



This article discusses the general health benefits of probiotics, which are strain-specific, and is not meant to imply that ACTIVIA® provides the benefits mentioned in this article. ACTIVIA is a probiotic yogurt that may help reduce the frequency of minor digestive discomfort when consumed twice a day for two weeks as part of a balanced diet and healthy lifestyle. Minor digestive discomfort includes bloating, gas, abdominal discomfort, and rumbling.

GUT HEALTH AND IMMUNE RESPONSE

The body has its own natural immune system, with the largest part residing in the gut. In addition to digestion, the gut microbiome performs a number of tasks that are essential for good health. This natural immune system protects the body from a wide range of everyday challenges, including pathogenic microorganisms, free radicals, or lifestyle factors such as psychological and physical stress.^{1,2,3}

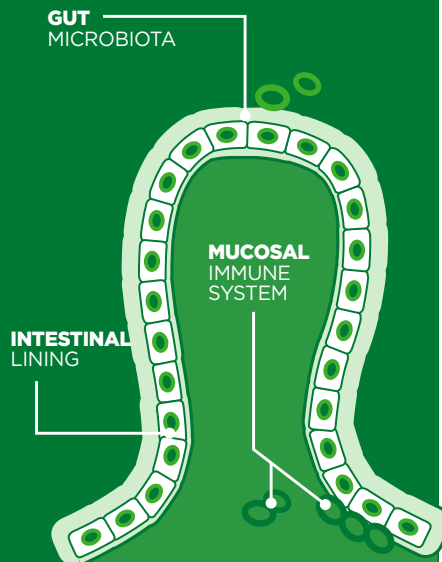
Three layers in the gut microbiome work together to provide a barrier against external aggressions. The efficacy of these three layers of protection depend upon the presence of certain specific elements coming from the outside environment.⁴ It is generally recognized that a balanced and nourishing diet and well-functioning gut are essential for the maintenance of the body's natural immune system.⁵

THE GUT MICROBIOME FUNCTIONS AS PART OF THE IMMUNE SYSTEM AND PROVIDES A BARRIER TO PATHOGENS^{6,7,8}

1. GUT MICROBIOTA: Consists of a multispecies microbial community, consisting of bacteria, fungi, and viruses, living within a particular niche in synergy with the host.

2. INTESTINAL LINING: Acts as a “safety net” for the epithelium, which allows it to block most bacteria while remaining permeable to nutrients.

3. MUCOSAL IMMUNE SYSTEM: About 70% of the immune system is located in the gut where specialized cells play an important role as the first line of defense against certain bacterial and environmental assaults.



IT STARTS IN THE GUT





THE GUT AND IMMUNE SYSTEM: A SYMBIOTIC RELATIONSHIP

The body's immune response depends on the intestinal microbiome. There is a bi-directional relationship between the gut microbiome and the innate immune system, meaning they are in constant communication with each other.⁹

The conversations between the gut and the immune system help the body discriminate between harmless foreign entities like food and harmful ones like Salmonella, training the immune system to make the distinction.¹⁰ The effect of the gut microbes isn't only confined to the gut, but also the whole systemic immune system.¹¹ Therefore, supporting a healthy microbiome is essential in ensuring that the immune system is able to respond to infections, inflammation and recovery from illness.⁴

HOW NUTRITION IMPACTS IMMUNE HEALTH⁵

The foods we eat have a direct impact on the immune system by supplying needed nutrients, and indirectly impact the immune system through their influence on the gut microbiota (bacteria living in our gut). Our diets affect which microbes live in our gut. Some components of the diet, such as indigestible fibers coming from plants, are considered food for some of the good bacteria in our gut. These bacteria will consume the fibers and in return produce beneficial compounds, such as short chain fatty acids. Short chain fatty acids can be used by our bodies as well as support the beneficial gut microbes which are linked to our immune health. Eating a fiber-rich diet with a wide variety of plant foods (such as vegetables, fruits, berries, nuts, seeds, grains and pulses) and including fermented foods is important to maintain a healthy mix of gut microbiota and a robust immune system. It is also important to include some lean meats, eggs, dairy products and oily fish as part of a healthy diet. There are many, varied roles for nutrients in supporting the function of the immune system. Therefore, good nutrition helps create an environment in which the immune system is able to respond when challenged.

There is evidence that probiotic bacteria (sometimes added to fermented dairy products such as certain yogurts or kefir) may compete with pathogenic bacteria for nutrients, interact with the gut wall and gut associated immune tissues, and are thought to be able to influence the immune system at sites elsewhere in the body.⁵

NUTRIENTS TO SUPPORT THE IMMUNE SYSTEM⁵

When our immune system protects us against pathogens, it becomes more active when infection occurs. This activity increases the demand for certain nutrients in the diet (such as glucose, amino acids and fatty acids) to help provide energy and building blocks for new immune cells and regulatory molecules. Several vitamins and minerals play key roles in supporting this process and reducing risk of infections, such as:

VITAMINS	A	B6	B12	FOLATE (B9)	C	D	E
MINERALS	ZINC	COPPER		SELENIUM			IRON

Evidence suggests that supplementing the diet with a combination of multiple, selected, immune supportive micronutrients may help to support immune function.¹²

REFERENCES

1. Belkaid Y, Hand TW. Role of the microbiota in immunity and inflammation. *Cell*. 2014;157(1):121-141.
2. Dumitrescu L, Popescu-Olaru I, Cozma L, et al. Oxidative Stress and the Microbiota-Gut-Brain Axis. *Oxid Med Cell Longev*. 2018;2018:2406594.
3. Karl JP, Hatch AM, Arcidiacono SM, et al. Effects of Psychological, Environmental and Physical Stressors on the Gut Microbiota. *Front Microbiol*. 2018;9:2013.
4. Wiertsema SP, van Bergenhenegouwen J, Garssen J, Knipfels LMJ. The Interplay between the Gut Microbiome and the Immune System in the Context of Infectious Diseases throughout Life and the Role of Nutrition in Optimizing Treatment Strategies. *Nutrients*. 2021;13(3):886.
5. Calder PC. Nutrition, immunity and COVID-19. *BMJ Nutr Prev Health*. 2020;3(1):74-92.
6. Iacob S, Iacob D.G., Luminos L.M. Intestinal Microbiota as a Host Defense Mechanism to Infectious Threats. *Front Microbiol*. 2018;9:3328.
7. Lazar V, Ditu L-M, Pircalabioru GG, Gheorghe I, Curutiu C, Holban AM, Picu A, Petcu L, Chifiriuc MC. Aspects of Gut Microbiota and Immune System Interactions in Infectious Diseases, Immunopathology, and Cancer. *Front Immunol*. 2018;9:1830.
8. Okumura R, Takeda K. Roles of intestinal epithelial cells in the maintenance of gut homeostasis. *Exp Mol Med*. 2017;49:e338.
9. Shi N, Li N, Duan X, Niu H. Interactions between the gut microbiome and mucosal immune system. *Mil Med Res*. 2017;4:14.
10. Sonnenburg J, Sonnenburg E. *The good gut: Taking control of your weight, your mood, and your long-term health*. Penguin Press. 2015.
11. Shanahan F, van Sinderen D, O'Toole PW, Stanton C. Feeding the microbiota: transducer of nutrient signals for the host. *Gut*. 2017;66(9):1709-1717.
12. Gombart AF, Pierre A, Maggini S. A Review of Micronutrients and the Immune System-Working in Harmony to Reduce the Risk of Infection. *Nutrients*. 2020;12(1):236.