This won't come as a surprise:

Swimming isn't fun when you're feeling bloated, crampy, or gassy. An upset stomach or digestive tract can degrade your performance. Swimming with a pain-free, healthy gut can help you achieve your swimming goals, whether you're jumping in the water for fitness or are a hardcore competitor.

There are some key players affecting your gut that can make a huge difference in your overall health and wellness. These are extremely tiny "friends" that have a lot of power in your systems. You've heard of them before: probiotics and prebiotics.

You might think that the term "probiotics" refers to a supplement that comes in a jar, but probiotics exist naturally in your gut and should come from food first before you consider supplementation. Probiotics affect your microbiome, the community of microorganisms within your gut.

Here's how you can establish a strong gut for strength, stamina, and optimal performance by incorporating these tiny, necessary microorganisms and compounds into your health routine.

How Probiotics and Prebiotics Help

Probiotics are a mixture of live bacteria (yeast) that live in your body and are the good bacteria that keeps your gut healthy and strong. They send food through your gut, and when food flows easily through, it can be adequately digested, absorbed, and used for fuel.

Guts that don't flow well can lead to discomfort, cramping, gas, pain, and other negative side effects caused by poor digestion. Probiotics are found in fermented foods such as kefir, kimchi, kombucha, miso, pickles, sauerkraut, sourdough bread, tempeh, yogurt, and some cheeses.

Certain probiotic strains can increase absorption of key nutrients, such as amino acids from proteins, which can positively affect the way you use specific proteins from food. Combining probiotics with exercise can enrich your microbiota diversity and stimulate the proliferation of bacteria within your gut, which can make your gut healthier.

Research published in *Nutrients* in 2021 has shown that 70%–80% of your immune system stems from your gut. This is a huge percentage that further shows how a strong, functioning gut can affect your overall wellness. Probiotics contribute to gut health support. Including foods that contain probiotics within your regular diet is important to maintaining a healthy gut and reducing the risk of getting sick.

Prebiotics come from foods that are nondigestible. Prebiotics act as food for the probiotics to grow and thrive within your gut. Think of prebiotics as the fertilizer that helps good bacteria grow.

Prebiotics primarily come from fibers and starches, and the compounds include galacto-oligosaccharides, inulin, lactulose, and oligofructose. They can be found naturally in foods such as artichokes, asparagus, bananas, barley, berries, chicory, garlic, green leafy vegetables, legumes, linseed, oats, onions, tomatoes, and wheat. A study published in *Beneficial Microbes* in 2020 found prebiotics improve stress-induced symptoms, such as depression and mood disturbances, and other digestive issues, such as inflammation.

Probiotics and prebiotics synergize to improve your overall gut health and augment the anti-inflammatory effects of exercise. Probiotics have been studied a lot more than prebiotics in regard to their effect on exercise. Because you need prebiotics to feed the probiotics, understanding how this relationship works is important.

When you read about probiotics and prebiotics, you might also come across the term postbiotics, which are what's left behind after your body digests probiotics and prebiotics. These leftovers contribute to a healthy gut and immune system, and include nutrients such as amino acids, antimicrobial peptides, short-chain fatty acids, vitamin B, and vitamin K.

Postbiotics also have benefits that include helping good bacteria remain abundant by slowing down the growth of bad bacteria that can decrease the quantity of healthy bacteria within your gut. The relationship between postbiotics and gut health is still being studied.

Eating a well-balanced diet rich in a variety of nutrients is key to establishing healthy habits that are wholesome and holistic. There's never a one-shot solution or "just eat this and you'll be cured." It's truly about the balance of including a variety of macronutrients, micronutrients, microorganisms, minerals, and vitamins. All help optimize your overall health and performance.

How Probiotics and Prebiotics Affect Swimming Performance

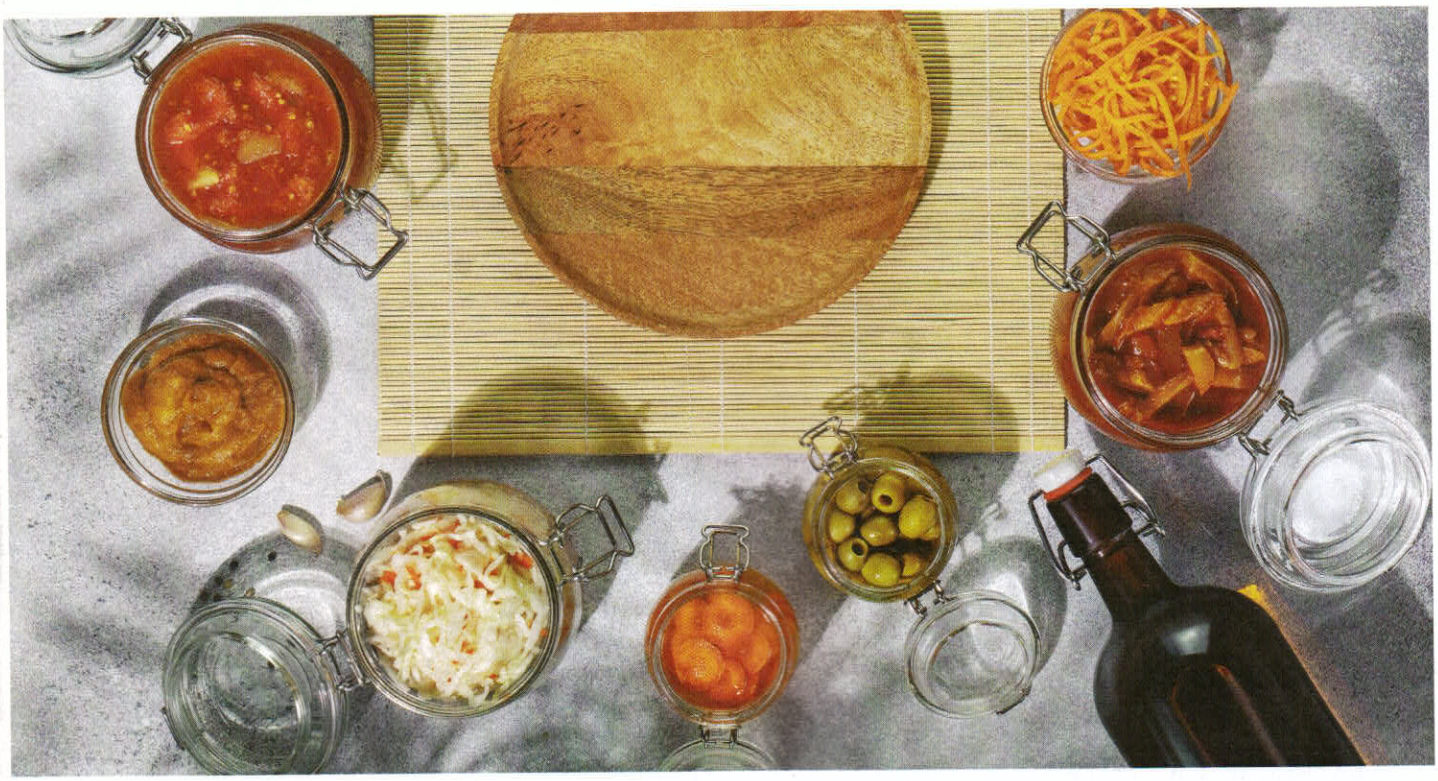
Many athletes put a lot of strain on their bodies through excessive training, psychological stress, potentially disturbed sleep (think of all those early morning practices), and environmental extremes (especially when it gets hot outside in the summer). All these factors can contribute to an increased risk of respiratory tract infections. Traveling or being exposed to a lot of crowds can elevate your risk of getting sick.

The following studies looked at multiple ways of taking probiotics, either via natural foods or supplementation, and the specific strains consumed. These studies show how probiotics can affect a swimmer's performance by optimizing diversity within the microbiome and enhancing gut health, which contributes to better performance outcomes.

A study of competitive female swimmers published in the *Medical Journal of the Islamic Republic of Iran* in 2013 showed statistically significant results among swimmers who took probiotic supplements in reducing the number of episodes of respiratory infections and shortening the duration of symptoms such as dyspnea (shortness of breath) and ear pain. The overall health of the athletes who took the probiotic supplements was enhanced too. Because infections can hinder your performance, finding strategies to improve your resistance to and risk of illness is necessary, and probiotics can help.

The Journal of the International Society of Sports Nutrition in 2019 published its stance on the use of probiotics and shared many positive correlations for athletes who consumed them. The review discussed how multiple studies have shown that specific strains of probiotics can promote a healthy immune response and reduce the number of episodes, the severity, and the duration of illness and upper respiratory tract infections.

Studies noted in the *Journal of International Society of Sports Nutrition*'s stance on probiotics in 2019 demonstrated how intense, prolonged exercise, especially in the heat, increased gut permeability,



BIGSTOCK/KRISS1605

which resulted in systemic toxemia. Fortunately, specific probiotic strains showed an improvement within the integrity of the gut barrier function in athletes, reducing this negative outcome.

More studies from that 2019 stance have shown how probiotics have been linked to improved recovery from muscle-damaging exercise. Other probiotic benefits relevant to athletes include improved body composition and lean body mass, normalization of age-related declines in testosterone levels, reduction of cortisol levels by improvement in responses to a physical or mental stressor, reduction in exercise-induced lactate, and an increase in cognition and mood. Those are a lot of benefits for athletes, all stemming from these powerful little probiotics.

Another systematic review of athletes published in the *Journal of the International Society of Sports Nutrition* in 2016 estimated between 20% and 60% of athletes suffer from stress caused by excessive exercise and inadequate recovery that is exacerbated by sports such as swimming. Consuming fermented foods enriched with *Lactobacillus* and *Bifidobacterium* can result in specific changes within your gut microbiota activity and improve these stress-induced symptoms including depression, mood disturbances, and digestive issues. The fermented foods already had the probiotics naturally present in them; they were enriched by adding higher quantities of the specific strains so people could absorb a great amount of the probiotic.

Upset stomachs affect a lot of swimmers, and having your gut gurgling while racing through the water is no fun. Supplementing with probiotics is associated with a lower incidence and severity of gastrointestinal symptoms in athletes, according to a study published in 2020 in *Beneficial Microbes*. Even if the athletes in the study experienced some discomfort and gastrointestinal issues, the length of discomfort and the intensity decreased in those taking the probiotic supplement compared to those who didn't.

Do You Need Supplementation?

If you're enjoying a consistent diet that includes probiotic- and prebiotic-rich foods, you may not need supplementation. However, supplementation with multiple strains of probiotics has been reported to increase VO2 max, aerobic power, training load, and time to exhaustion in several studies found in *Beneficial Microbes* (which reviewed 31 studies) in 2020, *Medical Journal of the Islamic Republic of Iran* in 2013, and the *Journal of the International Society of Sports Nutrition* in 2019. Other studies noted in the *Journal of International Society of Sports Nutrition*'s stance have shown that probiotic supplementation, when paired with whey protein, can even expedite recovery, decrease soreness, and reduce muscle damage caused by resistance exercise.

Athletes with high training loads who travel a lot tend to have a higher risk of a compromised immune system, leading to an increased risk of upper respiratory tract illnesses. Taking a probiotic supplement may help support the immune system so that it can better fight infection. More research is needed on the specific requirement to supplement. According to studies published in 2015 by the *Journal of Food Science and Technology* and articles published in *Journal of International Society of Sports Nutrition* in 2019, supplementing with probiotics hasn't harmed anyone or worsened symptoms. Probiotic supplementation is considered safe, but before taking any supplement, consult with your primary care physician or registered dietitian nutritionist first to determine the right strain, dose, and quantity needed for your customized care.

Once again, food first is always advocated to get in your nutrients. Supplementation should be discussed first with your doctor or dietitian.

Davis Aquatic Masters member Sarah Koszyk, MA, RDN, a registered dietitian and sports nutritionist, is a lifelong swimmer and founder of MIJA Naturals.