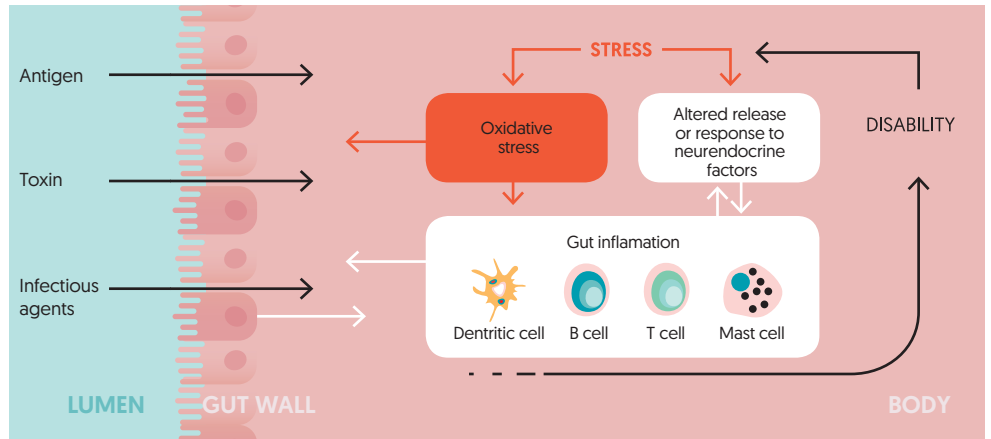


# Reducing exercise-induced stress

Endurance sports have been linked to gastrointestinal complaints and increased susceptibility to infections, resulting in underperformance.<sup>1</sup> Manipulation of the bacterial populations in the gut by specific probiotics could support athletes' general health and performance.

Despite the many health benefits of regular physical activity, athletes are also familiar with the disadvantages of intensive exercise. Endurance and strength sports have been associated with increased risk of nausea, vomiting, abdominal pain, diarrhoea, fatigue, mood disturbances, upper respiratory tract infections (URTIs) and chronic inflammation.<sup>2,3</sup> The physical and psychological demands during intense exercise initiate a complex stress response in the athlete's body that has a profound impact on microbial composition, intestinal permeability, oxidative stress and immune and cognitive responses<sup>4</sup>. The prevalence of stress is believed to be higher in endurance sports such



**Figure 1:** Physiological effects of stress. Stress leads to altered release/response to neuroendocrine factors, acting directly or indirectly on the gut wall, inducing barrier dysfunction and uptake of damaging substances from the lumen. The resulting inflammation causes disability and increases stress.

as swimming, cycling or running<sup>3</sup>. Research has shown that the gut microbiota has a key role in controlling the oxidative stress and inflammatory responses as well as improving metabolism and energy expenditure during intense exercise.<sup>3</sup> Modifying the microbiota through the use of probiotics could be an important therapeutic tool to improve athletes' overall health. There is now reasonable body of evidence for pro-

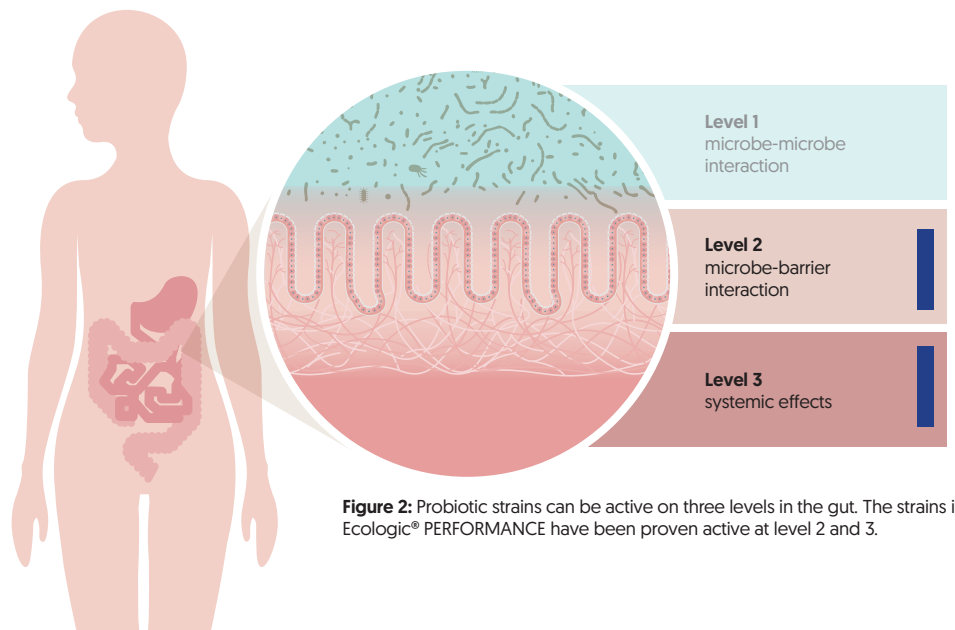
biotics to positively modify the gut microbiota's population and structure, and influence immune and intestinal barrier function in athletes.<sup>4</sup>

As more elite athletes suffer from psychological and gastro-intestinal conditions that can be linked to the gut, targeting the gut microbiota with specific probiotics could support athletes during intense periods of training and competition.

## Strain selection

Ecologic<sup>®</sup> PERFORMANCE is a multispecies probiotic formulation, developed to reduce the adverse effects of exercise-induced stress on the body. The formulation consists of 6 specially selected probiotic strains. Probiotic strains can exert health effects at different levels in the gut [see figure 2]. The probiotic strains of Ecologic<sup>®</sup> PERFORMANCE have been screened for their anti-inflammatory and oxidative properties and their ability to improve the barrier function. The bacterial strains have been tested *in vitro* for their capacity to:

- strengthen the epithelial barrier
- reduce oxidative stress
- induce the production of anti-inflammatory cytokines.



**Figure 2:** Probiotic strains can be active on three levels in the gut. The strains in Ecologic<sup>®</sup> PERFORMANCE have been proven active at level 2 and 3.

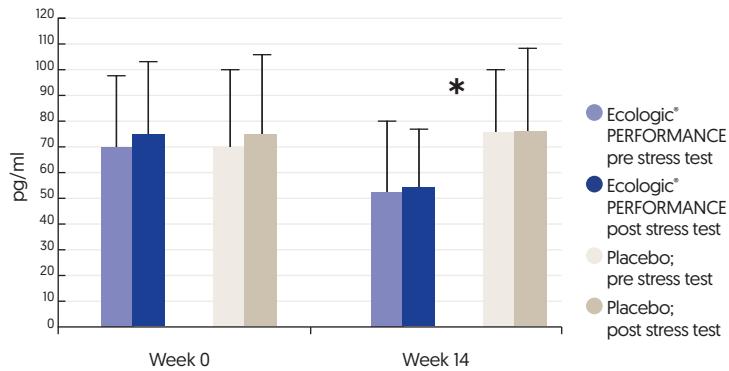
## Clinical evidence

Ecologic® PERFORMANCE has been tested in a randomized, double-blinded, placebo controlled trial at the Medical University of Graz, Austria. Twenty-three endurance sportsmen received Ecologic® PERFORMANCE or placebo for 14 weeks. **Ecologic® PERFORMANCE significantly decreased stool zonulin levels ( $p=0,019$ ), an important marker for a 'leaky gut'**. Moreover, a trend was shown towards a decrease in the chronic inflammatory marker

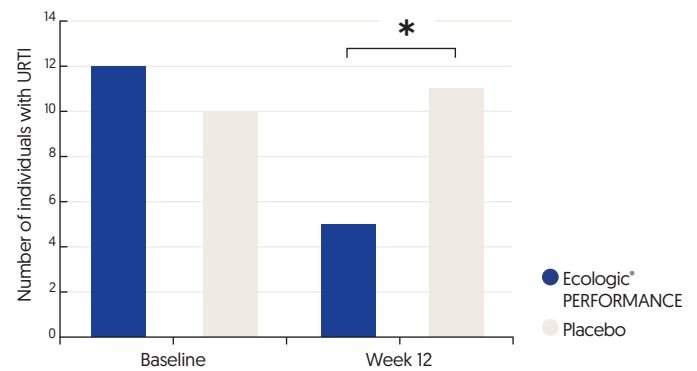
TNF- $\alpha$  [figure 3] and in the protein oxidation marker Carbonyl protein.<sup>5</sup>

In a randomized, double-blinded, placebo controlled trial among 33 trained athletes at the Medical University of Innsbruck, **Ecologic® PERFORMANCE showed to significantly reduce the incidence of URTIs**. After 12 weeks of treatment, the proportion of subjects who experienced one or more URTI symptoms

during the study period was 2.2-fold higher in the placebo group than in the probiotics group [ $p=0.016$ ]<sup>5</sup> [figure 4]. Also, the athletes in the Ecologic® PERFORMANCE group could train 2.6 hours more per week compared to the control group [ $p<0.001$ ].<sup>6</sup> These results show that Ecologic® PERFORMANCE could reduce the adverse effects of stress and offer support during heavy exercise training periods.







**Figure 3:** Effects of Ecologic® PERFORMANCE on TNF- $\alpha$  concentration. \* After 14 weeks TNF- $\alpha$  was reduced by a trend in the Ecologic® PERFORMANCE group compared to the placebo group [ $p=0.054$ ].



**Figure 4:** Incidence of URTIs before and after 12 weeks of supplementation with Ecologic® PERFORMANCE. \*Significant difference [ $p=0.016$ ].

## Formulation details

Indication	Reducing exercise-induced stress.		
Colony forming units (cfu)	2,5 x 10 <sup>9</sup> cfu/gram.		
Bacterial strains	<i>B. bifidum</i> W23 <i>B. lactis</i> W51	<i>E. faecium</i> W54 <i>L. acidophilus</i> W22	<i>L. brevis</i> W63 <i>Lc. lactis</i> W58
PROBIOACT® Technology	 Carefully selected ingredients that contribute to stability (shelf-life), GI-survival and metabolic activity of the probiotic strains.		
Recommended daily dosage	2 grams, twice daily.		
Treatment period	For as long as desired/needed.		
Storage and stability	2 years stable at room temperature, no refrigeration needed.		
Available dosage forms	Dry powder which can be supplied as bulk or sachets, fully packed (with your design).		
Safety and Quality Profile	 	All probiotic strains have the Qualified Presumption of Safety (QPS) status or have an extensive safety file <sup>7</sup> . Winclove is a NSF International Certified GMP Facility for manufacturing dietary supplements and is ISO 22000:2005 certified for the development and production of pre- and probiotics.	
Marketing		Medically endorsed under private label on a co-branding basis. Co-branding enables our business partners to use the scientific data in their marketing communication.	

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