Infection Agents: Agent Icky

1.1 Welcome

Notes:

Welcome to Infectious Agents: Agent Icky an online Science tutorial for students in 6th grade.
1.2 Objective

By the end of this tutorial, you'll be able to:

• Compare and Contrast Infectious Agents
  • Viruses
  • Bacteria
  • Fungi
  • Parasites

Notes:

Hi, I'm Agent Icky, and I used to be an infectious agent. I was once known worldwide for infecting thousands of people and making them Icky sick, until finally I was tracked down by the Microbe Busters and talked into joining them as a secret infectious agent. The Microbe Busters are a force the government put together to help fight infection, so now I fight infection instead of causing it. Never a day goes by that the Microbe Busters and I are not inundated, that means flooded up to our eyeballs, with infectious agents, but we get the job done!

Oh, you don’t know what an infectious agent is or how to fight them? Well, I can fix that. Follow me and I can show you! By the end of our time together, you’ll be able to compare and contrast types of infectious agents that may infect the human body, including viruses, bacteria, fungi, and parasites. Who knows, maybe you can be a Microbe Buster one day too!
1.3 Prior Knowledge

Notes:

So what do you need to know to understand how all this works? You should know that your body is made of cells. Those cells have a nucleus that contains DNA and that DNA gets copied during cell division. That will be important later when we talk about viruses. You also need to remember the term homeostasis. Homeostasis is your body's way of regulating things so you always have a steady, stable internal condition-like body temperature. Your body is always pretty close to 98.6 degrees Fahrenheit. That’s part of homeostasis.
1.4 Microbe Busters

Notes:

The Microbe Busters are on a new case. Recently, several students have been absent from Ms. Edwards’ class and they’re trying to figure out exactly what type of infectious agent they are dealing with. The goal is to stop other students from getting sick.

After interviewing several of the remaining students in her class, they have figured out the symptoms of the sick students. They have fever, chills, body aches, coughing, and sneezing. What could be causing this? Let’s learn more to see if we can help!
1.5 Infectious Agents

Notes:

So, back to the question: What is an infectious agent? Infectious agents are anything that can cause an infection. Many of these agents are microorganisms, meaning they are too small to see with the unaided eye. We can’t see microorganisms with the naked eye, so you would use a microscope to see them. A lot of people call them microbes for short-duhh, why do you think we’re the Microbe Busters?

When an organism causes a disease, then it is called a pathogen. Pathogens are infectious agents. When a pathogen causes an infection, it is called in infectious disease.
1.6 Practice 1

Drag and drop to match the answer choices on the right to the correct items on the left.

<table>
<thead>
<tr>
<th>Key Terms</th>
<th>Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infectious Agents</td>
<td>Cause infections</td>
</tr>
<tr>
<td>You need a microscopic to see</td>
<td>Microorganisms</td>
</tr>
<tr>
<td>Microorganisms are</td>
<td>Are also called microbes</td>
</tr>
<tr>
<td>Pathogens</td>
<td>Are infectious agents that cause infectious disease</td>
</tr>
</tbody>
</table>

Notes:

Time to show what you know! Drag and drop to match the answer choices on the right to the correct items on the left.

Feedback when correct:

Awesome! Pathogens are infectious agents which cause infections. You do need a microscope to see microorganisms which are also called microbes.

Feedback when incorrect:

Better luck next time. Pathogens are infectious agents which cause infections. You do need a microscope to see microorganisms which are also called microbes.
1.7 Types of Infectious Agents

**Notes:**

If infectious agents are anything that can cause an infection, then what type of infectious agents are there? Viruses, bacteria, fungi and parasites can all cause infectious disease. We will cover these agents in more detail on the coming slides.
1.8 Viruses

Notes:

Let’s talk about viruses first. Viruses are very tiny, much smaller than bacteria. The curious thing that many people don’t know about viruses is, that they are non-living. They are basically just a capsule with either DNA or RNA in it. In order for viruses to reproduce, they need a living cell from another organism, called a host. A host can be a plant, animal, which includes humans, fungus and even bacteria.

Once a virus is inside a cell, it uses the host cell’s DNA and other parts to make copies of itself-lots of copies. The virus keeps making copies, and making copies, and making copies of itself, until the host cell becomes full and bursts open releasing all the new copies of the virus. Obviously, the host cell is damaged when this happens, and each new virus copy goes on to infect a new cell, and using the same process it spreads throughout the host. The damaged cells are what makes you sick.

Some viral infections you may have heard about are the common cold, influenza or the flu for short, chickenpox, measles, and cold sores.
1.9 Bacteria

Bacteria are small single-celled living organisms that reproduce without a host. They have adapted to live almost anywhere. They are in the air, soil, and water. They live in some of the most extreme conditions like volcanic vents at the bottom of the ocean and in and around the ice at both polar regions of the Earth. They live on and in almost every organism on the planet. We have billions living on and inside us too, so fortunately for us, a lot of bacteria are good and they help with things like digestion. Good bacteria are also used to make foods like cheese and yogurt. Yay! I love yogurt!

Unfortunately, some bacteria are very harmful and can cause serious illnesses such as strep throat, tetanus, and tuberculosis—a lung disease. Bacteria make us sick by either damaging our cells directly, or by producing toxins, which are poisons, that damage our cells.
### 1.10 Practice 2

#### Notes:

Drag and drop the facts about viruses and bacteria to their correct location in the table. The facts don’t have to be in any particular order, they just need to be under the correct heading.

<table>
<thead>
<tr>
<th>Descriptions</th>
<th>Viruses and Bacteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-living</td>
<td>Viruses</td>
</tr>
<tr>
<td>Example: Influenza</td>
<td>Viruses</td>
</tr>
<tr>
<td>Small, very small</td>
<td>Viruses</td>
</tr>
<tr>
<td>Requires a host to reproduce</td>
<td>Viruses</td>
</tr>
<tr>
<td>Example: Strep throat</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Small</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Reproduces without a host</td>
<td>Bacteria</td>
</tr>
<tr>
<td>Living</td>
<td>Bacteria</td>
</tr>
</tbody>
</table>

**Feedback when correct:**

Perfect! You will be a Microbe Buster in no time! Viruses are non-living, they require a host to reproduce, they are very, very small, and an example is Influenza.

**Feedback when incorrect:**
No, that’s not it, but good try. Viruses are non-living, they require a host to reproduce, they are very, very small, and an example is Influenza.
1.11 Fungi

Notes:

Fungi are another group of organisms that are considered to be infectious agents. Although most fungi don’t cause problems and some of us find them yummy. Mushrooms on pizza are the best! Some fungi do cause infectious disease.

Fungi don’t make their own food, they’re not plants, instead, they often live off of dead or decaying organisms. The way they get their nutrients, or food, is by oozing out a substance that breaks down what it’s living on so it can absorb it through structures that are similar to roots. Fungi like warm damp places, so that’s usually where you find them. That’s why you end up with mold, a type of fungi, in your shower if you don’t clean it regularly.

Fungi reproduce by tiny spores which end up in the air where they can be inhaled, or land on the skin, and sometimes cause infection. Most fungal infections are harmless and are mostly just irritating like athlete’s foot or ring worm, which is basically just an itchy rash. Yep, just so you know, ring worm is not a worm, it’s a fungus! I bet that’s a surprise.

Some fungal infections are really serious though and can infect your lungs or even your brain, potentially causing death.
1.12 Practice 3

Which of these statements about fungi are true? Click on the correct choices.

<table>
<thead>
<tr>
<th>Correct</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Fungi make their own food using photosynthesis.</td>
</tr>
<tr>
<td>YES</td>
<td>Fungi reproduce by spores which can be inhaled.</td>
</tr>
<tr>
<td>YES</td>
<td>Fungi are not plants.</td>
</tr>
<tr>
<td>NO</td>
<td>Ringworm is a worm infection.</td>
</tr>
</tbody>
</table>

Feedback when correct:

Great! You know that fungi are not plants, so that means they do not use photosynthesis. Fungi reproduce by spores which can be inhaled or land on skin causing an infection. And, no, ringworm is not caused by a worm, it is caused by a fungus.

Feedback when incorrect:

Sorry, that’s not the right answer. Fungi are not plants, so that means they do not use photosynthesis. Fungi reproduce by spores which can be inhaled or land on skin causing an infection. And, no, ringworm is not caused by a worm, it is caused by a fungus.
1.13 Parasites

Notes:

What can I say, parasites are gross!

A parasite is anything that lives in or on another host organism, usually causing it harm. The parasite gets all of its food from the host and if that happens to be you, it can make you really sick. Some parasites like fleas and ticks lie around waiting for a host to happen by. You know when your dog goes out in the yard and lies in the sun to warm his bones? The fleas and ticks, those tiny vampires, are just waiting for your best friend!

Some parasites are carried by another organism until it reaches its target host. An example is plasmodium, a single-celled organism that is carried by mosquitoes. The plasmodium organism can cause malaria, a disease that can be deadly. The mosquitos don’t have the disease, they only carry the microorganism until it reaches its target host. Malaria is rare in the United States but it is very common in other places like Africa and South America. The first symptoms are fever, chills, and vomiting, but it can eventually affect the lungs and brain and even cause death.

Other diseases caused by parasites are carried by dirty food and water. Many of these parasites seek food and shelter in the digestive tract of its host. Tapeworms are an example. Humans usually get tapeworms form eating undercooked meat. Tapeworms are long flat worms that can grow up to 80 feet long. They are rare in humans in the United States, but common in our pets like dogs, cats and livestock.

Fun fact that’s a little bit scary….at one time tapeworms were sold as a way to lose weight. Yuk!
1.14 Practice 4

Try to answer the following question by typing your answer in the text entry box. A parasite is anything that lives in or on another organism which is usually harmed. The organism the parasite lives on is called the...

Feedback when correct:
Yes, a parasite lives on a host which it usually harms.

Feedback when incorrect:
Hmmm, that’s not it. A parasite lives on a host which it usually harms.

Notes:
Try to answer the following question by typing your answer in the text entry box. A parasite is anything that lives in or on another organism which is usually harmed. The organism the parasite lives on is called the....
1.15 The Spread of Pathogens

Notes:

How are pathogens or infectious agents spread?

There are many different ways you can get an infection, but one of the most common ways is from contact with people who are already sick. They can pass their pathogen to you from a sneeze or cough, or through direct contact like kissing or holding hands. If someone has a cold and sneezes and then you inhale the particles, there is a good chance that you will get a cold too.

Pathogens are spread through contaminated water or food as well. Contaminated just means that something is impure and probably contains pathogens. Contaminated food and water makes millions of people sick every year. A disease called dysentery, that causes severe diarrhea, is spread through contaminated water. Your food can also become contaminated if you don’t handle it properly during or after cooking.

Contaminated surfaces are a problem too. Doorknobs, bathrooms, and kitchens are hot spots where pathogens can easily be spread if you’re not careful. And don’t forget about items that are used often, or by a lot of people, like telephones, remote controls, computer keyboards, and even your game controller. Bacteria and viruses can remain on surfaces for hours or even days and still be infectious. So beware!

You can also be infected by bites from insects or animals like mosquitos and ticks or wildlife that may carry rabies.

Infectious agents usually come into your body through your eyes, nose, and mouth, or anywhere you have a break in your skin-like a cut or scrape. If you touch a contaminated surface and then touch your eyes, nose, or mouth, you could get sick.
**Notes:**

Time for more practice. Now that you know how pathogens are spread, choose the statement that is FALSE. Click on your answer.

<table>
<thead>
<tr>
<th>Correct</th>
<th>Choice</th>
<th>Feedback</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NO</strong></td>
<td>Pathogens usually enter your body through the eyes, nose, or mouth.</td>
<td>This answer is a true statement. Pathogens do enter your body through your eyes, nose and mouth. Remember to select the statement that is false.</td>
</tr>
<tr>
<td><strong>NO</strong></td>
<td>Pathogens are spread through contaminated food and water.</td>
<td>This answer is a true statement. Pathogens are spread through contaminated food and water. Remember to select the false statement.</td>
</tr>
<tr>
<td><strong>YES</strong></td>
<td>Pathogens cannot be spread by contaminated surfaces.</td>
<td>Major Microbe Busters! You’re absolutely right! Pathogens enter your body through your eyes, nose, and mouth. They can be spread by contaminated food or water, and by coughing or sneezing. You do need to worry about contaminated surfaces as well, they spread pathogens as well.</td>
</tr>
<tr>
<td><strong>NO</strong></td>
<td>Pathogens are spread by coughing and sneezing.</td>
<td>This answer is a true statement. Pathogens are spread by coughing and sneezing. Choose the false statement.</td>
</tr>
</tbody>
</table>
1.17 Preventing Infection

Notes:

So what can you do to prevent the spread of infection and to protect yourself and others from infection?

First, if you ever find yourself caught on a reality show where they leave you stranded in the woods, don’t drink the water unless you boil it first! Just so you know, that kills all the pathogens in there.

In the regular world, the good news is good hygiene, or cleanliness, is one of your best defenses. Wash your hands thoroughly any time you know you have come in contact with an infectious agent-like after you visit your sick friend, or after the lady at the grocery store sneezes on you, or after using a public keyboard. Eeeewwww, think about all the hands that were on it before yours!

Also wash your hands before and after you eat, even when it is just a snack. Oh, and don’t forget to wash your hands after a handstand!

When you go to the bathroom always wash your hands with soap and water before you leave. Use a clean paper towel to turn off the water and to open the door.

Even though you wash your hands try not to touch your hands to your eyes, nose, and mouth.

Always handle food properly. Wash your hands before and after you handle food. Wash your hands after handling raw meat. Never cross contaminate-that means don’t use the same knife and cutting board to cut meats and vegetables. Use a different knife and cutting board, or wash them both thoroughly in between. Wash your hands and surfaces often. And, make sure you keep refrigerated foods cold, and warm foods warm.

So, are you seeing a theme here? Wash your hands, wash your hands, wash your hands!
1.18 Practice 6

Notes:

OK Microbe Buster, use the drop downs to match the items on the left with the appropriate answer choices to the right.

<table>
<thead>
<tr>
<th>Correct</th>
<th>Choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Good Hygiene</td>
<td>is one of your best defenses against pathogens</td>
</tr>
<tr>
<td>After using the restroom</td>
<td>wash your hands with soap and water</td>
</tr>
<tr>
<td>Don’t cross-contaminate.</td>
<td>knives and cutting boards for meat and vegetables</td>
</tr>
<tr>
<td>This means use separate</td>
<td></td>
</tr>
<tr>
<td>Don’t spread germs, wash</td>
<td>hands</td>
</tr>
<tr>
<td>your</td>
<td></td>
</tr>
<tr>
<td>Keep foods</td>
<td>at their proper temperature</td>
</tr>
</tbody>
</table>

Feedback when correct:

You got them all. Good hygiene, or cleanliness, is one of the best ways you can fight infection. Always wash your hands after using the restroom. Always handle food properly.

Feedback when incorrect:

Incorrect. To review, good hygiene, or cleanliness, is one of the best ways you can fight infection. Always wash your hands after using the restroom. Always handle food properly.
1.19 Vaccines and Antibiotics

Notes:

What happens if hand washing isn’t enough? Then we chase after them of course!

No, not really. What we do have are vaccines and antibiotics.

Vaccines, which give your body immunity to a pathogen, can prevent some infections. If there is a vaccine available, it will help prevent you from getting the disease, and it will also help prevent the spread of the disease because you will be one less person to spread it. Vaccines can prevent some viral infections and some bacterial infections, but vaccines cannot treat the disease once you get it.

Antibiotics only work on infections which are caused by bacteria. Antibiotics do not prevent an infection, instead, they treat the infection once you have it. It is important to take your antibiotics according to the directions your doctor gives you and finish all of your antibiotics. If you don’t finish them, all the bacteria do not die, and they become resistant to the antibiotic which means they become stronger and the antibiotic no longer works against them.

And always remember to wash your hands...oh wait, I already said that.

Keep all of this in mind and you’ll always be a Microbe Buster! Thumbs up to ya!
1.20 Practice 7

Facts

<table>
<thead>
<tr>
<th>Vaccines</th>
<th>Both Vaccines and Antibiotics</th>
<th>Antibiotics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevents some viral infections.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cannot treat infections.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prevents some bacterial infections.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>May prevent the spread of disease.</td>
<td></td>
<td>Both</td>
</tr>
<tr>
<td>Can cause bacteria to become resistant if not used properly.</td>
<td>Antibiotics</td>
<td></td>
</tr>
<tr>
<td>Treats bacterial infections.</td>
<td>Antibiotics</td>
<td></td>
</tr>
</tbody>
</table>

Feedback when correct:

Fantastic! Vaccines can prevent some viral and bacterial infections, and as a result may prevent the spread of certain diseases. Antibiotics are used to treat bacterial infections. If antibiotics are not taken correctly, they can cause the bacteria to become resistant.

Feedback when incorrect:

Notes:

Were you paying attention? Drag and drop the facts about vaccines and antibiotics to the correct category. There might be a fact that applies to both, so place that in the ‘Both’ category.
You missed one. Here’s the deal, vaccines can prevent some viral and bacterial infections, and as a result may prevent the spread of certain diseases. Antibiotics are used to treat bacterial infections. If antibiotics are not taken correctly, they can cause the bacteria to become resistant.
1.21 Lesson Review

Notes:

Ok, time to review. In this tutorial we learned that infectious agents are anything that can cause an infection. Most of them are microorganisms, which you need a microscope to see. Pathogens are infectious agents that cause disease.

The types of infectious agents are viruses, bacteria, fungi, and parasites.

Viruses are very tiny non-living particles that cannot reproduce on their own. Instead they need a host. When the virus multiplies using the host, it makes the host sick. The common cold and influenza are examples of infections caused by viruses. Some viral diseases can be prevented by vaccines.

Bacteria are also small, but not as small as viruses. Bacteria are single-celled living organisms that can reproduce on their own, usually very rapidly, and can live almost anywhere. Bacteria either make you sick by damaging your cells, or producing toxins that damage your cells. Some examples are strep throat and tuberculosis. Infections caused by bacteria can be treated with antibiotics.

Fungi are infectious agents as well. Many people think that they are plants but they’re not. They feed off the organism that they live on. Fungi reproduce by spores which is the particle that causes the infection. Athletes foot and ringworm are examples of fungal infections.

Parasites are organisms that live in or on another organism which we call the host. The host is usually harmed. Parasites either lie in wait for the host to happen by, they are carried by insects or other animals, and they are carried by contaminated food and water. The human tapeworm is an example of an intestinal parasite.

There are several ways that pathogens are spread: they are spread by direct contact with infected people or other organisms. Coughing and sneezing are commonly known to spread infection. Contaminated food and water can spread them too. Contaminated surfaces are also a problem. Some pathogens can remain infectious on surfaces for several days in some cases. Bites from insects and wild animals can spread pathogens as well.
Overall, the one best thing you can do to fight the spread of infection is washing your hands.

After investigation, we determined that Ms. Edwards’ class had a viral infection. It was spread by coughing and sneezing and touching contaminated surfaces. What do you think? The best advice I think we can give the students is wash your hands, wash your hands, wash your hands! Of course they could always call the Microbe Busters!

Until next time, have a pathogen free day!
Notes:

Thank you for using this original tutorial. This screen shows your start and end times, which can be printed on your computer or tablet. Be sure to check out our other original tutorials too.

---------------------------------

Credits

All images licensed from iStock.com and/or Thinkstock.com, unless otherwise noted.

- By Nephron - Own work, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=9132881

- By Transferred from en.wikipedia to Commons. This media comes from the Centers for Disease Control and Prevention's Public Health Image Library (PHIL), with identification number #5205. Note: Not all PHIL images are public domain; be sure to check copyright status and credit authors and content providers. English | Slovenščina | +/-, Public Domain, https://commons.wikimedia.org/w/index.php?curid=1877700

- By Photo Credit: Content Providers(s): - This media comes from the Centers for Disease Control and Prevention's Public Health Image Library (PHIL), with identification number #2110. Note: Not all PHIL images are public domain; be sure to check copyright status and credit authors and content providers. English | Slovenščina | +/- modified by de:Benutzer:Kookaburra, Public Domain, https://commons.wikimedia.org/w/index.php?curid=146411

- By NIAID - H1N1 Influenza Virus Particles, CC BY 2.0, https://commons.wikimedia.org/w/index.php?curid=39933204

- By Alan Vernon - originally posted to Flickr as Yawning Raccoon, CC BY 2.0, https://commons.wikimedia.org/w/index.php?curid=8572085

- By Photo Credit: Content Providers(s): CDC/Dr. Mae Melvin Transwiki approved by: w:en:User:Dmcdpivot. This media comes from the Centers for Disease Control and Prevention's Public Health Image Library (PHIL), with identification number #2704. Note: Not all PHIL images