

Escherichia coli bacteria

**Bacteria: The Good and the Bad**

Bacteria are tiny microscopic organisms that thrive in many diverse environments. Although we can not see bacteria with the naked human eye, it is everywhere. Bacteria can be found on the page of this book, on your hands, on the door knob and inside your body. In the late 1670s Anthony Leeuwenhoek was the first person to see bacteria. Some species of bacteria can survive in places where no other organisms can. Bacteria are single celled living things that are identified by the type of environment in which they live in. There is temperature loving known as **Thermophiles** which refers to bacteria that lives in hot conditions. Salt loving bacteria known as Salinophiles live in extremely saline or salty conditions. Bacteria can also be identified by whether it uses oxygen or not. **Anaerobic** bacteria live without oxygen while **aerobic** bacteria need oxygen to survive. Bacteria can also be classified by its shape. **Coccus** bacteria is shaped like spheres, **bacillus** bacteria are shaped like rods and **spirilus** bacteria have a spiral shape.

Good bacteria make up 85% of the bacteria while bad bacteria only make up the only 15%. Healthy bacteria, is beneficial to the human body and its main goal is to enhance the human health. The most common healthy bacteria are **probiotics** which enhances a healthy gut. Bad bacteria are harmful and can make you sick. It thrives in harsh, unhygienic environments.

Our main objective in this chapter is to explain how bacteria can either enhance the human immune system or throw it out of balance. We will take a deep look into how bacteria plays a critical role in the external environment and internal environment.

Here are the questions we will address:

* Can humans live without bacteria?
* How is bacteria spread?
* What is good bacteria?
* What is bad bacteria?

**Can humans live without bacteria?**

What would happen to the world if all bacteria suddenly vanished? Would the world be free of disease? Would humans suddenly live forever? Would humans have an endless supply of food and materials since nothing could harm them? The immediate answer would be yes. If all bacteria, fungus and viruses suddenly vanished all naturally caused infections would be gone. Yes, that means there would be no urinary tract infections, syphilis, Meningitis, sepsis, the common cold and many other bacterial infections. Seems like the ideal world, right? Unfortunately, not. In the beginning everything would seem perfect, but after some time the worlds nutrients would stop being made. “A plant, for example, survives via photosynthesis on water (hydrogen and oxygen), sunlight (to convert water and carbon dioxide into sugar), and a host of other elements like nitrogen, phosphorous, and potassium. All of these basic chemicals are taken in from the environment and recycled back to the Earth after they're consumed. And guess who controls and speeds along all of these processes? **Microbes**. Bacteria, for example, convert nitrogen and carbon dioxide from the air into usable components that plants and animals can use as essential building blocks” (Calderone, Julia).

Ask yourself, what do you think would happen if the world suddenly couldn’t produce anymore of the essential building blocks? You are right, all plants would die. Without the ability for microbes to go through photosynthesis they will all quickly die. Therefore, all herbivore animals would starve and die. This means the protein that most humans depend on would be gone. Yes, no more cows, sheep’s or goats. However, the human mind is insanely smart and we would come up with another good source of protein for the time being. “In the end, we'd survive for a period of time without microbes, but not indefinitely”

**Good bacteria**

Humans could not survive without good bacteria in fact most bacteria are harmless to humans. Good bacteria are also known as probiotics; probiotics are living bacteria that is essential for your **digestive system**. The role of probiotics is to replace healthy bacteria after it has been lost from either **antibiotics** or other bad bacteria. Probiotics can be found in certain foods such as yogurt and fermented foods or in natural supplements that can be found at your local grocery store. Healthy bacteria help prohibit bad bacteria from growing and causing disease. The following are a list of beneficial bacteria to humans according to *Healthy Eating*:

* Lactobacillus Acidophilus and other Lactobacilli – This type of bacteria can be found in food such as yogurt and creates unfavorable conditionals by producing lactic acid and hydrogen peroxide.
* Bifidobacterium Bifdum and Breve – this bacterium can help repair stomach ulcers caused by Helicobacter Pylori.
* Streptococcus Thermophilus and Salivarius – This type of bacteria is the started culture in manufacturing yogurt and other fermented dairy products. This bacterium is helpful for the relief of abdominal cramps, diarrhea, nausea and other gastrointestinal symptoms associated with lactose.
* Bacillus Coagulans – This type of bacteria is another probiotic that is available as a dietary supplement. It is useful in the treatment of gastrointestinal disorders.

**Bad bacteria**

Bad bacteria are everywhere, however there are only a few that are capable of causing diseases. This kind of bacteria is known as **Pathogenic**. It’s the reason we wash our hands after using the bathroom, the reason we take antibiotics, why we wear gloves and why we use disinfectant wipes. Most of the bad bacteria humans come in contact is from external sources that disturb the internal **homeostasis** of our body. The way our body responds to an **infection** can cause headaches, fever and malaise. These are symptoms of our immune system hard at working trying to eliminate the infection. These infections can range from a 24-hour illness to death. The range of different pathogenic illnesses causes by bacteria is drastic. The top ten most common bacteria infections are:

* Tetanus is caused by the bacterium Clostridium tetani. It enters the body via an open wound and releases a powerful toxin, tetanospasmin.
* Typhoid fever is caused by the bacterium Salmonella enterica. The sources of infection are represented by contaminated water and food
* Cholera is caused by the bacterium Vibrio cholerae. Humans take the bacterium from water infested with human feces.
* Plague is caused by Yersinia pestis.
* Syphilis, caused by the bacterium Treponema pallida, is the most severe sexually transmitted bacterial infection.
* Gonorrhea is triggered by the Neisseria bacteria and it is transmitted sexually
* Tuberculosis is caused by the Koch bacterium (Mycobacterium tuberculosis). It is as old as the humankind is.
* Legionnaire's disease is caused by Legionella bacteria. The bacteria are taken from air or wet environments.
* Pneumonia affects 1% of the planet's population and can be produced by bacteria (like Aeromonas hydrophila) or viruses.
* Anthrax (Bacillus anthracis) is the most famous bacterium fluttered in the bioterrorism war.

Antibiotics have been developed to help cure some of the previous listed diseases, but some strains of bacteria have developed a resistance to antibiotics.

**How to get rid of unbeneficial bacteria**

If you have a bacterial infection, it is important to see a doctor since it may be life threatening. “The discovery of antibiotics for bacterial infections is considered one of the most important breakthroughs in medical history. Unfortunately, bacteria are very adaptable, and the overuse of antibiotics has made many of them resistant to antibiotics. This has created serious problems, especially in hospital settings. Antibiotics are not effective against viruses, and many leading organizations now recommend against using antibiotics unless there is clear evidence of a bacterial infection” (Bacterial and Viral Infections).

**Aerobic -** relating to, involving, or requiring free oxygen.

**Antibodies -** a blood protein produced in response to and counteracting a specific antigen. Antibodies combine chemically with substances that the body recognizes as alien, such as bacteria, viruses, and foreign substances in the blood.

**Anaerobic -** relating to, involving, or requiring an absence of free oxygen

**Bacillus –** rod shaped bacterium

**Coccus –** any spherical or roughly spherical bacterium

**Digestive system -**  is a group of organs working together to convert food into energy and basic nutrients to feed the entire body

**Homeostasis -** the tendency toward a relatively stable equilibrium between interdependent elements, especially as maintained by physiological processes

**Infection -** the process of infecting or the state of being infected

**Microbes -** a microorganism, especially a bacterium causing disease or fermentation.

**Pathogenic -** causing or capable of causing disease

**Probiotics -** a microorganism introduced into the body for its beneficial qualities

**Spirilus -** a bacterium with a rigid spiral structure, found in stagnant water and sometimes causing disease

**Thermophiles -** a bacterium or other microorganism that grows best at higher than normal temperatures

References

Anitei, Stefan. “Top ten Bacterial Infections” *Softpedia News*. <http://news.softpedia.com/news/Top-10-Bacterial-Infections-83326.shtml>

“Bacterial and Viral Infections.” *WebMD*, WebMD, [www.webmd.com/a-to-z-guides/bacterial-and-viral-infections#2](http://www.webmd.com/a-to-z-guides/bacterial-and-viral-infections#2).

Calderone, Julia. “Something terrible would happen if all microbes instantly disappeared.” *Business Insider*, Business Insider, 1 June 2016, [www.businessinsider.com/what-happens-if-microbes-disappear-2016-5#humans-and-other-life-would-survive-in-the-short-term-but-eventually-would-die-6](http://www.businessinsider.com/what-happens-if-microbes-disappear-2016-5#humans-and-other-life-would-survive-in-the-short-term-but-eventually-would-die-6).

“List of Good Bacteria.” *Healthy Eating | SF Gate*, healthyeating.sfgate.com/list-good-bacteria-7771.html.