

Name _____

Infectious Disease:

Causes and Prevention

Objective #3: The students will be able to identify one or more infectious diseases and their cause(s). The students will be able to list at least 3 ways that infectious diseases can be prevented.



You get to be a Mysterious Disease Detective!

Now you can complete the “Disease Detective Series”! You can be a disease detective and solve science mysteries! HAVE FUN! PUT YOUR THINKING CAP ON!

FIRST...you will read the informational sheets so that you can get all the clues to solve the mysteries.

SECOND...you will solve some mysterious disease cases on your own using all the clues and your informational sheets.

THIRD...you will share your findings with other sleuths in the classroom and find out if your solution about the mysterious disease was correct.

FOURTH...your classmates will ALL discuss the “cases”.

THE DISEASE DETECTIVE SERIES

Solve the Case of the Mysterious Disease

Learning about the bacteria and viruses that cause infectious diseases and how to prevent them



Who are the Suspects?

What are the Cases?

Can you solve the mystery and prevent the disease?



Suspect #1

Lyme Disease



Borrelia burgdorferi



Deer Tick



Lyme disease "bull's eye" rash

Background:

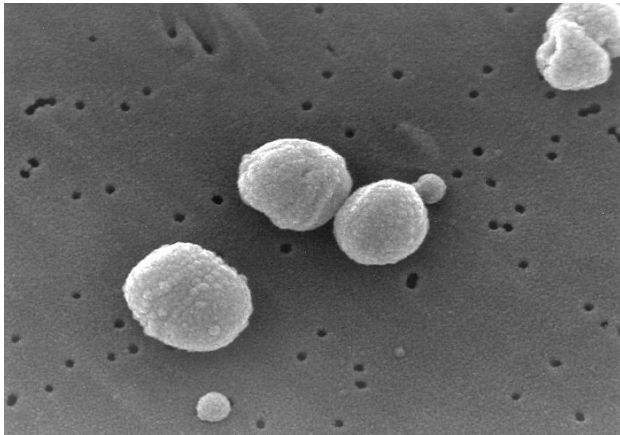
Lyme disease is caused by a spirochete-shaped bacteria called *Borrelia burgdorferi*. *Borrelia burgdorferi* lives in the gut of a tick and can be **transmitted** (passed) to a person if a **tick** that has *Borrelia burgdorferi* bites them. *Borrelia burgdorferi* infection in people leads to Lyme disease.

The natural **host** for Lyme disease is a deer. A tick is considered a **vector** for Lyme disease because it passes the disease from deer to people. Ticks that bite deer are called **deer ticks** (not all ticks are deer ticks). A deer tick is special type of tick that travels and feeds off of deer in the forest. *Borrelia burgdorferi* bacteria are found in both deer and deer ticks, but Lyme disease only occurs in people. The size of a deer tick is so small that it would fit in the period at the end of this sentence.

The infected person may get a fever, headache, or a "**bull's eye**" **skin rash**. If left untreated, the infection can spread to joints, the heart, and the nervous system. Medical tests can determine whether or not someone is infected with Lyme disease and the disease can be treated successfully with a few weeks of **antibiotics**. Steps to prevent Lyme disease include using insect repellent with DEET and looking for ticks after you have been in a wooded area.

Suspect #2

Strep Throat



Streptococcus pyogenes



**A throat infected with
*Streptococcus pyogenes***

Background:

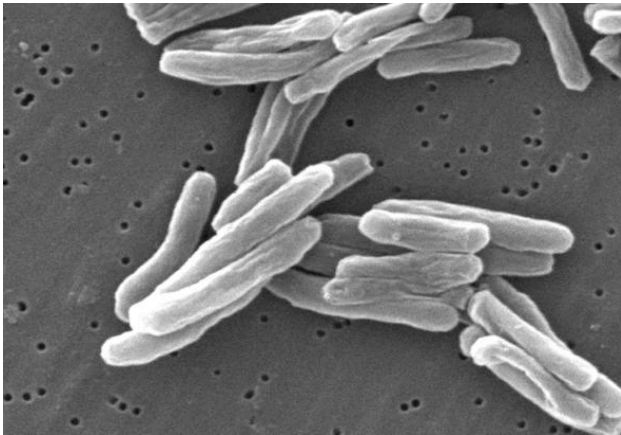
Strep throat is caused by the cocci-shaped bacteria *Streptococcus pyogenes*.

Streptococcus pyogenes infects the inside of the throat, making it feel very sore for several days. Not all sore throats are caused by *Streptococcus pyogenes*. Some of the **symptoms** of Strep throat are a painful, sore throat, high fever, chills, headache, and muscle aches. A quick medical test, called a throat culture, can determine whether or not a person is infected with Strep throat. The treatment for Strep throat is **antibiotics**. If left untreated, Strep throat symptoms may get worse and lead to more serious illnesses.

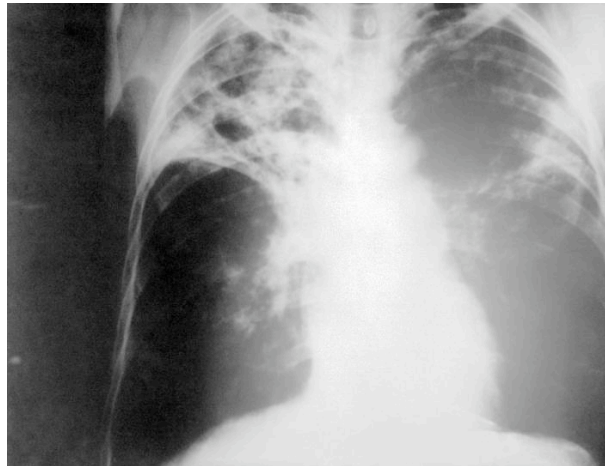
Streptococcus pyogenes bacteria are put into the air when a person with Strep throat coughs or sneezes. Strep throat is **transmitted directly** from person to person by coughing, sneezing, and close contact. Strep throat is spread through the air from person to person by them breathing in the bacteria, and becoming infected. Although anyone can become infected with Strep throat, it is most common in school-age children. Some of the common ways to prevent spreading Strep throat are covering your mouth when you cough or sneeze and washing your hands after sneezing.

Suspect #3

Tuberculosis



Mycobacterium tuberculosis



Lungs infected by Tuberculosis

Background:

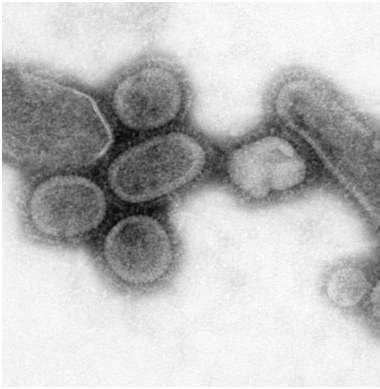
Tuberculosis is a disease caused by bacilli-shaped bacteria called *Mycobacterium tuberculosis*. *Mycobacterium tuberculosis* bacteria are put into the air when a person with Tuberculosis of the lungs coughs or sneezes. Tuberculosis is **transmitted** (spread) through the air from person to person by them breathing in the bacteria, and then becoming infected.

Mycobacterium tuberculosis usually causes infection in the lungs, but if left untreated, it can also infect the kidney, spine, and brain. **Symptoms** of Tuberculosis may include a bad cough (lasting 3 weeks or longer), pain in the chest, and coughing up blood. Medical tests can determine whether or not a person has Tuberculosis and infected people can be treated with antibiotics. Some common ways to prevent spreading Tuberculosis are covering your mouth when you cough or sneeze and washing your hands after sneezing.



Suspect #4

Influenza



Influenza viruses



Sneezing Influenza Viruses into the Air



Getting an Influenza vaccine

Background:

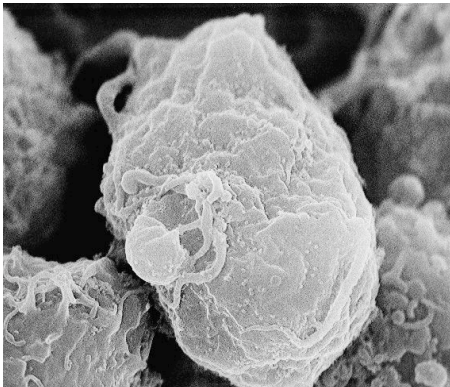
Influenza (also called the Flu) is caused by **Influenza viruses**. Influenza is a **contagious** illness that can be spread from person to person in droplets that are coughed or sneezed out from an infected person. Influenza virus can also be spread when infected people cough or sneeze on something (like a desk) and a **noninfected** person touches it and touches their mouth or nose.

Symptoms of Influenza include high fever, headache, dry cough, sore throat, upset stomach, and feeling very tired. Influenza can lead to more serious illnesses, such as breathing problems and ear infections. Most people can infect others beginning 1 day **BEFORE** symptoms develop and up to 5 days after becoming sick. That means that you can pass on Influenza to someone else before you know you are sick, as well as while you are sick.

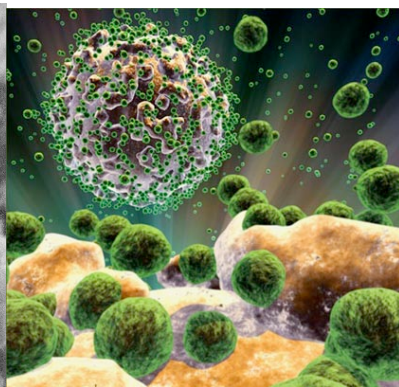
The best way to prevent Influenza infection is to get an Influenza **vaccination** every year in the fall. Vaccination allows the body to get a **vaccine** against the Influenza virus. This vaccine contains **inactivated** (killed) virus that is given with a needle. This vaccine helps the body to know what Influenza looks like, so that the body will be able to attack the Influenza virus if you become infected. This type of vaccine is only helpful to your body for one year because there is a new type of Influenza each year. It is important that you get the vaccine in the fall of **EVERY** year.

Suspect #5

AIDS



HIV viruses



**HIV viruses
infecting the body**



AIDS Medicine

Background:

AIDS (Acquired Immunodeficiency Syndrome) is a disease that is caused by infection of **HIV (Human Immunodeficiency Virus)**. HIV disrupts the body's ability to fight off infection and keep the body healthy. Instead, people infected with HIV can become very sick or die from many diseases that a healthy person would not ever get sick from.

AIDS can only be spread directly by infected blood, by sharing needles and syringes with an infected person or by infected bodily fluids. AIDS is NOT spread by indirect contact, such as sneezing, shaking hands, hugging, or being in the same classroom with someone who is infected.

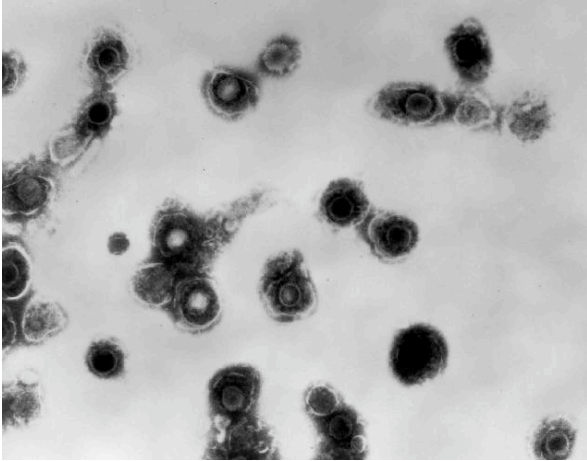
Early **symptoms** for AIDS include high fever, headache, dry cough, sore throat, upset stomach, and feeling very tired. AIDS symptoms may not occur until several years after infection. That means that you can pass on AIDS to someone else before you know you are sick, as well as while you are sick. Medical tests can determine whether or not you have AIDS. Some medicines can slow the course of AIDS, but there is NOT a **vaccine** or cure for AIDS. To prevent getting AIDS, do not touch used needles, do not touch other people's blood, and keep band-aids on your cuts and scrapes.



Suspect #6

Chickenpox

Varicella-zoster virus



**Blister-like rash
caused by Chickenpox**

Background:

Chickenpox is disease caused by infection with the **Varicella-zoster virus**. Chickenpox is highly **contagious** and spreads from person to person by direct contact or through the air from an infected person's coughing or sneezing. A person with Chickenpox is contagious 1-2 days before the rash appears and until all blisters are gone. It takes from 10-21 days after contact with an infected person for someone to develop Chickenpox. Once a person has been sick with Chickenpox, they are **immune** to it for the rest of their lives. Being immune means that you can no longer become infected.

Symptoms of Chickenpox include a **blister-like rash**, itching, tiredness, and fever. First the rash appears on the chest, back, and face, but it can spread over the entire body causing between 250 to 500 itchy blisters. It is important to stay home from school when you have Chickenpox until the blisters are gone, so that you do not spread it to other people. Most cases of Chickenpox occur in people less than 15 years old. The best way to prevent Chickenpox is to get a Chickenpox **vaccination**. Vaccination allows the body to get a **vaccine** against the Varicella-

zoster virus. One vaccination will prevent you from getting sick from Chickenpox for your entire life.



The Case of the Mysterious Disease

Now it is time for you to be the Disease Detective! A Detective uses clues to determine which Suspect has caused a crime and presents evidence to solve the Case. Use the clues in each case to figure out which one of the Disease Suspects is the criminal. Then, give evidence to support why you think that Disease Suspect is guilty of causing illness and answer the questions below.

Case #1

Mark has a high fever and an upset stomach. Mark always eats lunch with his friend Steve, who was coughing a few days ago and is now staying home sick from school. Mark's teacher asked him if he had a vaccination this year, but Mark does not remember getting any shots in the last few years.

Which disease does Mark have? _____

How is this disease spread? _____

What evidence do you have for your conclusion? _____

Is this disease caused by bacteria or a virus? _____

What is the name of the bacteria or virus? _____

How could this disease have been prevented? _____

Case #2

Soma has just returned from a family camping vacation in the woods and she has been having headaches for the past few days. Soma has a circular rash near her ankle. She has been vaccinated against the varicella-zoster virus.

Which disease does Soma have? _____

How is this disease spread? _____

What evidence do you have for your conclusion? _____

Is this disease caused by bacteria or a virus? _____

What is the name of the bacteria or virus? _____

How could this disease have been prevented? _____



Case #3

Tyron has a sore throat and chills. Many of Tyron’s friends from school are home sick and are taking antibiotics. Tyron’s school nurse suggests that he get a throat culture, but Tyron insists that he already got an Influenza vaccine.

Which disease does Tyron have? _____

How is this disease spread? _____

What evidence do you have for your conclusion? _____

Is this disease caused by bacteria or a virus? _____

What is the name of the bacteria or virus? _____

How could this disease have been prevented? _____

Case #4

Jing is a new student in school—she has only been there for 30 days. She used to be home-schooled, so she hasn’t been around very many other students her age before. Jing has had a high fever and has been feeling very tired for days. Her mom tells her to stay home from school. The next day, Jing sees very small, red blisters on her face. Jing has never been vaccinated for anything.

Which disease does Jing have? _____

How is this disease spread? _____

What evidence do you have for your conclusion? _____

Is this disease caused by bacteria or a virus? _____

What is the name of the bacteria or virus? _____

How could this disease have been prevented? _____

EXTRA CREDIT

1) What is a **vector**? _____

2) What does **inactivated** mean? _____

3) How does a **vaccine** help your body? _____

4) What does **HIV** stand for? _____

5) What does **transmitted** mean? _____

6) What are **symptoms**? _____



List of Bold Terms

Lyme disease
Borrelia burgdorferi
Transmitted
Host
Vector
Deer tick
Bulls eye skin rash
Antibiotics

Strep Throat
Streptococcus pyogenes
Symptoms
Antibiotics
Transmitted directly

Tuberculosis
Mycobacterium tuberculosis
Transmitted
Symptoms

Influenza
Influenza virus
Contagious
Noninfected
Symptoms
Vaccination
Vaccine

AIDS
HIV
Symptoms
Vaccine

Chickenpox
Varicella-zoster virus
Immune
Symptoms
Blister-like rash
Vaccination
vaccine

Infectious Disease Learning Packet 3

1. You have completed the experiment on “The Spreading of Colds and Flu”. Keeping this experiment in mind, answer the following questions.

A. How can a person with a cold or flu avoid spreading viruses? List at LEAST three ways and describe them thoroughly.

B. How can a healthy person keep from getting cold or flu viruses? List at LEAST three ways and describe them thoroughly.

C. Describe how cold or flu viruses are spread differently from HIV.

Infectious Disease Learning Packet 3

2. You have completed the experiment on how HIV spreads through blood, so now you can answer these questions successfully.

A. How can a person infected with HIV avoid passing the virus to others?

B. How can a healthy person avoid getting HIV?

Hint: When IV drug users share needles, blood-containing viruses (food coloring), from a person with HIV is left in the needle (medicine dropper) and is injected into the blood of the next IV drug user. Then that person is infected with HIV. Just as the green coloring cannot be removed from the oil, HIV cannot be removed from the infected person's body.

Infectious Disease Learning Packet 3

3. You have completed the “Wet-Wipe Clean Up” experiment. Hopefully, now you will think about the countless, unseen microscopic organisms that live in, on, and around us. Though many are beneficial, some can cause infectious diseases. Answer the following questions using good, complete, and scientific answers.

A. Describe what your wet wipe looks like. Did you realize your working area was this dirty? Explain.

B. Not all dirt contains harmful pathogens, but what can you do to reduce the possibility of transferring some of the harmful ones?

Explain. _____

C. Do the pathogens we found stay here on your desk all day, or do they travel with you? If so, where do they go? Explain.

Infectious Disease Learning Packet 3

4. After doing the “Not So Life Saving” experiment, we learned that we come in contact with numerous pathogens daily, but they do not always cause disease. Transmission of disease is easy, but we can protect ourselves. Answer the following questions using good, complete sentences.

A. How easy is it to come into contact with a pathogen and not know it?

B. Do we always acquire the illness when we come in contact with the pathogen that causes it?

C. What are some ways we can protect ourselves? Be specific and explain thoroughly.

Infectious Disease Learning Packet 3
Preventing Disease is the Key

Elementary school students can do a lot of things to help prevent the spread of infectious disease. One of the most important things that everyone can do is to **keep themselves healthy** so that your body is able to fight off infection better. Make sure that you have **proper nutrition, drink lots of water, get adequate amounts of sleep, and exercise regularly.**

You can help to prevent the spread of disease by **using a tissue** when you have a cold, cough, or you sneeze. It is very important that you **throw the tissue away** right after you use it, to prevent others from touching it and also becoming sick. Make sure to carefully and thoroughly **wash your hands with soap and water** (it should take you longer than singing the “Happy Birthday” song). Remember that if you are ill, you **should stay home from school, drink lots of water, and get lots of sleep**, so that you body can fight off the disease.

Many people work to help make the population healthier. **Scientists** study and experiment to find the causes and vaccines for infectious diseases. **Doctors** and **nurses** help us to recover from infectious diseases by giving us medicine and helpful advice. **Public health workers** watch over the entire population of people, solving mysteries of disease.

1. List at least three things that you can do to keep yourself healthy?

1. _____
2. _____
3. _____

2. List at least three things that you can do to prevent yourself from getting infectious disease?

1. _____
2. _____
3. _____

3. What are at least three things that you should you do when you have a cold?

1. _____

2. _____

3. _____

4. List three people who help us to prevent infectious diseases?

1. _____

2. _____

3. _____

Infectious Disease Learning Packet 3
Incredible Infectious Disease Activities

Your teacher will tell you which of the following activities are required and which ones are extra credit. Have fun!

1. Do the Infectious Disease Word Find #2 and/or #3.

2. Do the Infectious Disease Crossword Puzzle #2 and/or #3.

3. Design/build/create 3-D bacteria, fungi, and/or virus from materials that you have at home. Use some of the realistic photos that you have in your packet or use some of the colored photos that your teacher has displayed in your classroom.

4. Make an informational poster to show how you can keep healthy. Be neat, creative, and color carefully! Perhaps you will be able to display your poster in your school.

5. Make an informational poster to show why it is SO important to wash your hands. Be sure to give some “tips on hand washing” that you have learned in this unit.

6. Write a play, song, poem or an acrostic about hand washing and its importance in preventing infectious disease.

7. Make a poster to show some ways that each student can help to prevent the spread of infectious diseases in the home, school, and community. Be creative, neat, and be sure to give good information to those that read your poster.

Infectious Disease Word Find #2

Y X S N E G O H T A P S S B I
G C J P X S N L D R N O N A L
F U N G I S A K U O L M O C L
B C V R A R F E I Y E Y I T I
J C C F R R O T S C V C T E C
F J C Q O Q A C R I G O A R A
S M V T H N L M H E D C L I B
J W C I I B I K R E W C U A J
A E Q C R C D M V Y T I C C L
V K C A R U S M O M V E O M N
U A L O D I S F Y M A I N E I
V D B M Q N C C Q J F C I W D
Q E U B B U V V L V K B Z Q X
S G P Q P F B M O A J H E J A
I N F E C T I O U S Q L T Q S

BACILLI
DISEASE
INFECTIOUS
PATHOGEN
VECTOR

BACTERIA
FUNGI
INOCULATIONS
SPIROCHETE
VIRUS

COCCI
GERMS
MICROBES
VACCINATIONS

Infectious Disease Word Find #3

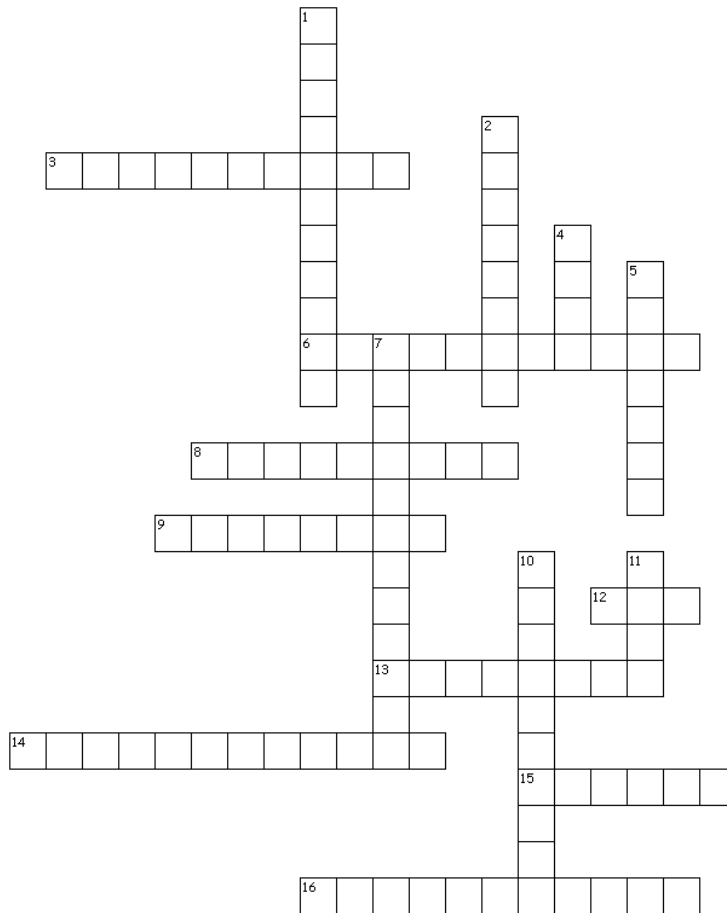
B E T X H D J S S C H D S T P
S U G T W A Y N L X L E U U T
Q C L V R M W E O Y Q E O B S
Q K I L P A A P M W Y R I E O
S L U T S W N E Y Z N T G R H
W B O A O E D S H I V I A C U
Y M A L K I Y E M U J C T U S
S U T C S A B E N I R K N L N
X O I E F T Z I R U T O O O X
V H A L Z C S N T A M Z C S Z
C S E N I C C A V N S M A I Z
E I N F L U E N Z A A H I S N
T A O R H T P E R T S O D U P
B B G O P S W F N N D I S L A
K L R B C C O D C T A D A X D

AIDS
CHICKENPOX
HIV
INFLUENZA
SYMPTOMS
VACCINE

ANTIBIOTICS
CONTAGIOUS
HOST
LYMEDISEASE
TRANSMIT

BULLSEYERASH
DEERTICK
IMMUNE
STREPTHROAT
TUBERCULOSIS

Infectious Disease Crossword Puzzle #2



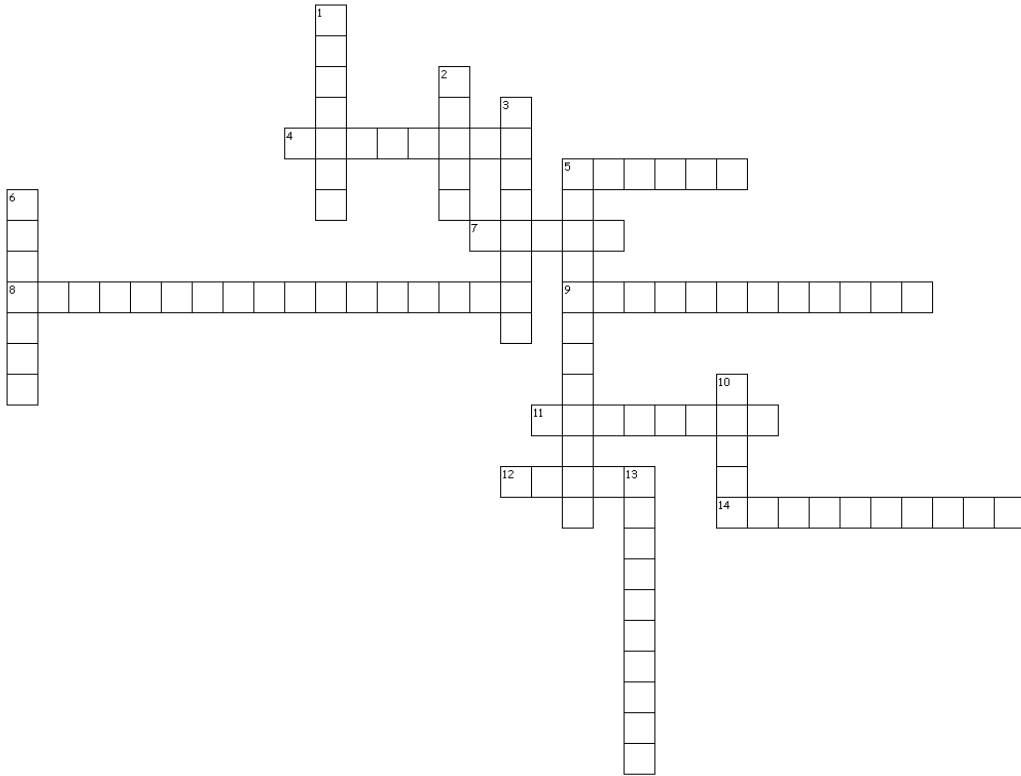
Across

- 3. a disease caused by the Varicella-zoster virus
- 6. a substance that is able to kill or inactivate bacteria
- 8. a disease caused by the Influenza Virus
- 9. a tick that carries and transmits the bacterium causing Lyme disease
- 12. Human Immunodeficiency Virus
- 13. signs or indications of the presence of something (a disease)
- 14. a target-shaped Lyme disease rash
- 15. protected from infection or disease
- 16. a disease caused by *Borrelia burgdorferi*

Down

- 1. a disease caused by *Streptococcus pyogenes*
- 2. to pass or spread something
- 4. an organism in which a pathogenic microorganism is commonly found
- 5. inject or introduce a weakened or dead form of a disease-producing pathogen into somebody's body in order to create immunity to the disease
- 7. a disease caused by *Mycobacterium tuberculosis*
- 10. easily and quickly spread (a disease from person to person)
- 11. Acquired Immunodeficiency Syndrome

Infectious Disease Crossword Puzzle #3



Across

- 4. a single-celled microorganism without distinct nuclei or organized cell structures
- 5. something that transmits disease-causing microorganisms from an infected organism to another organism
- 7. a spherically-shaped bacterium
- 8. harmful conditions that impair normal body function by infections that can be spread
- 9. injection or introduction of a weakened or dead form of a disease-producing pathogen into somebody's body in order to create immunity to the disease
- 11. a microscopic organism especially one that transmits a disease
- 12. a single-celled or multi-cellular organism without chlorophyll that reproduces by spores and lives by absorbing nutrients from organic matter
- 14. a coil-shaped bacterium

Down

- 1. a harmful condition that impairs (damages) normal functioning
- 2. an infection particle that lives like a parasite and consists of a nucleic acid core within a protein sheath
- 3. something that causes disease
- 5. inoculation with a vaccine to produce immunity
- 6. a rod-shaped bacterium
- 10. a microorganism that may or may not cause disease
- 13. capability of causing and spreading infection