

**What Does Your Gut Have to Do With Vaccines?**

Please respond to each statement in the table below three different times:

1. Before reading the article, “The Link Between Gut Bacteria and Vaccine Effectiveness”
2. After reading the article, “The Link Between Gut Bacteria and Vaccine Effectiveness” (included on page 2)
3. After viewing the Beyond the Blog video, “[COVID-19 and Our Microbiome](#)”

Response key:

- Yes, that sounds right to me
- No, I don’t think that is right
- I’m not sure and don’t have enough information to respond

Before Reading the Response	Statement	After Reading the Response	After Viewing the Response
<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	A human’s gastrointestinal tract is actually outside of the body.	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	The “gut microbiome” refers to only the harmful bacteria that may live in a person’s bowels.	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	A microbiome only includes bacteria, not viruses or other pathogens.	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	The human immune system only attacks harmful bacteria.	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	Antibiotics reduce the amount of all bacteria in or on a person.	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	Researchers have found that taking an antibiotic prior to receiving a flu vaccine boosted the vaccine’s effectiveness.	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	Scientists believe that the population of gut bacteria impacts the body’s immune response to all vaccines.	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	Current recommendations include a course of antibiotics shortly before receiving a COVID-19 vaccine.	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>	<input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>

## The Link Between Gut Bacteria and Vaccine Effectiveness

Did you know the inner space of your gastrointestinal (GI) tract is actually outside of the body? Food, pathogens and other potentially damaging material pass through the GI tract on a daily basis. The intestinal barrier system keeps harmful things out of the body and allows good nutrients and substances to enter through cells in the intestinal lining. The intestinal barrier system includes the physical barrier of a mucus layer and intestinal epithelial cells, along with a heavy immune system presence. In fact, about 70-80 percent of the human immune system resides in the GI tract.

The GI tract is also home to trillions of microbes, called the gut microbiome. The immune system co-exists with the “friendly” microbes to maintain health and protect against colonization by unwanted microbes. Resident microbes in the gut produce many products and compounds that affect the immune system and other physiological processes in the body. Dysregulation of the number or type of microbes in the gut has been shown to be involved in autoimmunity, cancer and other diseases.

A recent study published in *Cell* also implicates the gut microbiome in immunity developed after receiving a vaccine. For the study, researchers recruited people who had not received a flu shot or been infected by the flu in the previous three years. All were given a flu shot, but half were given antibiotics beforehand. Not surprisingly, gut bacterial diversity and number were decreased in people treated with antibiotics, because some of the bacteria in the gut were killed by the antibiotic. Along with this alteration in gut microbes, the people treated with antibiotics produced fewer flu-specific antibodies, the proteins that help prevent future infection with the flu, than those who did not receive an antibiotic treatment.

The study suggests that the microbial community in the gut influences vaccine immunity, although the exact mechanism is unknown. In the future, the scientists involved in the study want to understand more about the mechanism by which the microbes control immune responses to vaccination in the hopes of increasing the effectiveness of vaccines.

REFERENCE: Hagan, T. et al. Antibiotics-driven gut microbiome perturbation alters immunity to vaccines in humans. *Cell* (2019) 178:1313-1328 doi: 10.1016/j.

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