Bio.Me™ Barrier

Bio.Me™ Barrier is a probiotic intervention to improve the cross-talk between our microbes and our epithelial barrier, thus reducing the systemic effects of a disrupted barrier. The formula has shown clinical significance in human trials for the reduction of depression susceptibility[1] and working memory performance[2].

Bio.Me™ Barrier contains nine bacterial strains, which have been specifically selected for their capacity to strengthen the intestinal barrier function and reduce low-grade inflammation[3].

Table 1 displays the evidence behind the Bio.Me™ Barrier strain properties.

Table 1: Evidence based selection criteria

STRAIN	B animalis subsp. lactis W52	B animalis subsp. lactis W51	B. bifidum W23	L. acidophilus W37	L. brevis W63	L Casei W56	L. salivarius W24	Lc. lactis subsp. lactis W19	Lc. lactis subsp. lactis W58
strengthening epithelial barrier function (TEER)			●	●	●			●	
Stimulating regulatory cytokine production (IL-10)	●	●*	●			●			●
Inhibition of mast cell degranulation	●		●	NA	NA	●	●		NA
Decreasing LPS toxicity			●	●				●	

● = positive effect; blank cells = no or insufficient effect; NA = not available

B. animalis subsp. lactis (Bifidobacterium lactis & Bifidobacterium animalis are used as a synonym)

* Data derived from a different data-set than other IL-10 data

The role of increased permeability of the intestinal epithelial lining has been theorised to play a causative role in many disease processes. Recently, research is catching up with theory, giving us better explanations for the role that raised intestinal permeability plays in disease progression such as crohn's disease, coeliac's disease, autoimmune conditions, diabetes, chronic fatigue, and atopic conditions[4]. The latest research also shows the impact of disrupted intestinal barrier function on mental health, with the 'leaky gut, leaky brain' theories starting to gather further evidence[5].

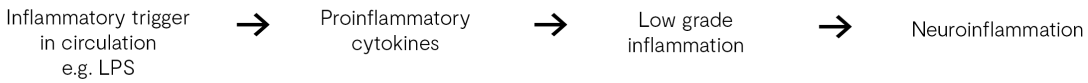

Figure 1: links between inflammatory triggers and neuroinflammation

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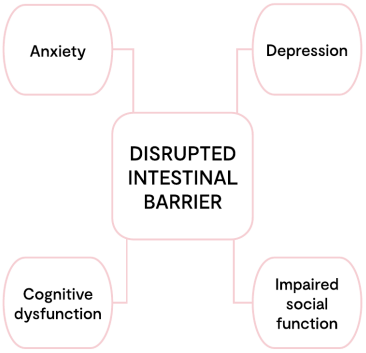


Figure 2: Figure adapted from Kelly et al. (2015). Potential neuropsychiatric consequences of a dysregulated intestinal barrier. Activation of brain-gut microbiota axis signaling pathways via a compromised intestinal barrier with potential effects on mood, anxiety, cognition and social interaction.

The influence of the microbiota extends beyond the gastrointestinal (GI) tract. It plays an important role in the bidirectional communication between the GI tract and the central nervous system (CNS). This connection is also called the gut-brain axis[6]. The high comorbidity between psychiatric disorders with GI conditions, such as irritable bowel syndrome and inflammatory bowel disease supports the evidence of the existence of this axis[7,8,9]. The intestinal barrier appears to play an important role in the communication between the gut and the brain. An impaired barrier function negatively influences hormones, immune cells, and bacterial metabolites that affect the gut-brain axis[10].

Bio.Me™ Barrier Research

In vitro

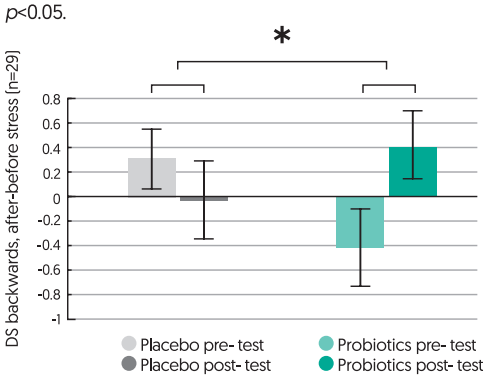
- Several strains in Bio.Me™ Barrier have been shown to stimulate IL-10 production in in-vitro cell assays from 200 o 300% of the stimulated control.
- Several strains significantly reduce the secretion of β-hexosaminidase, which is an indicator of mast cell degranulation in *in-vitro* cell assays.
- Bacteria have the ability to break down LPS with the enzyme alkaline phosphatase[11]. The strains in Bio.Me™ Barrier were shown to produce alkaline phosphatase *in vitro*.
- Several strains in Bio.Me™ Barrier increased the trans epithelial electric resistance (TEER) *in vitro*, after an inflammatory stressor compared to control.

See table 1 for an overview.

Human clinical studies

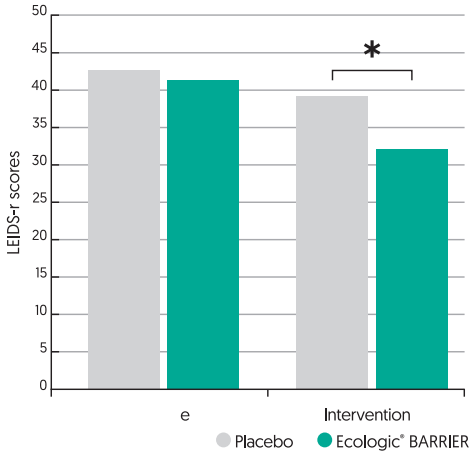
In a randomised, triple-blind, placebo-controlled study, Bio.Me™ Barrier was shown to significantly reduce vulnerability to depression[1] on the Leiden Index of Depression Sensitivity – revised.

Stress-induced changes in working memory. Calculated as the difference of DS backwards scores after stress minus scores before stress. * Significant differences, $p<0.05$.



In a separate randomised, double-blind, placebo-controlled study, Bio.Me™ Barrier was shown to increase working memory during acute stress.

LEIDS-r scores before and after 4 weeks of supplementation with Ecologic® BARRIER.
*Significant decrease, $p<0.001$.



Bio.Me Barrier is available in powder and capsules:

Nutritional Information	Per Dose
Actives	(1 tsp)
Ecologic® Barrier Probiotics	10 billion CFU
Bifidobacterium bifidum W23, Bifidobacterium lactis W51, Bifidobacterium lactis W52, Lactobacillus acidophilus W37, Lactobacillus brevis W63, Lactobacillus casei W56, Lactobacillus salivarius W24, Lactococcus lactis W19, Lactococcus lactis W58	
Other Ingredients: Maize starch, Maltodextrin, Inulin, Polydextrose, Vegetable Protein, Potassium Chloride, Magnesium Sulphate, Manganese Sulphate.	

Nutritional Information	Per Dose
Actives	3 capsules
Ecologic® Barrier Probiotics	5 billion CFU
Bifidobacterium bifidum W23, Bifidobacterium lactis W51, Bifidobacterium lactis W52, Lactobacillus acidophilus W37, Lactobacillus brevis W63, Lactobacillus casei W56, Lactobacillus salivarius W24, Lactococcus lactis W19, Lactococcus lactis W58	
Other Ingredients: Maize Starch, Maltodextrin, Inulin, Polydextrose, Vegetable Protein, Potassium Chloride, Magnesium Sulphate, Manganese Sulphate, Capsule Shell: Hydroxypropyl Methylcellulose	

References

1. Steenbergen et al. A randomized controlled trial to test the effect of multispecies probiotics on cognitive reactivity to sad mood. Brain Behav Immun 2015;48:258-64.

2.Papalini et al. Stress matters: a double-blind, randomized controlled trial on the effects of a multispecies probiotic on neurocognition. Reprint Biorxiv 2018; doi: https://doi.org/10.1101/263673

3.van Hemert et al. Influence of the multispecies probiotic Ecologic® BARRIER on parameters of intestinal barrier function. Food and Nutrition Sciences 2014.

4.MC Arrieta, L Bistritz, and JB Meddings, Alterations in intestinal permeability, Gut. 2006 Oct; 55(10): 1512–1520.

5.Mark E. M. Obrenovich, Leaky Gut, Leaky Brain? Microorganisms 2018, 6, 107; doi:10.3390/microorganisms6040107

6.Chen et al. The role of gut microbiota in the gut-brain axis: current challenges and perspectives. Protein Cell 2013;4(6):403-14.

7.Dinan et al. Melancholic microbes; a link between gut microbiota and depression? Neurogastroenterol Motil 2013;25:713-719.

8.Borre et al. Microbiota and neurodevelopmental windows: implications for brain disorders. Tr in MolMed 2014;20(9):509-18.

9.Kelly et al. Breaking down the barriers: the gut microbiome, intestinal permeability and stress-related psychiatric disorders. Front Cell Neurosci 2015:14(9):392.

10. Collins et al. The interplay between the intestinal microbiota and the brain. Nature Reviews Microbiolog 2012;10:735-742.

11. Bates et al. Intestinal Alkaline Phosphatase Detoxifies Lipopolysaccharide and Prevents Inflammation in Response to the Gut Microbiota. Cell Host Microbe 2007;2(6):371. doi: 10.1016/j.chom.2007.10.010

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