PROBIOTICS AND THE COMPETITIVE ATHLETE
HAVE YOU EVER MISSED A WORKOUT DUE TO ILLNESS?

DO YOU FEAR MISSING THAT BIG RACE BECAUSE OF A COLD OR FATIGUE?

What would it mean to you to know that you can train harder - to really push yourself - without the fear of illness and overtraining?

For any athlete, the cost of illness and fatigue is decreased performance. In this report, we look at what factors contribute to athlete’s fatigue, overtraining and depleted immunity. This is because there is an increasing amount of research showing that beneficial bacteria, called probiotics, can be a powerful tool to combat illness and optimize immunity - allowing athletes to maintain peak performance.

WHAT IS A PROBIOTIC?

*Probiotics are microorganisms that provide health benefits when consumed.*
As an athlete, you probably think of yourself as the epitome of health, but your passion can be a double-edged sword when it comes to the effects on your immunity.

**HOW?**

The physical stress of both training and racing wears down your immune system. This adversely affects not only your well-being but your ability to train and compete. Because of this stress, **it is not a matter of if you will get sick, but when.**

Here is a list of professional endurance athletes sidelined within the past few years because of infections, including stomach bugs and respiratory illnesses:

- **ANDY SCHLECK** - Tour Méditerranéen 2013 – “respiratory infection”
- **ANDY SCHLECK** - Tour du Haut Var-Matin 2013 – “respiratory infection”
- **THIBAUT PINOT** - Tour de France 2013 – “throat infection”
- **CADEL EVANS** - Flèche-Wallonne and Liège-Bastogne-Liège 2012 – “sinus infection”
- **CADEL EVANS** - USA Pro Challenge 2012 – “low grade infection”
- **RYDER HESJEDAL** - Giro d’Italia 2013 – “possible viral illness”
- **THOR HUSHOVD** - Tour de France 2012 – “viral infection”
- **STEVEN COZZA** - Tour of California 2011 – “yeast infection of the intestines”
- **BRADLEY WIGGINS** - Tour of Britain 2012 – “stomach bug”
- **TAYLOR PHINNEY** - Paris-Nice 2012 – “stomach bug”
- **TAYLOR PHINNEY** - Tour de San Luis 2014 – “stomach bug”
- **ALESSANDRO PETACCHI** - Tour de San Luis 2014 – “stomach bug”
- **DOMINIK NERZ** - Tour de San Luis 2014 – “stomach bug”
- **SYLVAIN CHAVANEL** - San-Remo 2012 – “bronchitis”
- **SYLVAIN CHAVANEL** - Pari-Roubaix 2014 – “bronchitis”
- **CHRIS FROOME** - Liège-Bastogne-Liège 2014 – “chest infection”
- **TERENZO BOZZONE** - Ironman World Championship 70.3 2012 – “sinus infection”
- **CRAIG ALEXANDER** - Ironman Australia 2011 – “viral infection”
- **FARIS AL-SULTAN** - Ironman World Championships 2007 – “gastroenteritis”
- **CHRISSIE WELLINGTON** - Ironman World Championships 2010 – “sore throat”
- **ABDI ABDIRAHMAN** - Boston Marathon 2013 – “flu”

**Why all of these infections?** Because despite our best efforts, there is a delicate balance between the good and bad in our body. It’s a battle that rages at the microscopic level between the bacteria meant to protect us and the bacteria that wants to do us harm.
YOUR NEW TRAINING PARTNER: BACTERIA

Your body is filled with trillions of bacteria. There are over 400 different species of bacteria in your gut alone! Probiotics are among the body’s “good bacteria.” They are living organisms that are shown to benefit the human body. In fact, small amounts of probiotics occur naturally in fermented food such as yogurt, sauerkraut, kimchi and kefir.

In 1908, the scientist Elie Metchnikoff discovered that adding probiotics to our body can actually improve immunity. One hundred years later, numerous scientific studies have supported Metchnikoff’s research. Read about more of these studies HERE.

New research on probiotics now focuses on the beneficial effects for athletes.

Why do probiotics benefit the athlete more than the couch potato?

Because athletes, and specifically endurance athletes, put themselves at risk for impaired immunity due to the intensity and duration of exercise (remember the double-edged sword?) At the heart of these immunity issues is your gut. Evidence increasingly points to the gut as the root cause for much of this immune dysfunction. This athlete-gut connection is more important than you might think - and why the latest research on probiotics is so important...
The human body contains approximately 100 trillion bacterial cells outnumbering human cells 3 to 1.

Microorganisms make up only about 1 to 3 percent of the body’s mass (in a 200-pound adult, that’s 2 to 6 pounds of bacteria). Avg adult human brain weighs 2.9lbs.

In volume, if consolidated, the microbiome would occupy about 3 pints.

Gut surface area is ~35 meters squared with 100 million neurons: more than spinal cord or peripheral nervous system.

70% of your immune system is in your digestive track.
GUT CHECK

Whether you are running Heartbreak Hill or biking up Powerline, blood and oxygen are being diverted to your heart and muscles and away from your gut. As a result of the diverted blood flow, your gut becomes “leaky,” and toxins seep into your bloodstream.

The higher the intensity and the longer the duration of exercise the more significant diversion of blood away from your gut. The decreased blood and oxygen supply to the gut results in insufficient removal of toxins. Toxins ultimately lead to a large amount of inflammation. During this period of increased inflammation and “leaky gut,” the body’s immunity is weakened. This allows viruses and bacteria to gain a foothold, increasing the risk of illness and days away from training and competition.
It’s not just the elite athletes that suffer this kind of inflammation. The weekend warriors and age-groupers among us are also at risk. Many of the exercise-induced changes in immunity are similar to those changes associated with other forms of stress, like sleep deprivation, ageing and psychological stress. Together, these factors can take just as much of a toll on your body as all that training – pushing you further to the right on the graph.

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HOW DO PROBIOTICS HELP ATHLETES?

Probiotics support your body’s immune system in several ways. Probiotics:

• act as a **physical barrier** by limiting the area available on the gut lining for bad bacteria to attach,

• promote the production of a substance called **mucin** which inhibits the adherence of nasty microbes.

• fend off viruses by enhancing the production of **natural killer cells**, and

• promote the production of **cytokines**. These little anti-inflammatory proteins help knock out the badness produced by your last interval session.

**So what does this all mean for you?** Studies show that athletes taking probiotics experience fewer upper respiratory tract infections and GI complaints, allowing us to do what we do best.

**Bottom line:** less fatigue and fewer sick days = more training and better performance.

Probiotics have also been shown to be vital in nutrient production and absorption. They aid in the production of B-vitamins through the liver as well as enhancing amino acid uptake in the gut. These actions are important for optimal recovery as an athlete – recovery being as important as your training.
GAME CHANGERS: PREBIOTICS + SPECIFIC PROBIOTIC STRAINS

It is not enough to take just any probiotic because there are many different types of probiotic strains. The probiotic strains that benefit a sedentary 65-year-old are different from those that have been shown to benefit athletes. The various probiotic strains don’t all have the same affect on your body, which is why they have been studied in many medical conditions including colon cancer, high blood pressure, allergic conditions, Crohn’s disease and osteoporosis.

Specific probiotic strains have also been studied in the athletic population. It’s critical that as an athlete you use a probiotic supplement that contains the specific probiotics found to be beneficial to you - the athlete!

Finally, don’t settle for a solely probiotic supplement, because probiotics have a synergistic effect when used with prebiotics. Prebiotics are nondigestible food ingredients. They are present in various fruits, vegetables, legumes, and grains. Prebiotics improve the function of the good bacteria in our gut. They are often used in combination with probiotics to stimulate probiotic numbers and function.

WHAT IS A PREBIOTIC?

A prebiotic is a nondigestible food ingredient that promotes the growth of beneficial microorganisms - like probiotics - in the intestines. When probiotics and prebiotics are combined, they form a synbiotic.

YOU CAN’T STAND ON THE PODIUM IF YOU’RE NOT IN THE RACE

You can’t leave race day to chance. The best competitors optimize every part of training and recovery. Make no mistake, there are no shortcuts and no magic pills. But every advantage an athlete can get will help to push past your competition and take your training to a new level. Probiotics can provide today’s competitive athlete with just such an advantage.
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Effects of probiotics supplementation on gastrointestinal permeability, inflammation and exercise performance in the heat
Eur J Appl Physiol. 2014 Jan;114(1):93-103
Four weeks of supplementation with a multi-strain probiotic increased running time to fatigue in the heat.

Probiotics supplementation for athletes - Clinical and physiological effects
Eur J Sport Sci. 2014 Oct 23-1-10
Several studies conducted since 2006 examining probiotic supplementation in athletes or highly active individuals indicate modest clinical benefits in terms of reduced frequency, severity and/or duration of respiratory and gastrointestinal illness.

Probiotics, immunity and exercise: a review
The capacity for probiotics to modulate perturbations in immune function after exercise highlight their potential for use in individuals exposed to high degrees of physical and environmental stress.

Probiotics and athletic performance: a systematic review
Probiotics may provide athletes with secondary health benefits that could positively affect athletic performance through enhanced recovery from fatigue, improved immune function, and maintenance of healthy gastrointestinal tract function.

The probiotic Lactobacillus fermentum and mucosal immunity
Br J Sports Med published online March 29, 2010
Prophylactic administration of PCC was associated with a substantial reduction in the number of days and severity of respiratory illness in a cohort of highly trained distance runners.

Daily probiotic’s (Lactobacillus casei Shirota) reduction of infection incidence in athletes
International Journal of Sport Nutrition & Exercise Metabolism. Feb2011, Vol. 21 Issue 1, p55-64
Regular ingestion of Lactobacillus casei shirota appears to be beneficial in reducing the frequency of URTI in an athletic cohort.

Lactobacillus fermentum (PCC (R)) supplementation and gastrointestinal and respiratory-tract illness symptoms: a randomised control trial in athletes
West et al. Nutrition Journal 2011, 10:30
L. fermentum may be a useful nutritional adjunct for healthy exercising males.

The effect of probiotics on respiratory infections and gastrointestinal symptoms during training in marathon runners
Int J Sport Nutr Exerc Metab. 2007 Aug;17(4):352-63
LGG had no effect on the incidence of respiratory infections or GI-symptom episodes in marathon runners, but it seemed to shorten the duration of GI-symptom episodes.

Exercise, intestinal barrier dysfunction and probiotic supplementation.
Probiotic supplements are an upcoming group of nutraceuticals that could offer positive effects on athlete's gut and entire health. Some results demonstrate promising benefits for probiotic use on the athlete's immune system. There is also evidence that probiotic supplementation can beneficially influence intestinal barrier integrity in acute diseases.

A new chance of preventing winter diseases by the administration of synbiotic formulations
J Clin Gastroenterol. 2008 Sep;42 Suppl 3 Pt 2:S224-33
These results demonstrate that a regular, long-term intake of various synbiotics may improve health by reducing the incidence and severity of respiratory diseases during the cold season.

Effectiveness of probiotics on the duration of illness in healthy children and adults who develop common acute respiratory infectious conditions: a systematic review and meta-analysis
British Journal of Nutrition / Volume 112 / Issue 01 / July 2014, pp 41-54
This systematic review provides evidence from a number of good-quality RCT that probiotics reduce the duration of illness in otherwise healthy children and adults.

Probiotic supplementation for respiratory and gastrointestinal illness symptoms in healthy physically active individuals
The probiotic BI-04 appears to be a useful nutritional supplement in reducing the risk of URTI in healthy physically-active adults.

Physical activity, immunity and infection
21-24 October 2009, The 3rd International Immunonutrition Workshop, Platja D’Aro, Girona, Spain
Describes the role of physical activity on immune function.

Exercise, nutrition and immune function
A review of exercise, nutrition and immune function.

Immunonutrition support for athletes
Results from these studies indicate that immunonutrition supplements have the potential to lessen the magnitude of exercise-induced perturbations in immune function and to reduce the risk of upper respiratory tract infections.

Probiotic immunomodulation in health and disease
J Nutr. 2000 Feb;130(2 Suppl):403S-409S
The application of probiotics has demonstrated trends with respect to altered aspects of immune response, the underlying mechanisms by which that occurs are unclear.
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Immune function and exercise: Position Statement - Part one
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A review of immune function and exercise.

Maintaining immune health: Position Statement - Part two
Exerc Immunol Rev. 2011;17:64-103
A review of immune function and exercise.

The Use of Probiotics in Sports Nutrition: Immunity, Nutrient Absorption & More
Presentation by Dr. Ralf Jäger, CISSN, FISSN, MBA at Priobiota 2014

Effects of Gut Microbes on Nutrient Absorption and Energy Regulation
A review of the role of the gut microbiota in energy harvest and fat storage is explored, as well as differences in the microbiota in obesity and undernutrition.

Human Microbiome: FAQ
An in depth report on the human microbiome from the AAM.

Surface area of the digestive tract much smaller than previously thought
A Science Daily article on intestinal anatomy.

Probiotics, prebiotics, and the host microbiome: the science of translation
A review of the influence of probiotics and prebiotics on the host microbiome.

NIH Human Microbiome Project defines normal bacterial makeup of the body
NIH article on genome sequencing creating the first reference data for microbes living with healthy adults.

Think Twice: How the Gut’s “Second Brain” Influences Mood and Well-Being
Scientific America. February 12, 2010
Article address the Gut-Brain connection.

Beta-Glucans Improve Growth, Viability and Colonization of Probiotic Microorganisms
In this work we report that a 2-substituted-(1,3)-β-D-glucan of non-dairy bacterial origin has a prebiotic effect on three probiotic strains.

Baker's yeast beta-glucan supplement reduces upper respiratory symptoms and improves mood state in stressed women
A study demonstrating that daily dietary supplementation with proprietary supplement containing beta-glucan reduces upper respiratory symptoms and improves mood state in stressed subjects, and thus it may be a useful approach for maintaining immune protection against daily stressors.

Influence of yeast-derived 1,3/1,6 glucopolysaccharide on circulating cytokines and chemokines with respect to upper respiratory tract infections
A proprietary supplement containing beta-glucan may decrease the duration and severity of URTI.

Baker's yeast β-glucan supplementation increases monocytes and cytokines post-exercise: implications for infection risk?
The key findings of the present study demonstrate that BG may have potential to alter immunity following a strenuous exercise session.

Beta 1,3/1,6 glucan decreases upper respiratory tract infection symptoms and improves psychological well-being in moderate to highly-stressed subjects
This report suggests that the beneficial properties of these microorganisms may be related to the biological activities of these biopolymers. In this work we report that a 2-substituted-(1,3)-β-D-glucan of non-dairy bacterial origin has a prebiotic effect on three probiotic strains.

Baker's Yeast Beta Glucan Supplementation Increases Salivary IgA and Decreases Cold/Flu Symptomatic Days After Intense Exercise
National Strength and Conditioning Association Annual Meeting, Providence, RI. July 14, 2012
The combination of reduction in URTI symptoms (E1) and increased salivary IgA levels (E2) indicates that preventing a drop in salivary immunoglobulin may be one potential mechanism by which BG supplementation reduces cold/flu symptoms post exercise.

Effect of Beta 1, 3/1, 6 glucan on upper respiratory tract infection symptoms and mood state in marathon athletes
Beta-glucan may prevent URTI symptoms, and improve overall health and mood following a competitive marathon.

Learn more about the science, research and latest news at www.soundprobiotics.com