END OF TERM 3 REVISION BIOLOGY

تم تحميل هذا الملف من موقع المناهج الإماراتية

موقع المناهج ⇦ المناهج الإماراتية ⇦ الصف الحادي عشر المتقدم ⇦ أحياء ⇦ الفصل الثالث ⇦ ملفات متنوعة ⇦ الملف

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المزيد من مادة أحياء: ملفات ا كتب للمعلم ا كتب للطالب ا اختبارات الكترونية ا اختبارات ا حلول ا عروض بوربوينت ا أوراق عمل منهج انجليزي ا ملخصات وتقارير ا مذكرات وبنوك ا الامتحان النهائي ا للمدرس

إعداد: غادة

التواصل الاجتماعي بحسب الصف الحادي عشر المتقدم

صفحة المناهج الإماراتية على فيسبوك

المواد على تلغرام | التربية الاسلامية | اللغة العربية | اللغة الانجليزية | الرياضيات

المزيد من الملفات بحسب الصف الحادي عشر المتقدم والمادة أحياء في الفصل الثالث

مجمع زايد التعليمي
الخوانيج

BE READY

END OF TERM 3 REVISION

BIOLOGY GRADE 11 ADV

COMPILED BY
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11 ADV-Biology- Inspire-EoT-Coverage-Term3 2025-2026

Academic Year العام الدراسي	2025-2026
Term الفصل	3
Subject المادة	Biology/Inspire الاحياء/انسبير
Grade الصف	11
Stream المسار	Advanced المتقدم
Number of MCQ عدد الأسئلة الموضوعية	30
Marks of MCQ درجة الأسئلة الموضوعية	(3-4)
Number of FRQ عدد الأسئلة المقالية	N/A
Marks per FRQ الدرجات للأسئلة المقالية	N/A
Type of All Questions نوع كافة الأسئلة	MCQ/ الأسئلة الموضوعية
Maximum Overall Grade الدرجة القصوى الممكنة	100
Exam Duration - مدة الامتحان	120 minutes
Mode of Implementation -طريقة التطبيق	SwiftAssess
Calculator الآلة الحاسبة	Allowed مسموحة

(Please refer to the page numbers displayed at the top of each page in the physical student book)

Academic Year / العام الدراسي	2025-2026
Term / الفصل	3
Subject / المادة	Biology/Inspire / الأحياء/إنسبير
Grade / الصف	11
Stream / المسار	Advanced / المتقدم
Number of MCQ / عدد الأسئلة الموضوعية	50
Marks of MCQ / درجة الأسئلة الموضوعية	[14]
Number of FRQ / عدد الأسئلة المقالية	N/A
Marks per FRQ / الدرجة للأسئلة المقالية	N/A
Type of All Questions / نوع كل الأسئلة	MCQ/ الأسئلة الموضوعية
Maximum Overall Grade / الدرجة القصوى للمادة	100
Exam Duration / مدة الامتحان	120 minutes
Mode of Implementation / طريقة التطبيق	Selfhelaaas
Calculator / الآلة الحاسبة	Allowed / مسموحة

(Please refer to the page numbers displayed at the top of each page in the physical student book)

Question* / السؤال*		Learning Outcome/Performance Criteria** / نتاج التعلم معاييرالأداء**	Reference(s) in the Student book (English Version) / المرجع في كتاب الطالب (النسخة الانجليزية) Example/Exercise / تمارين	Page / الصفحة
Pages used are from the "Biology Inspire G11-G12 Advanced Student Edition Volume 1" book.				
MCQ: الأسئلة الموضوعية	1	BIO. 3.1.01.017 Identify ways in which microorganisms can be beneficial	Information from text	3
	1	BIO. 3.1.01.017 Discuss the role of reservoirs in disease dispersal	Information from text Table 1	3
	1	BIO. 3.1.01.017 Identify the pathogens that cause infectious diseases to include bacteria, viruses, fungi protozoa, and parasites	Information from text Table 1	3
	1	BIO. 3.1.01.017 Differentiate between disease patterns to include endemic, epidemic and pandemic	Information from text 'Get it' question	6
	1	BIO. 3.1.01.019 Differentiate between the various types of immune cells, to include WBC (neutrophils macrophages, phagocytes, lymphocytes	Information from text Table 2	14
	1	BIO.3.1.01.019 Identify the function and structures of lymphatic system	Information from text Figure 10	14
	1	BIO. 3.1.01.019 Sequence the steps of the antibody-mediated response and the cytotoxic T cell response as a part of the specific immune system	Information from text	15
	1	BIO.3.1.01.019 Explain why immunizations (vaccinations) are effective in preventing diseases with current real world applications	Table 3	16
	1	BIO.3.1.01.017 Differentiate between the five categories of noninfectious diseases, in terms of cause and examples	Information from text	21
	1	BIO.3.1.01.017 Differentiate between the five categories of noninfectious diseases, in terms of cause and examples	Information from text	21-22
	1	BIO.3.1.01.017 Summarize factors that can cause coronary artery disease	Information from text Figure 13	21
	1	BIO.3.1.01.017 Explain the process of anaphylactic shock	Information from text 'Get it' question	25
	1	BIO.3.1.01.017 Explain how Koch proved the germ theory correct	Information from text 'Get it' question	3-4
	1	BIO.3.1.01.017 Analyze how diseases are transmitted	Information from text 'Get it' question	6-7
	1	BIO.3.1.01.017 Identify the pathogens that cause infectious diseases to include bacteria, viruses, fungi protozoa and parasites	Table 1	3
	1	BIO.3.1.01.017 Explain different ways pathogens can cause diseases including viruses, bacteria and fungi	Information from text	7
	1	BIO.3.1.01.017 Differentiate between bacterial sensitivity and resistance to antibiotics	Information from text	10
	1	BIO.3.1.01.017 Recognize that symptoms are caused by the host's immune system response to invasion of pathogens	Information from text	7-8
	1	BIO.3.1.01.019 Discuss the bodies nonspecific defenses to include first line of defense (barriers) and second line of defense (cellular defense, interferons and inflammatory response)	Information from text 'Get it' question	13
	1	BIO.3.1.01.019 Discuss the bodies nonspecific defenses to include first line of defense (barriers) and second line of defense (cellular defense, interferons and inflammatory response)	Information from text	13
	1	BIO.3.1.01.019 Differentiate between specific and nonspecific immune responses	Information from text	13-13-14
	1	BIO. 3.1.01.019 Explain how immune cells communicate and interact with one another during immune responses	Information from text	15
	1	BIO. 3.1.01.019 Compare and contrast passive and active immunity	Information from text	18
	1	BIO. 3.1.01.019 Analyze how HIV can cause immune system failure	Information from text	19-20
	1	BIO.3.1.01.017 Differentiate between the five categories of noninfectious diseases, in terms of cause and examples	Information from text	22
	1	BIO. 3.1.01.017 Infer why cancer is life threatening	Information from text	22
	1	BIO. 3.1.01.017 Explain autoimmune disorders, to include rheumatoid arthritis, rheumatic fever and lupus	Information from text Figure 17	24
	1	BIO.3.1.01.017 Analyze the increase in the occurrence of antibiotic-resistant bacteria	Information from text Figure 7	10-11
	1	BIO. 3.1.01.019 Compare and contrast passive and active immunity	Information from text	17-18
	1	BIO.3.1.01.017 Differentiate between inflammatory response and inflammatory disease	Information from text	22

* Questions might appear in a different order in the actual exam, or on the exam paper

* قد تظهر الأسئلة بترتيب مختلف في الامتحان الفعلي، أو على ورقة الامتحان

** Skill appears in the textbook, LMS, and (Mak_IT).

** تم ورد في كتاب الطالب والمنصة التعليمية .

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LESSON 1
INFECTIOUS DISEASES

1	BIO. 3.1.01.087 Identify ways in which microorganisms can be beneficial	Information from text	3

Pathogens Cause Infectious Disease

What do a cold and athlete's foot have in common? They are both examples of an infectious disease. An **infectious disease** is a disease that is caused by a pathogen passed from one organism to another, disrupting homeostasis in the organism's body. Agents called **pathogens** are the cause of infectious diseases. Some, but not all, types of bacteria, viruses, protozoans, fungi, and parasites are pathogens.

Many types of these organisms present in the world around us do not cause infectious diseases. Your body benefits from organisms, such as certain types of bacteria and protozoans, that normally live in your intestinal and reproductive tracts. Other bacteria live on your skin, especially in the shafts of your hair follicles. These organisms keep pathogens from thriving and multiplying on your body.

On the skin and in the shafts of hair follicles, some bacteria help protect against infection.

In the reproductive tract, some bacteria maintain reproductive health.

In the intestinal tract, some bacteria help in the digestion of food.

Past ministry exams

Which scientist established a method for determining whether a microorganism caused a specific disease?

Koch

Hooke

Mendel

Sagan

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Past ministry exams

2. Which scientist established a method for determining whether a microorganism caused a specific disease?

A Koch
CORRECT

Sagan

Hooke

Mendel

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13	BIO.3.1.01.087 Explain how Koch proved the germ theory correct	Information from text 'Get it' question	3-4

Germ Theory and Koch's Experiments

Before the invention of the microscope, people thought "something" passed from a sick person to a well person to cause an illness. Then, scientists discovered microorganisms and Louis Pasteur demonstrated that microorganisms from the air are able to grow in nutrient solutions. With the knowledge gained from these and other discoveries, doctors and scientists began to develop the germ theory. The germ theory states that some microorganisms are pathogens. However, scientists were not able to clearly demonstrate this theory until Robert Koch developed his postulates.

Identification of the first disease pathogen

In the late 1800s, Robert Koch, a German physician, was studying anthrax (AN thraks)—a deadly disease that affects cattle and sheep and can also affect people. Koch isolated bacteria, like those in **Figure 1**, from the blood of cattle that had died from anthrax. After growing the bacteria in the laboratory, Koch injected the bacteria into healthy cattle. These animals developed the disease anthrax. He then isolated bacteria from the blood of newly infected cattle and grew the bacteria in the laboratory. The characteristics of the two sets of cultures were identical, indicating that the same type of bacteria caused the illness in both sets of cattle. Thus, Koch demonstrated that the bacteria he originally isolated were the cause of anthrax.

Get It?

Explain how Koch proved the germ theory correct.

Color-Enhanced SEM Magnification: unavailable

Figure 1 These rodlike bacteria cause the disease anthrax.

Past ministry exams

The figure below represents the anthrax bacteria, which Koch isolated from the cattle . After of the following is not one of the Koch's postulates?

The suspected pathogen must be isolated from the disease host in half the cases of the disease

The suspected pathogen must be grown in pure culture on artificial media in the laboratory

The suspected pathogen must cause the same disease when injected in a healthy new host

The suspected pathogen must be isolated from the new host

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Past ministry exams

The figure below represents the anthrax bacteria, which Koch isolated from the cattle. After growing the bacteria in the laboratory, he injected the bacteria in a healthy animal. Which of the following is **not** one of the Koch's postulates?

a. The suspected pathogen must be isolated from the disease host in half the cases of the disease

b. The suspected pathogen must be grown in pure culture on artificial media in the laboratory

c. The suspected pathogen must cause the same disease when injected in a healthy new host

d. The suspected pathogen must be isolated from the new host

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2	BIO. 3.1.01.087 Discuss the role of reservoirs in disease dispersal	Information from text Table 1	5

Spread of Disease

Although there are a large number of microorganisms, only a few cause disease. Some might cause mild diseases, such as the common cold. Others cause serious diseases, such as meningitis, an infection of the coverings of the brain and spinal cord. **Table 1** lists some human infectious diseases. For a pathogen to spread, it must have both a reservoir and a way to spread. A disease **reservoir** is a source of the pathogen in the environment. Reservoirs might be animals, people, or inanimate objects, such as soil.

Human reservoirs

Humans are the main reservoir for pathogens that affect humans. Many pathogens might be passed on to other hosts before the person even knows he or she has the disease. An individual that is symptom-free but capable of passing the pathogen is called a carrier. Pathogens that cause colds, the flu, and sexually transmitted diseases, such as HIV, can be passed on without the person knowing he or she is infected.

Animal reservoirs

Other animals also are reservoirs of pathogens that can be passed to humans. Influenza and rabies are examples of human diseases listed in **Table 1** that are caused by pathogens passed to humans from other animals. Influenza can infect pigs. Rabies is found in domestic dogs and many wild animals, such as bats, skunks, and raccoons.

Other reservoirs

Some bacteria normally found in the soil, such as tetanus bacteria, can cause disease in humans. The tetanus bacteria can cause a serious infection if it contaminates a deep wound in the body. Contamination of wounds by bacteria was a major cause of death during wars before the development of antibiotics and vaccinations.

Contaminated water or food is another reservoir of pathogens for human disease. One of the main purposes of sewage treatment plants is the safe disposal of human feces, which prevents contamination of the water supply by pathogens. Contaminated water used in growing or preparing food can transfer pathogens. Food also can become contaminated through contact with humans or insects such as flies.

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2	BIO. 3.1.01.087 Discuss the role of reservoirs in disease dispersal	Information from text Table 1	5

Table 1 Human Infectious Diseases

Disease	Cause	Affected Organ System	How Disease is Spread
Tetanus	Bacterium	Nervous system	Soil in deep puncture wound
Strep throat	Bacterium	Respiratory system	Droplets/direct contact
Lyme disease	Bacterium	Skeletal and nervous systems	Vector (tick)
Chicken pox	Virus	Skin	Droplets/direct contact
Rabies	Virus	Nervous system	Animal bite
Influenza (the flu)	Virus	Respiratory system	Droplets/direct contact
Hepatitis B	Virus	Liver	Direct contact with exchange of body fluids
Giardia	Protozoan	Digestive tract	Contaminated water
Malaria	Protozoan	Blood and liver	Vector (mosquito)
Athlete's foot	Fungus	Skin	Direct contact or contaminated objects

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3	,BIO. 3.1.01.087 Identify the pathogens that cause infectious diseases to include bacteria, viruses, fungi protozoa, and parasites	Information from text Table 1	5

Table 1 Human Infectious Diseases

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15	,BIO.3.1.01.087 Identify the pathogens that cause infectious diseases to include bacteria, viruses, fungi protozoa and parasites	Table 1	5

Table 1 Human Infectious Diseases

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Past ministry exams

Why can infectious disease spread easily between people?

Because symptoms appear immediately
Because people cannot carry pathogens
Because pathogens can be passed before a person knows they are sick
Because all diseases are non-infectious

A disease.....is a source of the pathogen in the environment.

Interferon
Pandemic
Epidemic
reservoir

Which of the following is an example of an inanimate reservoir?

Animal
bacteria
Soil
insects

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Past ministry exams

Why can infectious diseases spread easily between people?

Because symptoms appear immediately

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Because pathogens can be passed before a person knows they are sick

Because all diseases are non-infectious

A disease ____ is a source of the pathogen in the environment.

interferon

pandemic

epidemic

reservoir

Which of the following is an example of an inanimate reservoir?

Human

Dog

Soil

Bacteria

14	BIO.3.1.01.087 Analyze how diseases are transmitted	Information from text 'Get it' question	6-7

Transmission of pathogens

Pathogens are transmitted to humans in four main ways: direct contact, indirectly through the air, indirectly through touching contaminated objects, or by organisms called vectors that carry pathogens. **Figure 3** illustrates some of the ways pathogens can be transmitted to humans.

Direct contact Direct contact with other humans is one of the major modes of transmission of pathogens. Diseases such as colds, infectious mononucleosis (mah noh new klee OH sus) (commonly referred to as mono, or the "kissing disease"), herpes (HUR peez), and sexually transmitted diseases are caused by pathogens passed through direct contact, even if the person is a carrier.

Indirect contact Some pathogens can be passed through the air. When a person with an infectious disease sneezes or coughs, pathogens can be passed along with the tiny mucus droplets. These droplets then can spread pathogens to another person or to an object.

Many organisms can survive on objects handled by humans. Cleansing of dishes, utensils, and countertops with detergents, as well as careful hand-washing help prevent the spread of diseases that are passed in this manner. As a result, there are various food rules that restaurants must abide by that are based on preventing the spread of disease.

Vectors Certain diseases can be transmitted by vectors. The most common vectors are arthropods, which include biting insects such as mosquitoes and ticks. Recall from **Table 1** on the previous page that Lyme disease and malaria are diseases that are passed to humans by vectors. The Zika virus is another exmple of a disease that can be passed to humans by a vector. The Zika virus, which is currently spreading across South America and North America, is transmitted to humans by infected mosquitoes. The mosquitoes become infected when they bite a person who is already infected with the Zika virus. The West Nile virus, cases of which were reported in 47 states in 2016, is transmitted from horses and other mammals to humans by mosquitoes. Flies can transmit pathogens by landing on infected materials, such as feces, and then landing on materials handled or eaten by humans.

Get It?

Describe how diseases are spread to humans.

Past ministry exams

Which of the following is the most common way infectious diseases spread between people?

Genetic inheritance
Air droplets (coughing and sneezing)
Muscle movement
Bone growth

Which type of disease transmission is shown?

Direct contact
Object transmission
Air transmission
Vector transmission

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Past ministry exams

Which of the following is the most common way infectious diseases spread between people?

Through genetic inheritance

Through air droplets (coughing and sneezing)

Through muscle movement

Through bone growth

Which type of disease transmission is shown?

direct contact

object transmission

air transmission

vector transmission

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16	BIO.3.1.01.087 Explain different ways pathogens can cause diseases including viruses, bacteria and fungi	Information from text	7

Symptoms of Disease

When you become ill with a disease such as the flu, why do you feel aches and pains, and why do you cough and sneeze? The pathogen, such as the influenza virus or bacteria, has invaded some of the cells of your body. The virus multiplies in the cells and leaves the cells either by exocytosis, or by causing the cell to burst. Thus, the virus damages tissues and even kills some cells. When pathogenic bacteria invade the body, harmful chemicals or toxins might be produced. The toxins can be carried throughout the body via the bloodstream and damage various parts of the body.

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18	BIO.3.1.01.087 Recognize that symptoms are caused by the host's immune system response to invasion of pathogens	Information from text	7-8

Toxins produced by some pathogens can affect specific organ systems. The tetanus bacteria produce a potent toxin that causes spasms in voluntary muscles. The disease botulism (BAH chuh lih zum) usually is caused when a person consumes food in which the botulism bacteria have grown and produced a toxin. This toxin paralyzes nerves. The toxin from the botulism bacteria can cause disease in humans even when no bacteria are present.

Some types of bacteria, some protozoans, and all viruses invade and live inside cells, causing damage. Because the cells are damaged, they might die, causing symptoms in the host. Some disease symptoms, such as coughing and sneezing, are triggered by the immune system, as discussed later in this module. For a closer look at research on the immune system, examine **Figure 4**, on the next page.

Get It?

Describe what happens when a person consumes food that contains botulism bacteria.

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A ..... is a substance that can kill or inhibit the growth of the infectious microorganisms.

Antibiotic
Vector
Toxin
reservoir

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Past ministry exams

A ____ is a substance that can kill or inhibit the growth of infectious microorganisms

- antibiotic
- vector
- toxin
- reservoir

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4	BIO. 3.1.01.087 Differentiate between disease patterns to include endemic, epidemic and pandemic	Information from text 'Get it' question	8

Disease Patterns

As outbreaks of diseases spread, certain patterns are observed. Agencies such as community health departments, the Centers for Disease Control and Prevention (CDC), and the World Health Organization (WHO) continually monitor disease patterns to help control the spread of diseases. The CDC, with headquarters in Atlanta, Georgia, receives information from doctors and medical clinics and publishes a weekly report about the incidence of specific diseases, as shown in **Figure 5**. The WHO similarly watches disease incidence throughout the world.

Some diseases, such as the common cold, are known as **endemic diseases** because small numbers of incidents are continually found within the population. Sometimes, a particular disease will have a large outbreak in an area and afflict many people, causing an **epidemic.** In 2003, there was an epidemic of severe acute respiratory syndrome (SARS). If an epidemic is widespread throughout a large region, such as a country, continent, or the entire globe, it is described as **pandemic.** HIV is an example of a pandemic. Influenza has led to several pandemics throughout history, including the Spanish flu in 1918, the Asian flu in 1957, and the Hong Kong flu in 1968. Each of the these flu pandemics killed millions of people worldwide.

TABLE 2. Reported cases of notifiable diseases,* by geographic division and area – United States, 2014

Area	Total resident population (in thousands)	Lyme disease
UNITED STATES	318,856	33,461
NEW ENGLAND	14,681	11,292
Connecticut	3,597	2,360
Maine	1,330	1,401
Massachusetts	6,745	5,304
New Hampshire	1,327	724
Rhode Island	1,055	904
Vermont	627	599
MID. ATLANTIC	41,471	14,509
New Jersey	8,938	3,286
New York (Upstate)	11,255	2,887
New York City	8,491	849
Pennsylvania	12,787	7,487
E.N. CENTRAL	46,740	1,950
Illinois	12,881	233
Indiana	6,597	110
Michigan	9,910	127
Ohio	11,594	119

Figure 5 The Centers for Disease Control and Prevention publish reports on the incidence of certain diseases.

Infer *how these reports are helpful in understanding disease patterns.*

Get It?

Compare and contrast an epidemic and a pandemic.

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Which is a disease that has a large outbreak in an area and afflict many people?

Epidemic
Endemic
Pandemic
reservoir

When a disease becomes widespread in a particular area, it is called a\an.....

Epidemic
Endemic
Pandemic
Infectious disease

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1.

Which is a disease that has a large outbreak in an area and afflicts many people?

A epidemic CORRECT

endemic

pandemic

reservoir

2. When a disease becomes widespread in a particular area, it is called a/an _____.

a) pandemic
b) epidemic
c) endemic disease
d) infectious disease

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17	BIO.3.1.01.087 Differentiate between bacterial sensitivity and resistance to antibiotics	Information from text	10

Treating and Fighting Diseases

A medical professional may prescribe a drug to help the body fight a disease. One type of prescription drug is an **antibiotic** (an ti bi AH tihk), which is a substance that can kill or inhibit the growth of microorganisms. Penicillin is secreted by the fungus *Penicillium*, which is shown in **Figure 6**. This fungus secretes the chemical penicillin to kill competing bacteria that grow on the fungal food source. Penicillin was isolated, purified, and first used in humans during World War II. Many other fungal secretions are used as antibiotics, such as erythromycin, neomycin, and gentamicin. Synthetic antibiotics also have been developed by pharmaceutical companies.

Figure 6 Penicillin, a widely used antibiotic, is secreted by the mold called *Penicillium*, shown growing on these oranges.

Determine *why many strengths and varieties of penicillin and other antibiotics are needed.*

Chemical agents also are used in the treatment of protozoan and fungal diseases. Some antiviral drugs are used to treat herpes infections, influenza in the elderly, and HIV infections. Most viral diseases are handled by the body's built-in defense system—the immune system.

Get It?

Explain the history of the use of penicillin as an antibiotic.

HEALTH Connection Over the last 60 years, the widespread use of antibiotics has caused many bacteria to become resistant to particular antibiotics. Natural selection occurs when organisms with favorable variations survive, reproduce, and pass their variations to the next generation. Bacteria in a population might have a trait that enables them to survive when a particular antibiotic is present. These bacteria can reproduce quickly and pass on the variation. Because reproduction can occur so rapidly in bacteria, the number of antibiotic-resistant bacteria in a population can increase quickly, too.

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28	BIO.3.1.01.087 Analyze the increase in the occurrence of antibiotic-resistant bacteria	Information from text Figure 7	10-11

Problems resulting from antibiotic resistance

Antibiotic resistance of bacteria has presented the medical community with problems when treating certain diseases. For example, penicillin was used effectively for many years to treat gonorrhea (gah nuh REE uh), a sexually transmitted disease, but now most strains of gonorrhea bacteria are resistant to penicillin. As a result, new drug therapies are needed to treat gonorrhea. **Figure 7**, on the next page, shows the increase in gonorrhea resistance from 1980–1990.

Another treatment problem is with staphylococcal disease—it is acquired in high-density living conditions, which can result in skin infections, pneumonia (noo MOH nyuh), or meningitis. These staphylococci are often strains of bacteria that are resistant to many current antibiotics and can be difficult to treat.

For example, MSRA, or methicillin-resistant *Staphylococcus aureus*, is a type of bacteria that is a common cause of infections in hospitals and other healthcare facilities. It is spread by direct contact, usually from the contaminated hands of healthcare providers.

Streptococcus pneumonia is another bacterium that has become resistant to antibiotics. This bacterium causes pneumonia, sinus infections, and infections in the bloodstream. The bacterium that causes tuberculosis, a respiratory infection, can be resistant to the initial antibiotics used to treat the infection. In these cases, different medications are used to treat the infection, but it takes more time and can be more expensive. Scientists are continually researching solutions to treat antibiotic-resistant bacteria.

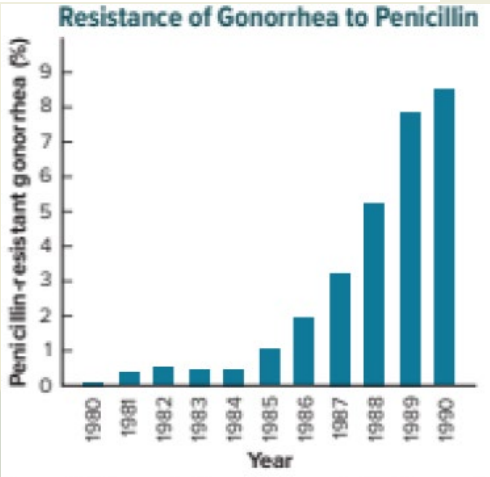

Figure 7 The graph shows the reported incidence of penicillin-resistant gonorrhea in the U.S. from 1980–1990.

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LESSON 2
THE IMMUNE SYSTEM

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21	BIO.3.1.01.088 Differentiate between specific and nonspecific immune responses	Information from text	12-13-14

Nonspecific Immunity

At the time of birth, the body has a number of defenses in the immune system that fight off pathogens. These defenses are nonspecific because they are not aimed at a specific pathogen. They protect the body from any pathogen that the body encounters.

The nonspecific immunity provided by the body helps to prevent disease. Nonspecific immunity also helps to slow the progression of the disease while the specific immunity begins to develop its defenses. Specific immunity is the most effective immune response, but nonspecific immunity is the first line of defense.

Barriers

Like the strong walls of a fort, barriers are used by the body to protect against pathogens. These barriers are found in areas of the body where pathogens might enter.

Skin barrier The first major line of defense is the unbroken skin and its secretions. Skin contains layers of living cells covered by many layers of dead skin cells. By forming a barrier, the layers of dead skin cells help protect against invasion by microorganisms. Of the many different types of bacteria that normally live on the skin, most have little or no effect on our health. Many of the bacteria that live symbiotically on the skin digest skin oils to produce acids that inhibit many pathogens. **Figure 8** shows bacteria that are normally found on the skin and protect the skin from attack.

SEM Magnification: unavailable

Staphylococcus epidermidis

Figure 8 These bacteria are found on human skin and provide protection from pathogens.

FOCUS QUESTION

How do nonspecific and specific immunity compare?

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19	BIO.3.1.01.088 Discuss the bodies nonspecific defenses to include first line of defense (barriers) and second line of defense (cellular defense, interferons and inflammatory response)	Information from text 'Get it' question	13

Chemical barriers Saliva, tears, and nasal secretions contain the enzyme lysozyme. Lysozyme breaks down bacterial cell walls, which kills pathogens.

Another chemical defense is mucus, which is secreted by many inner surfaces of the body. It acts as a protective barrier, blocking bacteria from sticking to the inner epithelial cells. Cilia also line the airway. Their beating motion sends any bacteria caught in the mucus away from the lungs. When the airway becomes infected, extra mucus is secreted, which triggers coughing and sneezing to help move the infected mucus out of the body.

A third chemical defense is the hydrochloric acid secreted in your stomach. In addition to digestion, stomach acid kills many microorganisms found in food that could cause disease.

Get It?

Compare and contrast the different types of barriers of the immune system.

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20	BIO.3.1.01.088 Discuss the bodies nonspecific defenses to include first line of defense (barriers) and second line of defense (cellular defense, interferons and inflammatory response)	Information from text	13

Nonspecific responses to invasion

Even if an enemy gets through the walls of a town's fort, defense doesn't end. Similarly, the body has nonspecific immune responses to pathogens that get beyond its barriers.

Cellular defense If foreign microorganisms enter the body, the cells of the immune system, shown in **Table 2**, on the next page, defend the body. One method of defense is phagocytosis. White blood cells, especially neutrophils and macrophages, are phagocytic. Recall that phagocytosis is the process by which phagocytic cells surround and internalize the foreign microorganisms. The phagocytes then release digestive enzymes and other harmful chemicals from their lysosomes, destroying the microorganism.

A series of about 20 proteins that are found in the blood plasma are called complement proteins. **Complement proteins** enhance phagocytosis by helping the phagocytic cells bind better to pathogens and activating the phagocytes. Some complement proteins can form a complex in the plasma membrane of a pathogen. This complex forms a pore, which aids in the destruction of the pathogen, as shown in **Figure 9**.

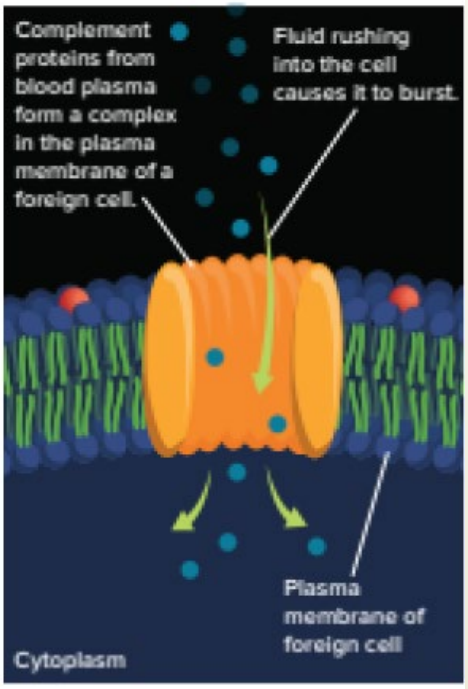

Figure 9 For some pathogens, complement proteins can form a pore in the plasma membrane of the invading cell.

Interferon When a virus enters the body, another cellular defense helps prevent the virus from spreading. Virus-infected cells secrete a protein called **interferon.** Interferon binds to neighboring cells and stimulates these cells to produce antiviral proteins which can prevent viral replication in these cells.

Inflammatory response Another nonspecific response, the inflammatory response, is a complex series of events that involves many chemicals and immune cells that help enhance the overall immune response. When pathogens damage tissue, chemicals are released by both the invader and cells of the body. These chemicals attract phagocytes to the area, increase blood flow to the infected area, and make blood vessels more permeable to allow white blood cells to escape into the infected area.
This response aids in the accumulation of white blood cells in the area. Some of the pain, heat, and redness experienced during an infectious disease are the result of the inflammatory response.

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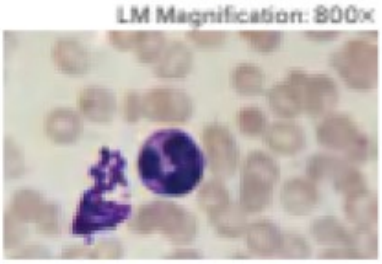
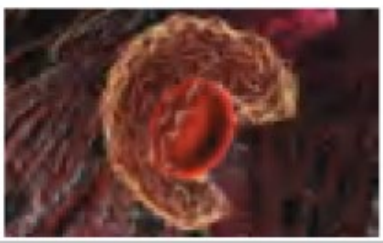
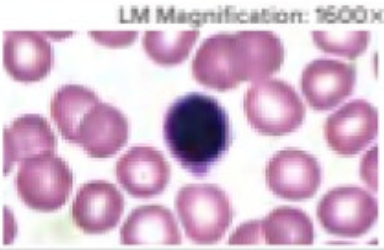
21	BIO.3.1.01.088 Differentiate between specific and nonspecific immune responses	Information from text	12-13-14

Table 2 Cells of the Immune System

Type of Cell	Example	Function
Neutrophils	LM Magnification: 800× 	Phagocytosis: blood cells that ingest bacteria
Macrophages		Phagocytosis: blood cells that ingest bacteria and remove dead neutrophils and other debris
Lymphocytes	LM Magnification: 1600× 	Specific immunity (antibodies and killing of pathogens): blood cells that produce antibodies and other chemicals

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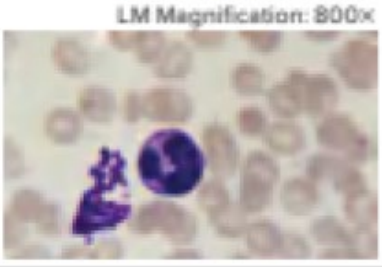
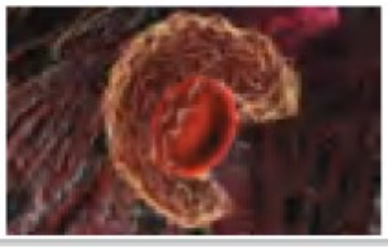
5	,BIO. 3.1.01.089 Differentiate between the various types of immune cells, to include WBC (neutrophils (macrophages, phagocytes, lymphocytes	Information from text Table 2	14

Table 2 Cells of the Immune System

Type of Cell	Example	Function
Neutrophils	LM Magnification: 800× 	Phagocytosis: blood cells that ingest bacteria
Macrophages		Phagocytosis: blood cells that ingest bacteria and remove dead neutrophils and other debris
Lymphocytes	LM Magnification: 1600×	Specific immunity (antibodies and killing of pathogens): blood cells that produce antibodies and other chemicals

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Which is the first defense your body has against infectious disease?

The helper T cell
An antibody
Your skin
phagocytosis

Complement proteins are found in the plasma. What is their role in the immune response?

Enhance phagocytosis
Activate phagocytes
Enhance destruction of a pathogen
All of the above

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Past ministry exams

3. Which is the first defense your body has against infectious disease?

- the helper T cell
- C your skin CORRECT
- an antibody
- phagocytosis

4. Complement proteins are found in the plasma. What is their role in the immune response?

- enhance phagocytosis
- enhance destruction of a pathogen
- activate phagocytes
- D all of the above CORRECT

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6	BIO.3.1.01.089 Identify the function and structures of lymphatic system	Information from text Figure 10	14

Specific Immunity

Pathogens sometimes get past the nonspecific defense mechanisms. In this event, the body has a second line of defense that attacks the pathogens. Specific immunity is more effective and involves the tissues and organs found in the lymphatic system.

Lymphatic system

The lymphatic system, shown in **Figure 10**, includes organs and cells that filter lymph and blood, destroy foreign microorganisms, and absorb fat. Lymph is the watery part of the blood (the plasma) that leaks out of capillaries to bathe all the cells in the body. This clear fluid, containing oxygen, nutrients, and white blood cells, circulates among the tissue cells, is collected by lymphatic vessels, and is returned to the circulatory system via the veins near the heart.

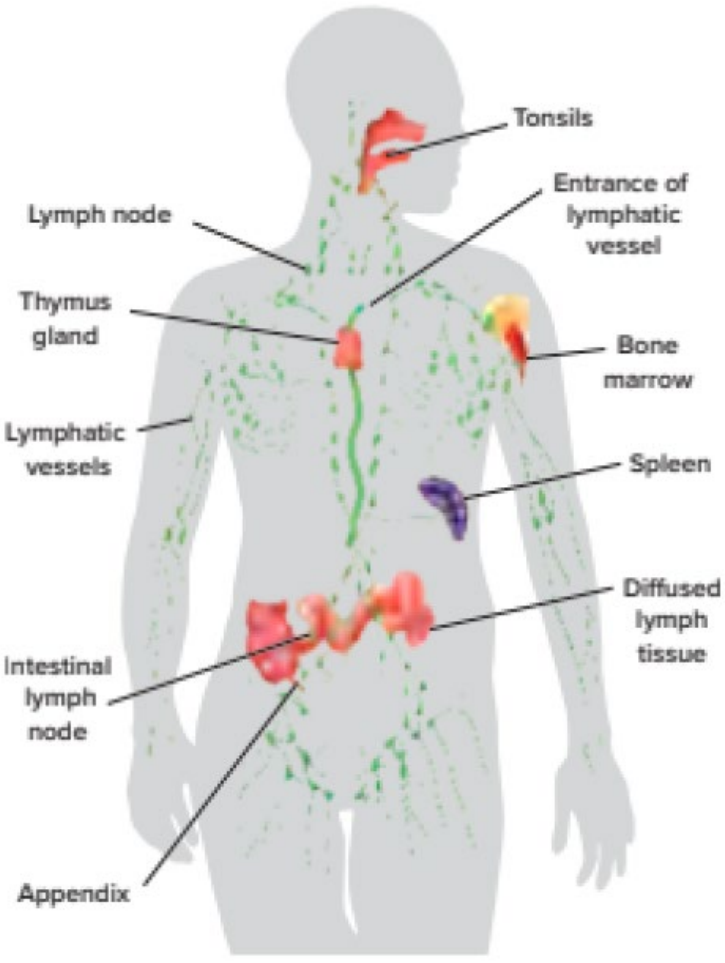

Figure 10 The lymphatic system contains the organs involved in the specific immune response.

Identify *the lymphatic organ where T cells mature.*

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22	BIO. 3.1.01.089 Explain how immune cells communicate and interact with one another during immune responses	Information from text	15

Lymphatic organs

The organs of the lymphatic system contain lymphatic tissue, lymphocytes, a few other cell types, and connective tissue. **Lymphocytes** are a type of white blood cell that is produced in red bone marrow. The lymphatic organs include the lymph nodes, tonsils, spleen, thymus (THI mus) gland, and diffused lymphatic tissue found in mucous membranes of the intestinal, respiratory, urinary, and genital tracts.

The lymph nodes filter the lymph and remove foreign materials from the lymph. The tonsils form a protective ring of lymphatic tissue between the nasal and oral cavities. This helps protect against bacteria and other harmful materials in the nose and mouth.

The spleen stores blood and destroys damaged red blood cells. It also contains lymphatic tissue that responds to foreign substances in the blood. The thymus gland, which is located above the heart, plays a role in activating a special kind of lymphocyte called T cells. T cells are produced in the bone marrow, but they mature in the thymus gland.

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What is the type of white blood cell that is produced in bone marrow and includes B and T cells?

Lymphocytes
Antigen
Antibodies
Lymph nodes

B cells, helper T cells and cytotoxic T cells are involved with..... Immunity.

Genetic
Nonspecific
Specific
hormonal

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B cells, helper T cells, and cytotoxic T cells are involved with __ immunity.

- A) genetic
- B) nonspecific
- C) specific
- D) hormonal

Correct Answer

C) specific

17) What is the type of white blood cell that is produced in bone marrow and includes B and T cells?

- lymphocytes
- antigens
- antibodies
- lymph nodes

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7	BIO. 3.1.01.089 Sequence the steps of the antibody-mediated response and the cytotoxic T cell response as a part of the specific immune system	Information from text	15

B Cell Response

B lymphocytes, often called **B cells,** are located in all lymphatic tissues and can be thought of as antibody factories. **Antibodies** are proteins produced by B lymphocytes that specifically react with a foreign antigen. An antigen is a substance foreign to the body that causes an immune response; it can bind to an antibody or T cell. When a portion of a pathogen is presented by a macrophage, B cells produce antibodies. Follow along in **Figure 11** on the next page as you learn about how B cells are activated to produce antibodies.

When a macrophage surrounds, internalizes, and digests a pathogen, it takes a piece of the pathogen, which is called a processed antigen, and displays it on its membrane, as illustrated in **Figure 11**. In the lymphatic tissues, such as the lymph nodes, the macrophage, with the processed antigen on its surface, binds to a type of lymphocyte called a **helper T cell.** This process activates the helper T cell. This lymphocyte is called a "helper" because it activates antibody secretion in B cells and another type of T cell, which will be discussed later, that aids in killing microorganisms:

- The activated helper T cell reproduces, binds processed antigens, and attaches to a B cell.
- The new helper T cells continue the process of binding antigens, attaching to B cells, and reproducing.
- Once an activated helper T cell binds to a B cell holding an antigen, the B cell begins to manufacture antibodies that specifically bind to the antigen.
- The antibodies can enhance the immune response by binding to microorganisms, making them more susceptible to phagocytosis and, by initiating the inflammatory response, helping promote the nonspecific response.

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7	BIO. 3.1.01.089 Sequence the steps of the antibody-mediated response and the cytotoxic T cell response as a part of the specific immune system	Information from text	15

B cells make many combinations of antibodies by using DNA that codes for the production of various heavy and light protein chains that make up antibodies, as shown in **Figure 12.** Any heavy chain can combine with any light chain. If a B cell can make 16,000 different kinds of heavy chains and 1200 kinds of light chains, it can make 19,200,000 different types of antibodies (1200 × 16,000).

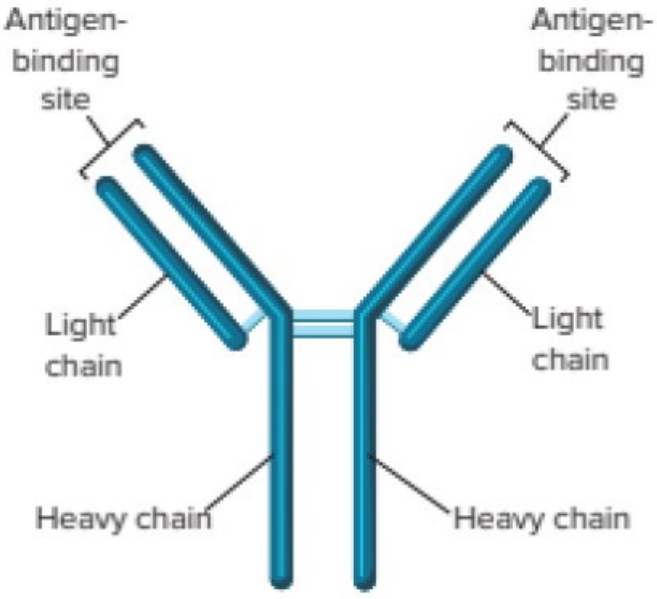

Figure 12 Antibodies are made up of two types of protein chains—heavy and light chains.

T Cell Response

Once helper T cells are activated by the presentation of an antigen by macrophages, helper T cells can also bind to and activate a group of lymphocytes called cytotoxic T cells. Activated **cytotoxic T cells** destroy pathogens and release chemicals called cytokines. Cytokines stimulate the cells of the immune system to divide and recruit immune cells to an area of infection. Cytotoxic T cells bind to pathogens, release a chemical attack, and destroy the pathogens. Multiple target cells can be destroyed by a single cytotoxic T cell. **Figure 11**, on the previous page, summarizes the activation of cytotoxic T cells.

Get It?

Summarize the role that lymphocytes play in immunity.

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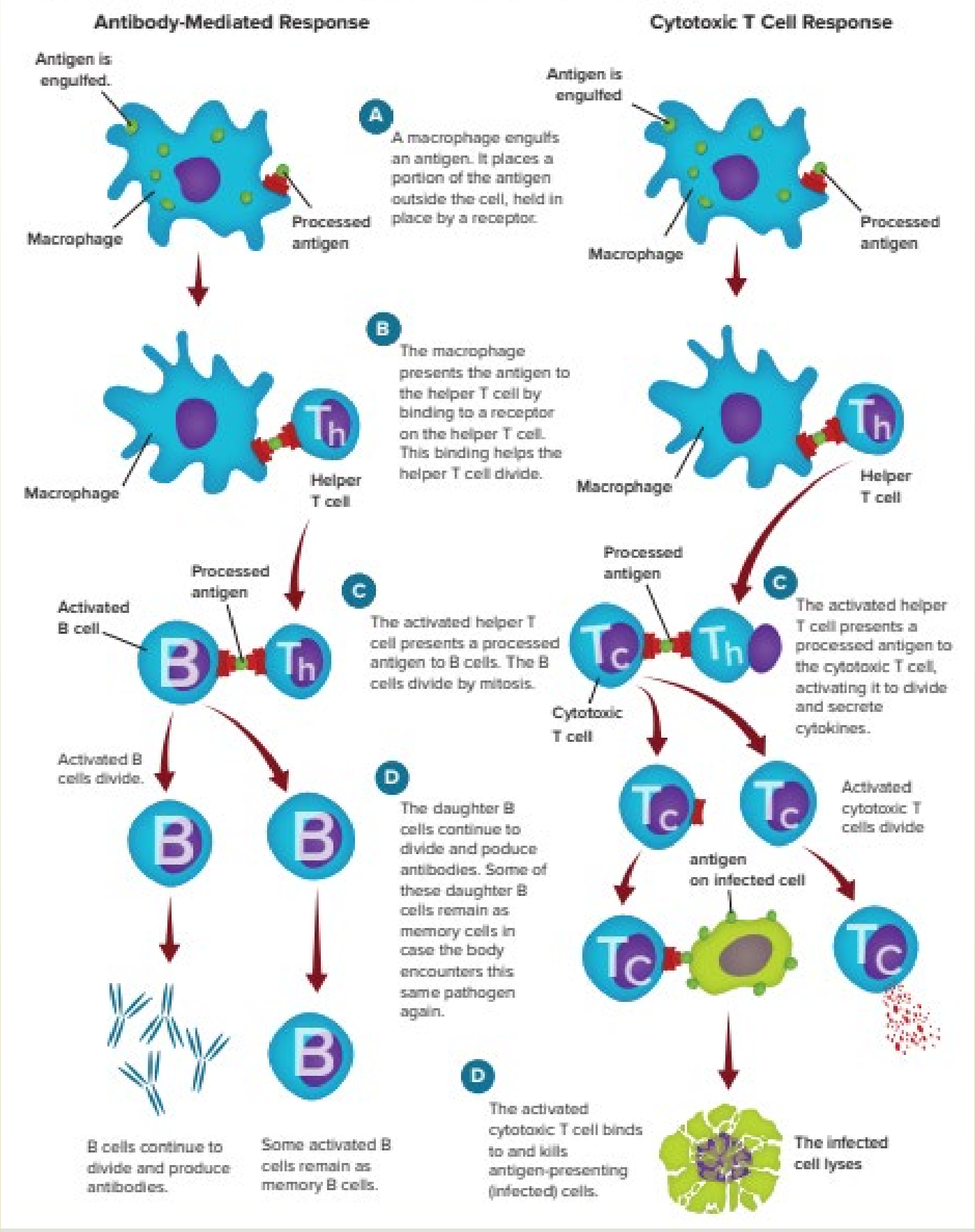
Antibody-Mediated Response
Antigen is engulfed.
Macrophage
Processed antigen
A
A macrophage engulfs an antigen. It places a portion of the antigen outside the cell, held in place by a receptor.
B
The macrophage presents the antigen to the helper T cell by binding to a receptor on the helper T cell. This binding helps the helper T cell divide.
Macrophage
Th
Helper T cell
Processed antigen
Activated B cell
B
Th
C
The activated helper T cell presents a processed antigen to B cells. The B cells divide by mitosis.
Activated B cells divide.
B
B
D
The daughter B cells continue to divide and poduce antibodies. Some of these daughter B cells remain as memory cells in case the body encounters this same pathogen again.
B
B cells continue to divide and produce antibodies.
Some activated B cells remain as memory B cells.
Cytotoxic T Cell Response
Antigen is engulfed
Macrophage
Processed antigen
Th
Macrophage
Helper T cell
Processed antigen
Tc
Th
C
The activated helper T cell presents a processed antigen to the cytotoxic T cell, activating it to divide and secrete cytokines.
Cytotoxic T cell
Tc
Tc
Activated cytotoxic T cells divide
antigen on infected cell
Tc
Tc
D
The activated cytotoxic T cell binds to and kills antigen-presenting (infected) cells.
The infected cell lyses

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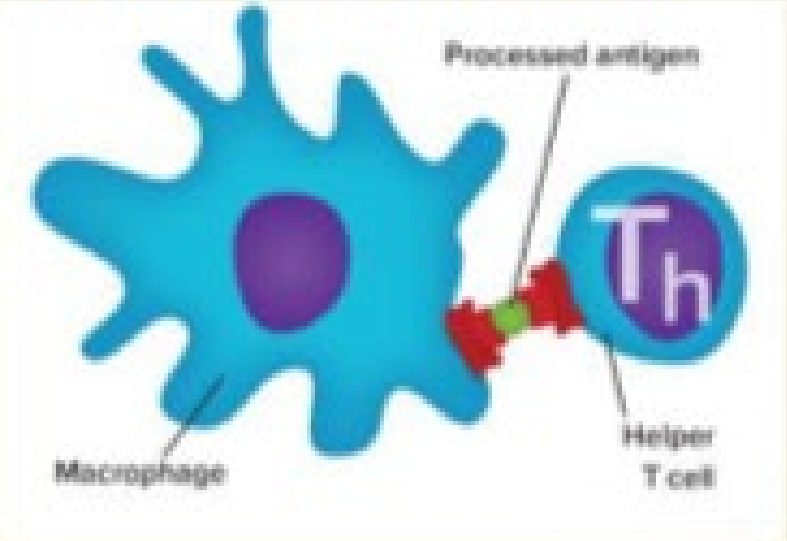
What kind of immune response is demonstrated in the diagram?

Genetic

Nonspecific

Specific

hormonal



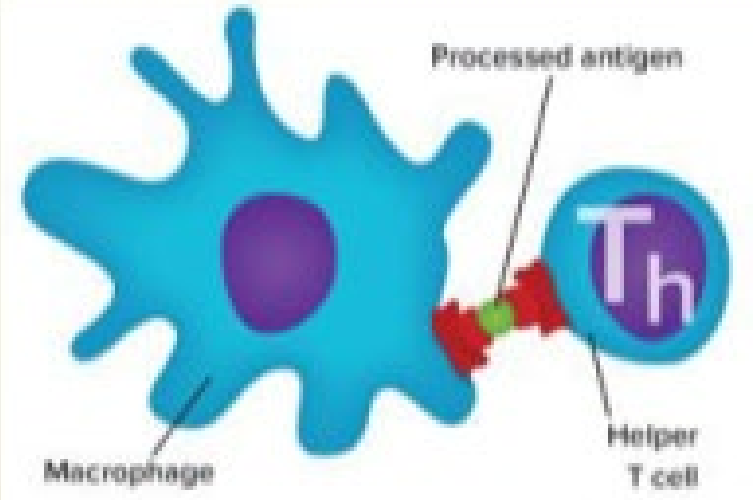
To which does the activated helper T cell present its antigen?

A pathogen

Bone marrow

A B cell

The thymus gland



.....is a cell that activates B cells and cytotoxic T cells.

Helper T cell

Memory cell

Lymphocyte

interferon

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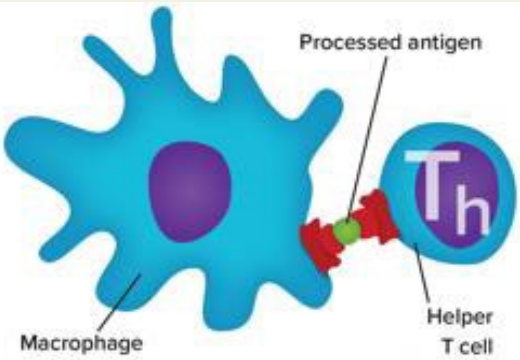
2. _____ is a cell that activates B cells and cytotoxic T cells.

a) **Helper T cell**
b) Memory cell
c) Lymphocyte
d) Interferon

1. What kind of immune response is demonstrated in the diagram?



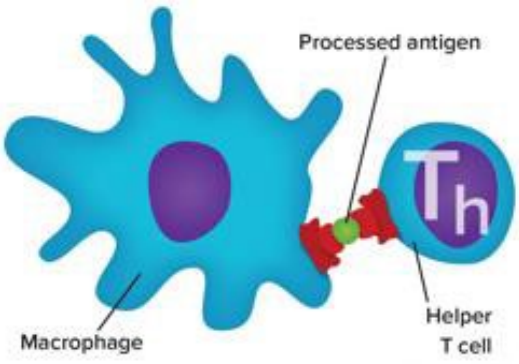
genetic

nonspecific

c specific CORRECT

hormonal

2. To which does the activated helper T cell present its antigen?



a pathogen

c a B cell CORRECT

bone marrow

the thymus gland

29	BIO. 3.1.01.088 Compare and contrast passive and active immunity	Information from text	17-18

Passive and Active Immunity

The body's first response to an invasion by a pathogen is called the primary response. For example, if the viral pathogen that causes chicken pox enters the body, nonspecific and specific immune responses eventually defeat the foreign virus and the body is cleared of the pathogen.

One result of the specific immune response is the production of memory B and T cells. **Memory cells** are long-living cells that are exposed to the antigen during the primary immune response. These cells are ready to respond rapidly if the body encounters the same pathogen later. Memory cells protect the body by reducing the likelihood of developing the disease if exposed again to the same pathogen.

Passive immunity

Sometimes temporary protection against an infectious disease is needed. This type of temporary protection occurs when antibodies are made by other people or animals and are transferred or injected into the body. For example, passive immunity occurs between a mother and her child. Antibodies produced by the mother are passed through the placenta to the developing fetus and through breast milk to the infant child. These antibodies can protect the child until the infant's immune system matures.

Antibodies developed in humans and animals that are already immune to a specific infectious disease are used to treat some infectious diseases in others. These antibodies are injected into people who have been exposed to that particular infectious disease. Passive immune therapy is available for people who have been exposed to hepatitis A and B, tetanus, and rabies. Antibodies also are available to inactivate snake and scorpion venoms.

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23	BIO. 3.1.01.088 Compare and contrast passive and active immunity	Information from text	18

Active immunity

Active immunity occurs after the immune system is exposed to disease antigens and memory cells are produced. Active immunity can result from having an infectious disease or immunization. **Immunization,** also called vaccination, is the deliberate exposure of the body to an antigen so that a primary response and immune memory cells will develop. **Table 3** lists some of the common immunizations offered in the United States. Immunizations contain killed or weakened pathogens, which are incapable of causing the disease.

Most immunizations include more than one stimulus to the immune system, given after the first immunization. These booster shots increase the immune response, providing further protection from the disease-causing organism.

Get It?

Describe the difference between passive immunity and active immunity.

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8	-BIO.3.1.01.089 Explain why immunizations (vaccinations) are effective in preventing diseases with current real world applications	Table 3	18

Why are immunizations effective in preventing disease? The characteristics of the secondary immune response, which is the response to a second exposure to an antigen, enable immunizations to be effective in preventing disease. Study the graph in **Figure 13.** Note that the secondary response to the antigen has a number of different characteristics. First, the response is more rapid than the primary response, as shown by the greater steepness in the portion of the curves plotted in red. Second, the overall response, both B and T cell response, is greater during the second exposure. Lastly, the overall memory lasts longer after the second exposure.

Get It?

Analyze how immunizations help prevent disease.

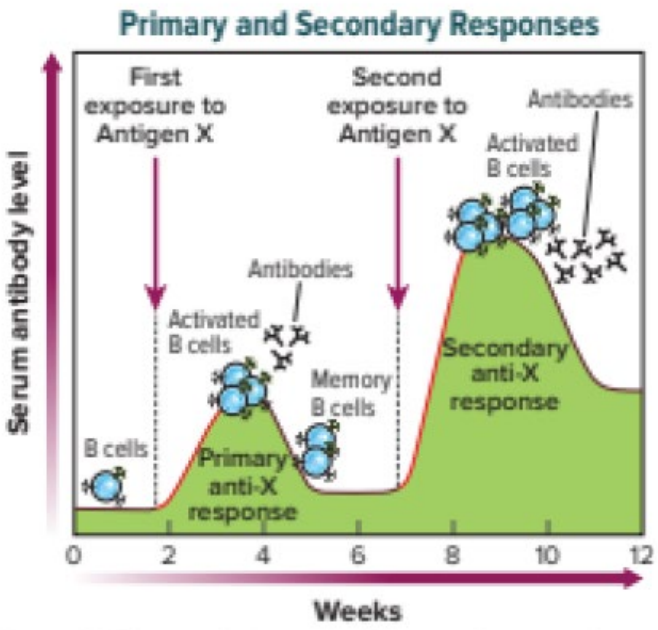

Figure 13 This graph shows the difference between the primary and secondary immune responses to exposure to an antigen.

Analyze *the differences between the primary and secondary immune responses.*

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8	-BIO.3.1.01.089 Explain why immunizations (vaccinations) are effective in preventing diseases with current real world applications	Table 3	18

Table 3 Common Immunization

Immunization	Disease	Contents
DPT	Diphtheria (D), tetanus (T), pertussis (P) (whooping cough)	D: inactivated toxin, T: inactivated toxin, P: inactivated bacteria
Polio	Poliomyelitis	Inactivated virus
MMR	Measles, mumps, rubella	All three inactivated viruses
Varicella	Chicken pox	Inactivated virus
HIB	Haemophilus influenzae (flu) type b	Portions of bacteria cell wall covering
HBV	Hepatitis B	Subunit of virus

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The deliberate exposure of the body to an antigen to build future immunity is called .....

Phagocytosis

Cellular defense

Passive immunity

immunization

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The deliberate exposure of the body to an antigen to build future immunity is called ___.

- A) phagocytosis
- B) cellular defense
- C) passive immunity
- D) immunization

Correct Answer

D) immunization

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24	BIO. 3.1.01.089 Analyze how HIV can cause immune system failure	Information from text	19-20

Immune System Failure

Defects in the immune system can result in an increased likelihood of developing infectious diseases as well as certain types of cancers. Some diseases can affect the immune system's effectiveness. One such disease called acquired immunodeficiency syndrome (AIDS) results from an infection by human immunodeficiency virus (HIV). AIDS is a serious health problem worldwide.

In 2015, approximately 18,303 AIDS cases were diagnosed in the U.S. In 2014, 6,721 people died of AIDS in the U.S. In 2015, an estimated 36 million people globally were living with HIV infection.

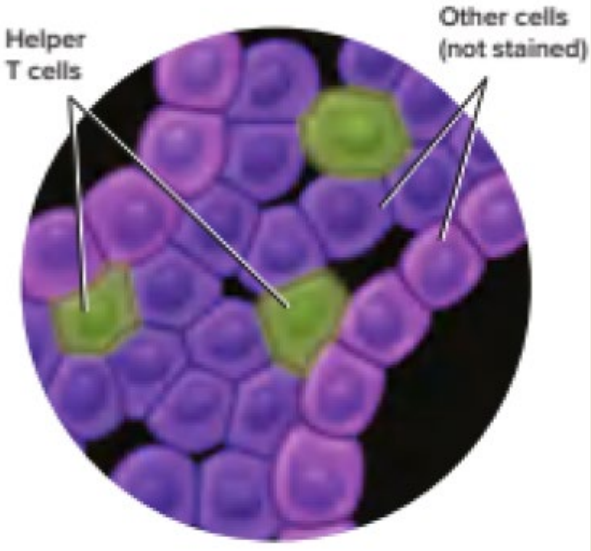

Figure 14 Helper T cells have receptors on the surface that are used to identify them in the laboratory.

Recall the important role that helper T cells play in specific immunity. T cells are also called $CD4^+$ cells because these cells have a receptor on the outside of their plasma membrane. This $CD4^+$ receptor is used by medical professionals to identify these cells, as illustrated in **Figure 14.**

HIV is an RNA virus that infects helper T cells. The helper T cells become HIV factories, producing new viruses that are released and infect other helper T cells. Over time, the number of helper T cells in an infected person decreases, making the person less able to fight disease. HIV infection usually has an early phase during the first six to twelve weeks while viruses are replicating in helper T cells.

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24	BIO. 3.1.01.089 Analyze how HIV can cause immune system failure	Information from text	19-20

The patient suffers symptoms such as night sweats and fever, but these symptoms are reduced after about eight to ten weeks. Then, the patient exhibits few symptoms for a period of time as long as ten years but is capable of passing the infection through sexual intercourse or blood products.

HIV is a secondary immunodeficiency disease, which means that the immune system of a previously healthy person fails. Without antiviral drug therapy, the patient usually dies from a secondary infection from another pathogen after about ten years of being infected with HIV. Current antiviral drug therapy is aimed at controlling the replication of HIV in the body. Resistant strains, expensive drugs, and side effects are all issues that patients face. Researchers and health care providers are working to meet these needs and continue the search for a cure.

Get It?

Summarize how the immune system protects and attempts to maintain a healthy balance in the body.

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LESSON 3
NONINFECTIOUS DISORDERS

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9	BIO.3.1.01.087 Differentiate between the five categories of noninfectious diseases, in terms of cause and examples	Information from text	21

Genetic Disorders

Not all diseases or body disorders are caused by pathogens. Some diseases, such as albinism, sickle cell anemia, Huntington's disease, and hemophilia, are caused by the inheritance of genes that do not function properly in the body. There are also disorders, such as Down syndrome and Turner syndrome, that result from abnormal chromosome numbers. Many diseases are complex and have both an environmental and a genetic cause.

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11	BIO.3.1.01.087 Summarize factors that can cause coronary artery disease	Information from text Figure 15	21

Coronary artery disease (CAD) is an example of a condition with environmental and genetic origins. This cardiovascular disease can result in blockage of arteries, shown in **Figure 15**, that deliver oxygenated blood to the heart muscle. There is a genetic component that increases a person's risk of developing CAD. Environmental factors such as diet and inactivity contribute to the development of this complex disease. Families with a history of CAD have a two to seven times greater risk of having CAD than families without a history of CAD. The exact genetic factors, however, are not known.

Get It?

Summarize the factors that cause coronary artery disease.

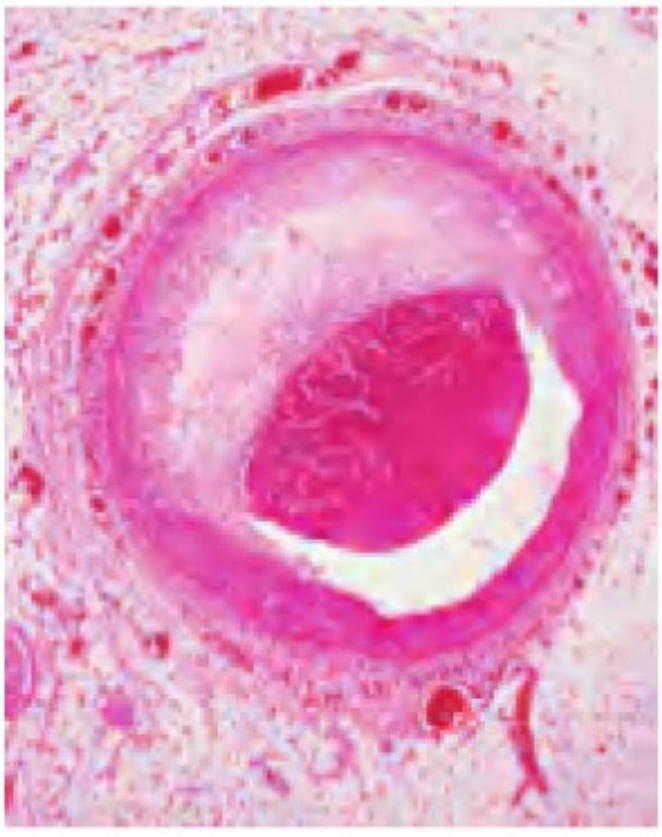

Figure 15 When blood cannot flow through a coronary artery, such as the diseased artery shown here, a heart attack or sudden death can result.

10	BIO.3.1.01.087 Differentiate between the five categories of noninfectious diseases, in terms of cause and examples	Information from text	21-22

Degenerative Diseases

Diseases that are the result of the body wearing out or of the natural aging process are referred to as **degenerative** (dih JEH nuh ruh tihv) **diseases.**

However, a degenerative condition, such as degenerative arthritis, could occur sooner than would be expected if the person is genetically predisposed to the disease or if the person's joints have experienced an increased amount of wear and tear. Degenerative arthritis is common; most people have it by age 70. It is found in almost all vertebrate animals. Arteriosclerosis (ar tir ee oh skluh ROH sus), which is a hardening of the arteries, is another example of a degenerative disease. Because degenerative diseases also have a genetic component, some individuals might be more likely to develop such a disease because of their genetic makeup.

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25	BIO. 3.1.01.087 Differentiate between the five categories of noninfectious diseases, in terms of cause and examples	Information from text	22

Metabolic Diseases

Metabolic disease results from an error in a biochemical pathway. Some metabolic diseases result in the inability to digest specific amino acids or to regulate body processes. The condition known as phenylketonuria (PKU) is an inherited disorder that creates the inability to break down part of a protein called phenylalanine. When the pancreas does not make the proper amount of insulin and glucose does not enter body cells normally, the condition is known as Type 2 diabetes. This results in high glucose levels in the bloodstream, which causes damage to many organs including the kidneys and the retinas of the eyes. Metabolic diseases can have a genetic component but also can involve environmental factors such as diet.

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26	BIO. 3.1.01.087 Infer why cancer is life threatening	Information from text	22

Cancer

Cancer is characterized by abnormal cell growth. Normally, certain regulatory molecules in the body control the beginning and end of the cell cycle. If this control is lost, abnormal cell growth results that could lead to various types of tumors, as shown in **Figure 16.** The abnormal cells can interfere with normal body functions and can travel throughout the body. Cancer can develop in any body tissue or organ, including the blood cells. Cancer in the blood cells is called leukemia. Both genetic and environmental factors have been shown to cause cancer.

HISTORY Connection Cancer is a disease that has affected humans since ancient times. Egyptian mummies show evidence of bone cancer, and ancient Greek scientists described different kinds of cancer. Medieval manuscripts have reported details about cancer.

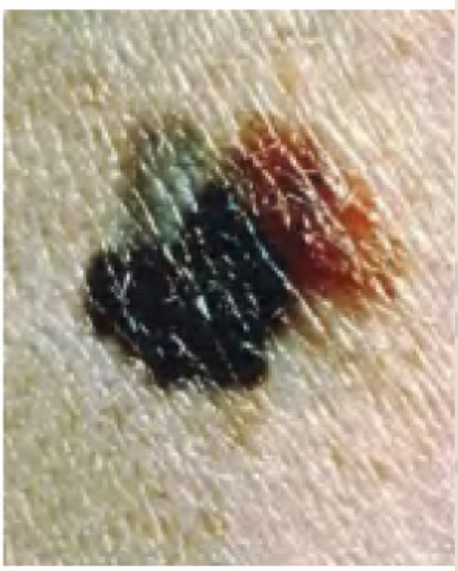

Figure 16 Cancer is due to an abnormal increase in cell division in the body, resulting in a tumor such as this skin tumor.

Infer *why this growth is so life-threatening.*

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An example of a disease caused by both genetic and environmental factors is .....

Inflammatory disease

Metabolic disease

Degenerative disease

Coronary artery disease

A ..... disease results from a body part wearing out over time.

Inflammatory disease

Metabolic disease

Degenerative disease

cancer

Which type of noninfectious disease is defined as a problem in a biochemical pathway in the body?

Inflammatory disease

Metabolic disease

Degenerative disease

cancer

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4) A _____ disease results from a body part wearing out over time.

Correct Answer
Blank 1: degenerative

11) An example of a disease caused by both genetic and environmental factors is _____.

Correct Answer
Blank 1: coronary artery disease

2. Which type of noninfectious disease is defined as a problem in a biochemical pathway in the body?

- ✗ inflammatory disease
- ✗ degenerative disease
- B metabolic disease
  CORRECT
- ✗ cancer

30	BIO.3.1.01.087 Differentiate between inflammatory response and inflammatory disease	Information from text	22

Inflammatory Diseases

Inflammatory diseases, such as allergies and autoimmunity, are diseases in which the body produces an inflammatory response to a common substance. Recall from Lesson 2 that infectious diseases also result in an inflammatory response. However, the inflammatory response in an infectious disease enhances the overall immune response. This inflammatory response is a result of the immune system removing bacteria or other microorganisms from the body. In inflammatory disease, the inflammatory response is not helpful to the body.

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12	BIO.3.1.01.087 Explain the process of anaphylactic shock	Information from text 'Get it' question	23

Allergies

Certain individuals might have an abnormal reaction to environmental antigens. A response to environmental antigens is called an **allergy.** These antigens are called allergens and include things such as plant pollens, dust, dust mites, and various foods, as shown in **Table 4.** An individual becomes sensitized to the allergen and has a localized inflammatory response with swollen itchy eyes, stuffy nose, sneezing, and sometimes a skin rash. These symptoms are the result of a chemical called histamine, released by certain white blood cells. Antihistamine medications can help alleviate these symptoms.

Get It?

Explain how allergies are related to the immune system.

Severe allergic reactions to particular allergens can result in **anaphylactic** (an uh fuh LAK tik) **shock,** which causes a massive release of histamine. In anaphylactic shock, the smooth muscles in the bronchioles contract, which restricts air flow into and out of the lungs.

Common allergens that cause severe allergic reactions are bee stings, penicillin, peanuts, and latex, which is used to make balloons and surgical gloves. People who are extremely sensitive to these allergens require prompt medical treatment if exposed to these agents, because anaphylactic reactions are life-threatening. Allergies and anaphylactic reactions are known to have an inherited component.

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12	BIO.3.1.01.087 Explain the process of anaphylactic shock	Information from text 'Get it' question	23

Table 4 Common Allergens

Allergen	Example	Description
Dust mite	Color-enhanced SEM, magnification ×44	Dust mites are found in mattresses, pillows, and carpets. Mites and mite feces are allergens.
Plant pollen	Color-enhanced SEM, magnification ×1000	Different parts of the country have very different pollen seasons. People can react to one or more pollens, and a person's pollen allergy season might be from early spring to late fall.
Animal dander	Color-enhanced SEM, magnification ×100	Dander is skin flakes. Cat and dog allergies are the most common, but people also are allergic to pets such as birds, hamsters, rabbits, mice, and gerbils.
Peanut		Allergic reaction to peanuts can result in anaphylactic shock. Peanut allergy is responsible for more fatalities than any other type of allergy.
Latex		Latex comes from the milky sap of the rubber tree, found in Africa and Southeast Asia. The exact cause of latex allergy is unknown.

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Individuals can have a dangerous response to particular allergens, such as latex, and go into anaphylactic shock. What will be the result?

Breathing problems

Atherosclerosis

Epileptic seizures

arthritis

After a person who has an allergy to animal dander handles a cat, his or her body produces the chemical .....

Histamine

acetylcholine

Insulin

Allergies

Why is an allergy considered an inflammatory disease?

Allergens decrease inflammation

Histamines produce inflammatory allergens

Histamine causes an inflammatory response

Allergens cause rapid cell division

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4. Individuals can have a dangerous response to particular allergens, such as latex, and go into anaphylactic shock. What will be the result?

A breathing problems
CORRECT

atherosclerosis

epileptic seizures

arthritis

12) After a person who has an allergy to animal dander handles a cat, his or her body produces the chemical _____.

Correct Answer

Blank 1: histamine

31) Why is an allergy considered an inflammatory disease?

- Allergens decrease inflammation.
- Histamines produce inflammatory allergens.
- Histamine causes an inflammatory response.
- Allergens cause rapid cell division.

27	BIO. 3.1.01.087 Explain autoimmune disorders, to include rheumatoid arthritis, rheumatic fever and lupus	Information from text Figure 17	24

Autoimmunity

During the development of the immune system, the immune system learns not to attack proteins produced by the body. However, some people develop autoimmunity (aw toh ih MYOON ih tee) and do form antibodies to their own proteins, which injures their cells. **Figure 17** shows the hands of a person with rheumatoid arthritis—a form of arthritis in which antibodies attack the joints. Degenerative arthritis, the form of arthritis that you read about earlier in the section on degenerative diseases, is not caused by autoimmunity.

Rheumatic fever and lupus (LEW pus) are other examples of autoimmune disorders. Rheumatic fever is an inflammation in which antibodies attack the valves of the heart. This can lead to damage to the heart valves and cause the valves to leak or not close properly as blood moves through the heart. Lupus is a disorder in which autoantibodies are formed and attack healthy tissue. As a result, many organs are vulnerable to attack by the body's own immune system.

Figure 17 The large knobs and deformaties of these fingers are due to rheumatoid arthritis, an autoimmune disease.

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In autoimmunity, which attacks the body's own proteins?

Antigen

Allergens

Antihistamines

antibodies

Which autoimmune disease can be indicated by large knobs on joints and deformities of joints?

Rheumatoid arthritis

Tetanus

Sickle-cell disease

allergy

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5. In autoimmunity, which attacks the body's own proteins?

- ✗ antigens
- ✗ allergens
- C antibodies CORRECT
- ✗ antihistamines

1. Which autoimmune disease can be indicated by large knobs on joints and deformities of joints?

- ✗ tetanus
- ✗ sickle-cell disease
- C rheumatoid arthritis CORRECT
- ✗ allergy

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