, some antibodies against the virus stay in your body. If you are exposed to that virus again, your body will remember and make more antibodies to fight it off. In some cases, that quick response means you won't get sick again. If you do get sick, your cold might not last as long or be as bad as it was the first time.

11 Your body's response sounds like a good plan, but it's not as simple as it sounds. There are more than 200 different viruses that cause colds. Throughout your life, you probably won't get the same one twice. That's why most people get about two to three colds each year.

12 Most colds are caused by **rhinoviruses**. This type of virus can also cause sinus

infections and ear infections, and even trigger **asthma** attacks.

13 Other viruses that cause colds include:

- **Respiratory syncytial virus (RSV):** This virus is very **contagious**, but most people who are generally healthy do not get very sick from RSV. However, babies, older adults, and any person with a weak immune system can get seriously sick if they catch RSV.
- **Parainfluenza** viruses: Even though the name sounds like it, these viruses are not the same as the ones that cause the flu.
- **Adenovirus:** Many colds are caused by this type of virus. However, one type, adenovirus 14, causes severe illness. People who catch it may have a cold that turns into **pneumonia**.
- **Coronaviruses:** Most people have become familiar with this type of virus because one of them, SARS-CoV-2, causes COVID-19. Another respiratory illness, Middle East respiratory **syndrome** (MERS), is also caused by a coronavirus. Many other coronaviruses commonly cause mild colds. Most people will catch at least one coronavirus in their life.
- **Metapneumovirus:** This type of virus causes infections in the upper and lower respiratory tract. The symptoms are usually mild. The virus is most active in the winter and early spring.

Will There Ever Be Vaccine for Colds?

14 Vaccines work by exposing your immune system to proteins on viruses and bacteria. That means your body will start making antibodies without you having to get sick.

15 The flu vaccines and COVID-19 vaccines both work on viruses. You might wonder why we don't have vaccines for colds if they are also caused by viruses. Remember: There are more than 200 viruses that cause colds. We would have to make vaccines for every single one.

Summary

16 The common cold is caused by one of more than 200 different viruses. When your body is exposed to a cold-causing virus, it jumps into action to fight off the infection.



17 Cold viruses don't damage cells as other viruses do. However, there are a lot of changes taking place in your body as your immune system fights off the infection. When you get a runny nose or a cough from a cold, these symptoms are actually signs that your immune system is working.

18 Even after you start feeling better, your immune system is still working. Your body makes proteins called antibodies against the virus that made you sick. If you get exposed to the virus again, your body will remember how to fight it off.

19 That said, there are hundreds of viruses that cause colds. Even if your body has learned how to protect you from one, there are plenty more that can still make you sick.

1.1 Text-based Comprehension Exercises

Directions: Read the text and choose the best answers to the following questions.

1. What does your immune system do when you catch a cold?
 - A. It tries to fight off the virus first.
 - B. It stops working when you start feeling better.
 - C. It tries to fight off the infection first.
 - D. It gets your body ready to fight off the infection in the future.
2. What symptoms will you have when you catch a cold?
 - A. Your nose and airway feel stuffy or achy.
 - B. You get a runny nose.
 - C. You may cough.
 - D. All of the above.
3. Which play the key role in fighting off future colds?
 - A. White blood cells.
 - B. Proteins.
 - C. Antibodies.
 - D. Red blood cells.
4. What makes it difficult to make vaccines for colds?
 - A. There are too many viruses that can cause colds.
 - B. The costs will be too high.
 - C. The procedures will be too complicated.
 - D. There are not enough vaccine manufacturers.
5. Which is TRUE about the immune system according to the text?
 - A. Fighting off the infection is harder than fighting off the virus in the future.

- B. It can't prevent you from getting colds forever.
- C. It can be triggered instantly when you get colds.
- D. The harder it fights, the better it works.

1.2 Getting the Meaning of Technical Terms from Context

Directions: Read the sentences from the text in Column A, and match the underlined words with their correct definitions in Column B.

Column A

1. () Viruses that cause the common cold attach themselves to the cells inside your nose in your nasal passages and sinuses.
2. () They do this by releasing chemical messengers called cytokines.
3. () Cold viruses do not damage cells the way that influenza viruses do.
4. () While they're fighting, your white blood cells will get used to the virus that makes you sick. This is called sensitization.
5. () Once you get over a cold, some antibodies against the virus stay in your body.

Column B

- a. chemicals made by the cells that act on other cells to stimulate or inhibit their function
- b. a state or condition in which the response to a second or later stimulus (e.g. a drug) is greater than the response to the original stimulus (e.g. first administration of the drug)
- c. the spaces in the bone behind your nose
- d. specialized cells of the immune system which can recognize organisms that invade the body (such as bacteria, viruses, and fungi)
- e. a highly contagious viral infection of the respiratory passages causing fever and severe aching, often occurring in epidemics

1.3 Recalling Information

Directions: Mark each statement with T (for True), F (for False) or NG (for Not Given) according to the information given in the text.

1. () The common symptoms of the common cold are from the virus itself.
2. () The white blood cells are significant in fighting off viruses.



3. () Once you get a cold, you probably won't get the same one twice.
4. () Besides rhinoviruses, there are many other viruses that can cause colds.
5. () Cold viruses will damage the cells in your body as other viruses do.

1.4 Answering Questions

Directions: Answer the following questions after reading the text. You may discuss them with your partner.

1. How does your immune system react to a common cold?

2. What happens in your body when you catch a cold?

3. Why do most people get about two to three colds each year?

4. What do you know about other viruses that can cause colds?

5. Do you think it's possible to make vaccines for colds in the future as technology develops?

Text 2



Vaccines Safeguard Our Health

1 We share more than food and culture within our homes and communities. We can also spread disease. Luckily, we live in a time when vaccines can protect us from many of the most serious illnesses. Staying current on our shots helps us—and our neighbors—avoid getting and spreading disease.

2 Vaccines have led to large reductions in illness and death—for both kids and adults—compared with the “pre-vaccine era”, says Dr. David M. Koelle, a vaccine expert at the University of Washington in Seattle. According to a recent report,