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Immunomodulation of probiotics and their role in allergy

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Probiotics

WHO:

Live microorganisms which when administered in adequate amounts confer a health benefit on the host

***Lactobacillus** and **Bifidobacterium** are most important probiotic genera*
Yogurt, kefir, milk, pickles are the main sources of probiotics

Prebiotics

- ✓ Selectively fermented
- ✓ Induce the growth or activity of microorganisms
- ✓ Fermentation
- ✓ Increase the production of IgG and IgA
- ✓ Mineral absorption (lowering pH, increase gene expression of protein transporters)

Common prebiotics in use:

- Inulin
- Fructo-oligosaccharides
- Galacto-oligosaccharides



Allergy

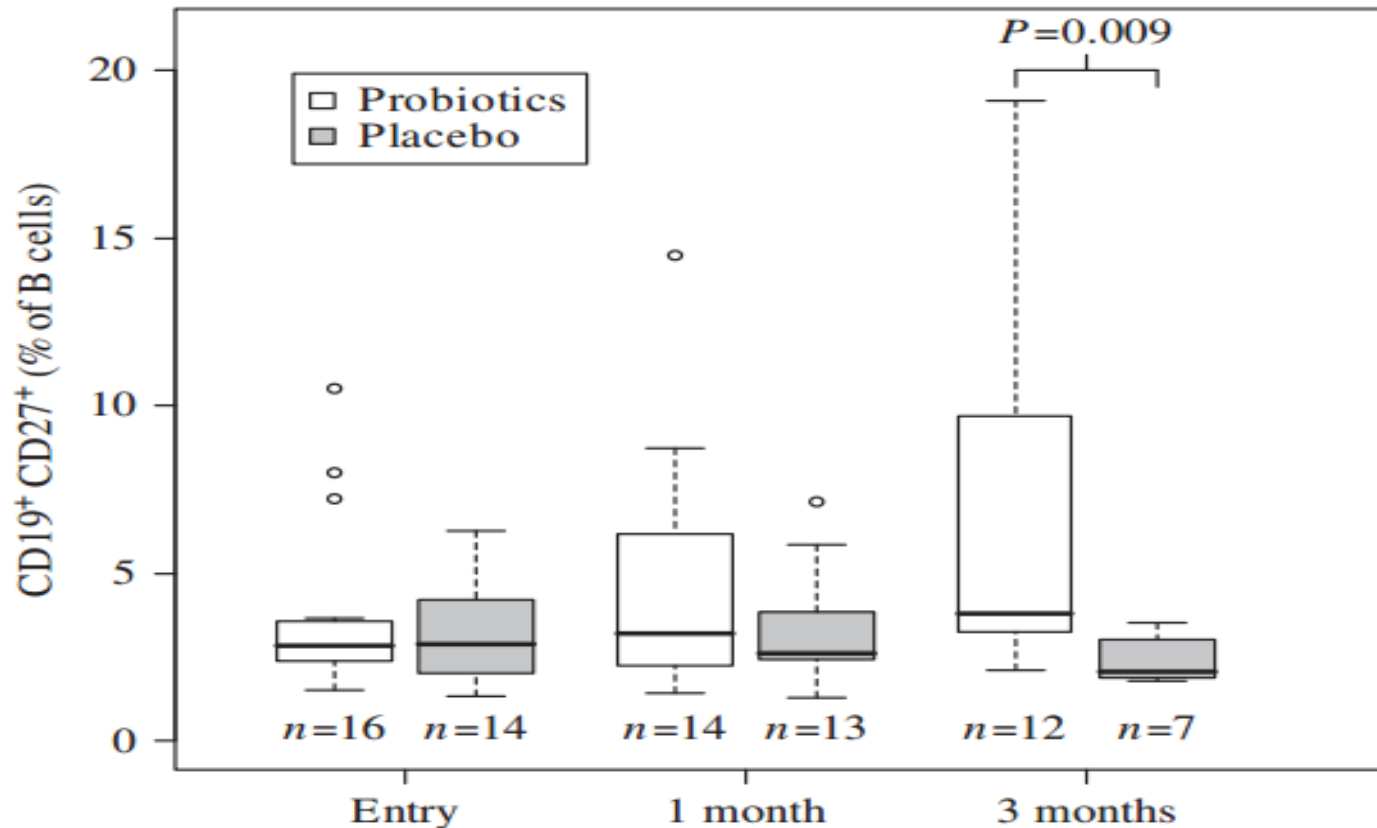
Allergies are a number of conditions caused by hypersensitivity of the immune system to something in the environment that usually causes little problem in most people



References	Probiotic strain	Effect of probiotic	Outco
Maturing gut barrier			
Sudo <i>et al.</i> [16]	<i>Bfδbm</i>	Oral tolerance	↑
Isolauri <i>et al.</i> [18]	<i>LGG</i>	Faecal IgA levels	↑
Isolauri <i>et al.</i> [18]	<i>Lctbs rhamnosus GG (LGG)</i>	Gut-stabilizing effect	↑
Malin <i>et al.</i> [20]	<i>LGG</i>	Gut defence	↑
Kaila <i>et al.</i> [22]	<i>Lctbs</i>	Intestinal permeability	↓
Ovalbumin-induced food allergy			
Kim <i>et al.</i> [27]	<i>Bfδbm lactis/bifidum; Lctbs acidophilus</i>	Th1/Th2 balance	↓
Torii <i>et al.</i> [42]	<i>Bfδbm bifidum; Lctbs acidophilus</i>	TGF-β production	↑
Th1 cytokines			
Maassen <i>et al.</i> [26]	<i>Lctbs reuteri</i>	Th1/Th2 balance Th2 cytokines	↑
Niers <i>et al.</i> [25]	<i>Bfδbm bifidum/infantis; Lctbs lactis</i>	Th1/Th2 balance	↓
Takahashi [28]	<i>Bfδbm longum</i>	Th1/Th2 balance	↓
IL-10 production			
Niers <i>et al.</i> [25]	<i>Bfδbm bifidum/infantis; Lctbs lactis</i>	Th1/Th2 balance	↑
Maassen <i>et al.</i> [26]	<i>Lctbs casei</i>	Th1/Th2 balance	↑
Kim <i>et al.</i> [27]	<i>Bfδbm lactis/bifidum; Lctbs acidophilus</i>	Th1/Th2 balance	↑
Sistek <i>et al.</i> [31]	<i>Lctbs rhamnosus GG (LGG)</i>	Th1/Th2 balance	↑
Kruisselbrink <i>et al.</i> [33]	<i>Lactobacillus plantarum</i>	Th1/Th2 balance	↓
Hart <i>et al.</i> [36]	<i>Bfδbm bifidum</i>	Th1/Th2 balance	↑
Smits <i>et al.</i> [38]	<i>Lctbs reuteri/casei</i>	Prime monocyte-derived dendritic cell	↑
IL-4 production			
Maassen <i>et al.</i> [26]	<i>Lctbs casei</i>	Th1/Th2 balance	↑
Kim <i>et al.</i> [27]	<i>Bfδbm lactis/bifidum; Lctbs acidophilus</i>	Th1/Th2 balance	↓

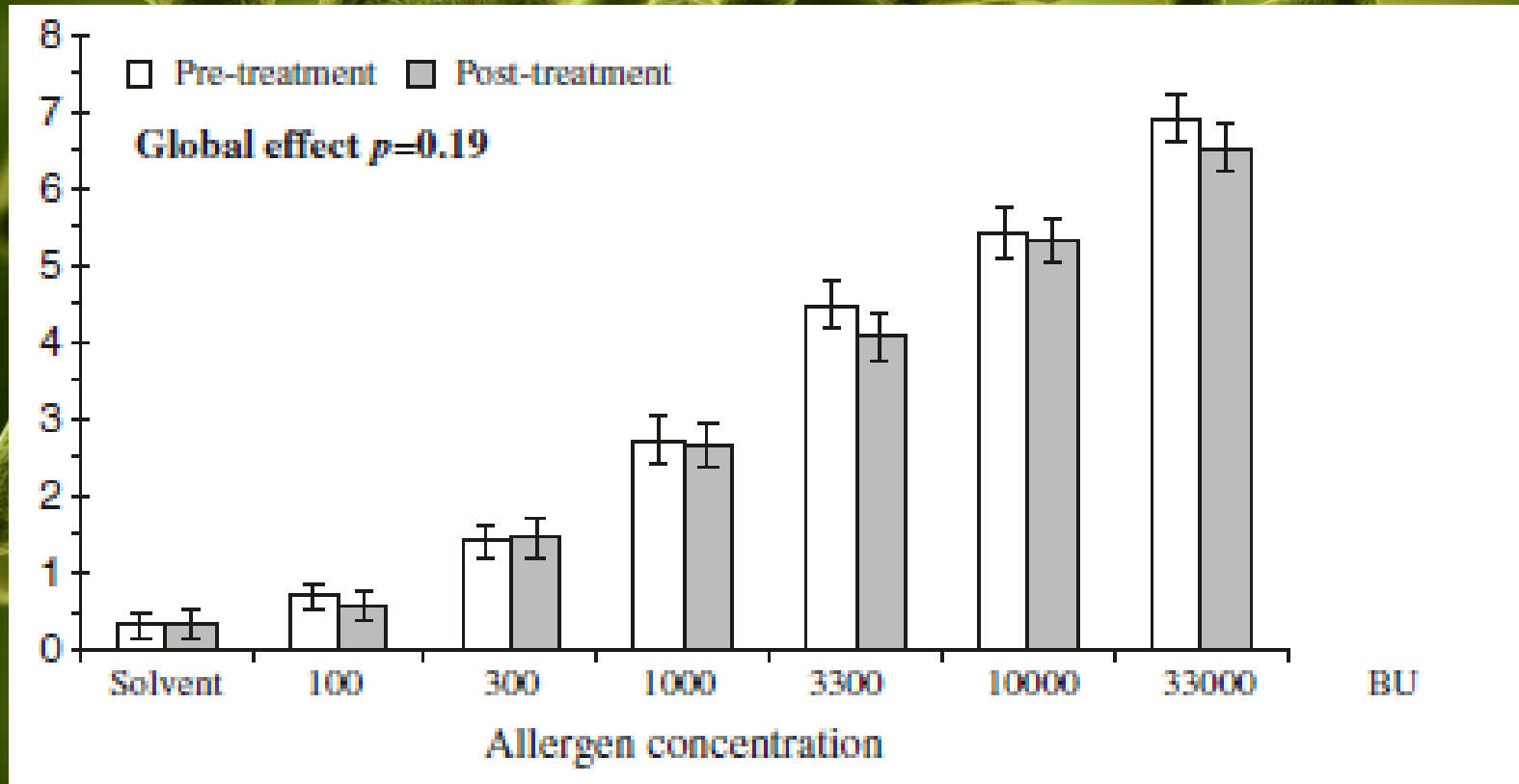
		<i>IFN-γ</i>	
Kim <i>et al.</i> [27]	<i>Bfäbmb lactis/bifidum; Lctbs acidophilus</i>	Th1/Th2 balance	↑
Mohamadzadeh <i>et al.</i> [35]	<i>Bfäbmb bifidum</i>	Most potent polarizer of dendritic cells	↑
<i>IgE production</i>			
Kim <i>et al.</i> [27]	<i>Bfäbmb lactis/bifidum; Lctbs acidophilus</i>	Immunomodulation	↓
Takahashi <i>et al.</i> [28]	<i>Bfäbmb longum</i>	Immunomodulation	↓
Gill <i>et al.</i> [29]	<i>Bfäbmb lactis Bb-12</i>	Immunomodulation	↓
Borchers <i>et al.</i> [30]	<i>LGG</i>	Immunomodulation	↓
Torii <i>et al.</i> [42]	<i>Bfäbmb bifidum; Lctbs acidophilus</i>	Immunomodulation	↓
<i>Serum inflammatory parameters</i>			
Maassen <i>et al.</i> [26]	<i>Lctbs reuteri</i>	Immunomodulation	↑
Sistek <i>et al.</i> [31]	<i>Lctbs rhamnosus GG (LGG)</i>	Immunomodulation	↓
<i>Development of tolerogenic dendritic cells</i>			
Niers <i>et al.</i> [34]	<i>Bfäbmb</i>	Prime neonatal dendritic cells	↑
Mohamadzadeh <i>et al.</i> [35]	<i>Bfäbmb bifidum</i>	Most potent polarizer	↑
Braat <i>et al.</i> [37]	<i>Lctbs rhamnosus</i>	Modulates dendritic cell function	↑
Smits <i>et al.</i> [38]	<i>Lctbs reuteri/casei</i>	Prime monocyte-derived dendritic cells	↑
<i>Toll-like receptor (TLR) stimulation</i>			
Hoarau <i>et al.</i> [39]	<i>Bfäbmb bifidum/infantis; Lctbs salivarius</i>	Activate TLR-2	↑
Forsythe <i>et al.</i> [40]	<i>Lctbs reuteri</i>	Activate TLR-9	↑
<i>Regulatory T cell production</i>			
Smits <i>et al.</i> [38]	<i>Lctbs reuteri/casei</i>	Prime monocyte-derived dendritic cells	↑
Torii <i>et al.</i> [42]	<i>Bfäbmb bifidum; Lctbs acidophilus</i>	TGF- β production	↑
<i>T cell hyporesponsiveness</i>			
Kruisselbrink <i>et al.</i> [33]	<i>Lactobacillus plantarum</i>	Inhibits specific T cell responses	↑
Braat <i>et al.</i> [37]	<i>Lctbs rhamnosus</i>	Modulates dendritic cell function	↑

Proportions of CD19+ and CD27+ B cells in infants



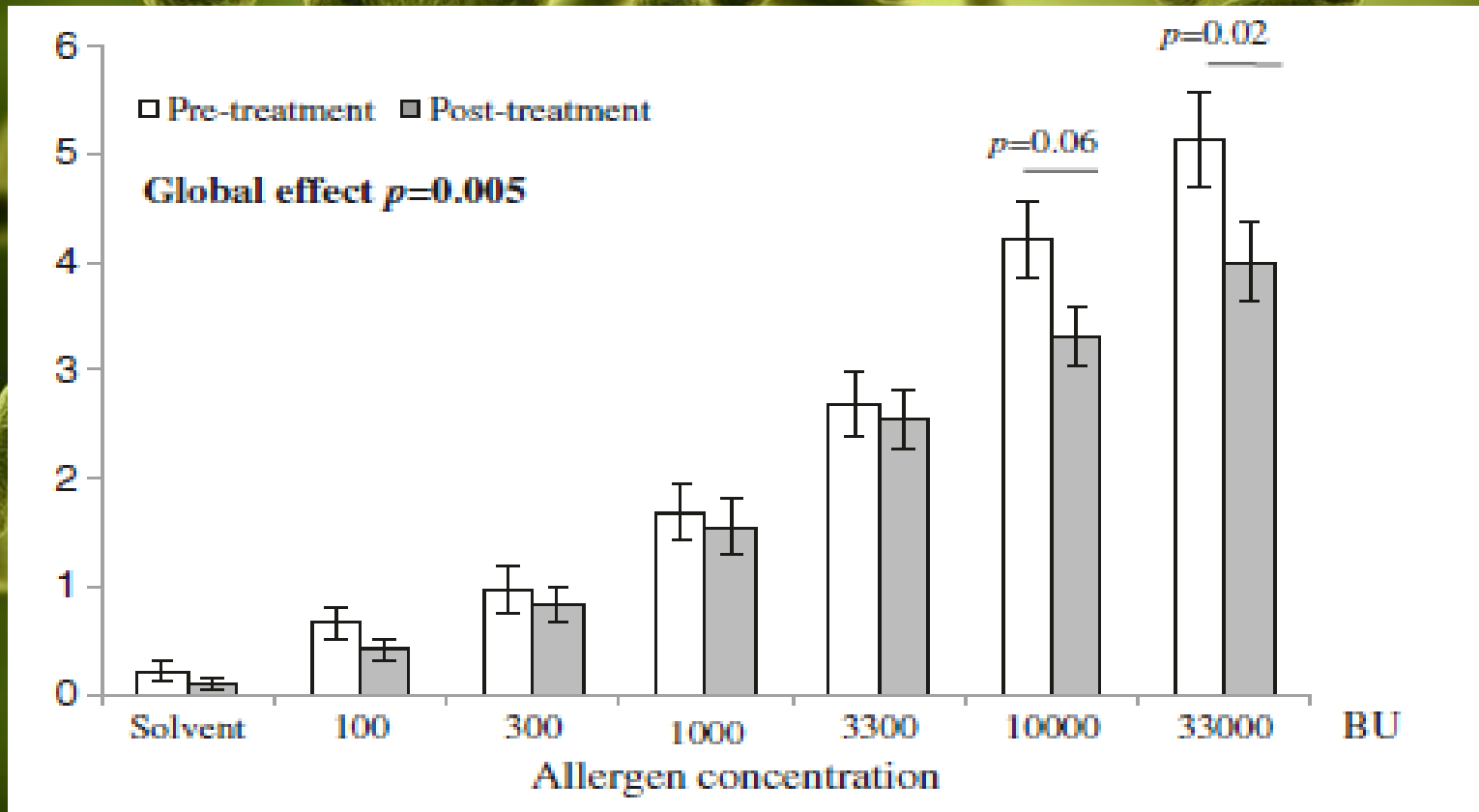
L. rhamnosus was given to 39 infants for a period of 3 months

Effect of probiotics in grass pollen rhinitis



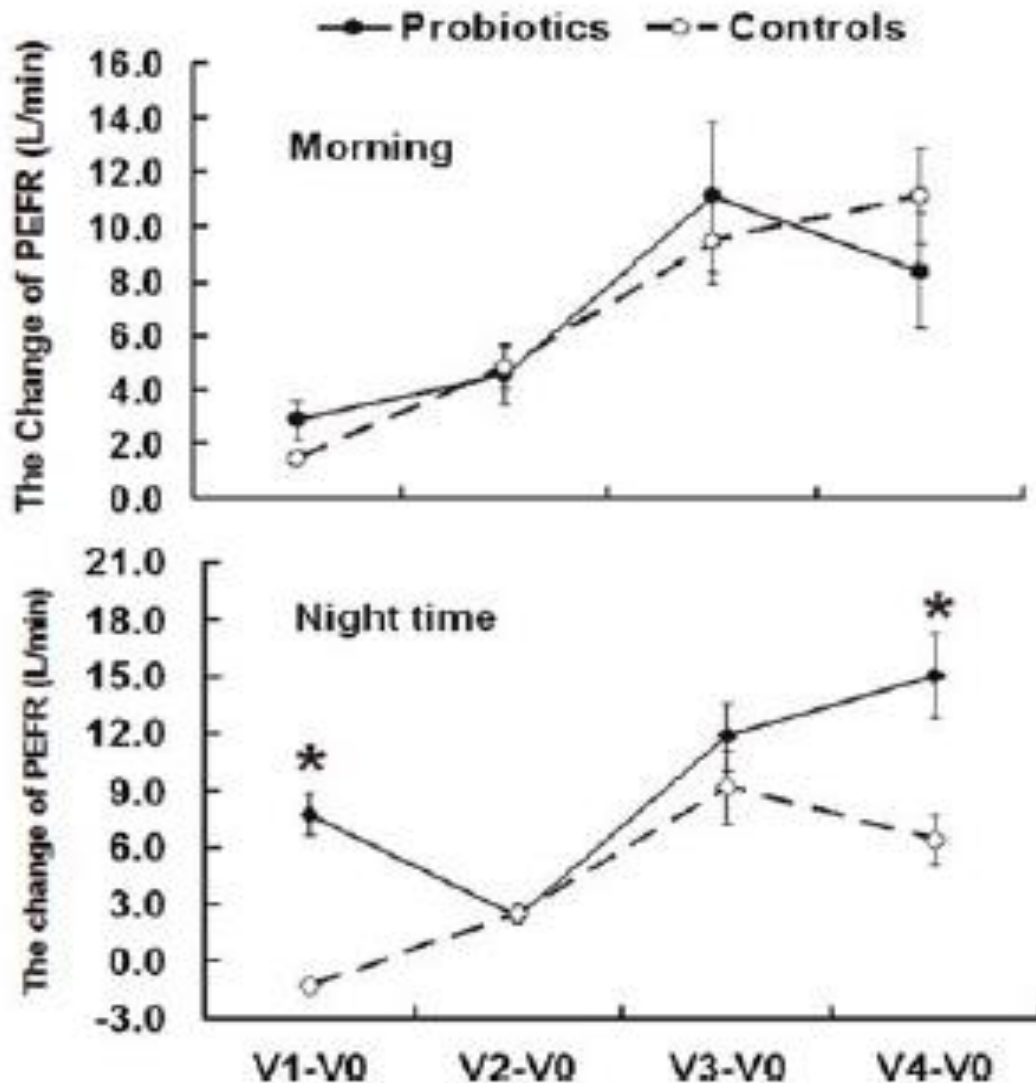
L. acidophilus and *B. lactis* were given to 31 adults with allergic rhinitis to grass pollen

Effect of probiotics in nasal pruritus



L.paracasei was given to 31 adults with nasal pruritus

Effect of probiotics in children with asthma



PEFR –peak....

Patients:

105(49 probiotic/56 placebo)
asthmatic children
(age 6–12 years)

Therapy:

Corticosteroids
 β 2-agonists

Probiotic: *L.gasseri*

V1-V3 = 2 week

V4 = 8 week

Chen Yet al. Randomized placebo-controlled trial of lactobavillus on asthamtic children with allergic rhinitis, Pediatric Pulmonology 2010. 45:1111-1120 .



Conclusion

- * Probiotics are beneficial for human health
- * They can lower the allergy symptoms
- * Despite the effect to the immune system, probiotics confer positive effects to other systems (especially the gastro intestinal tract)
 - Mild side effects
 - They are easily available in fermented milk products
- * **They are not magical!**

THANK YOU FOR YOUR ATTENTION!

We're not
ALL BAD!!

