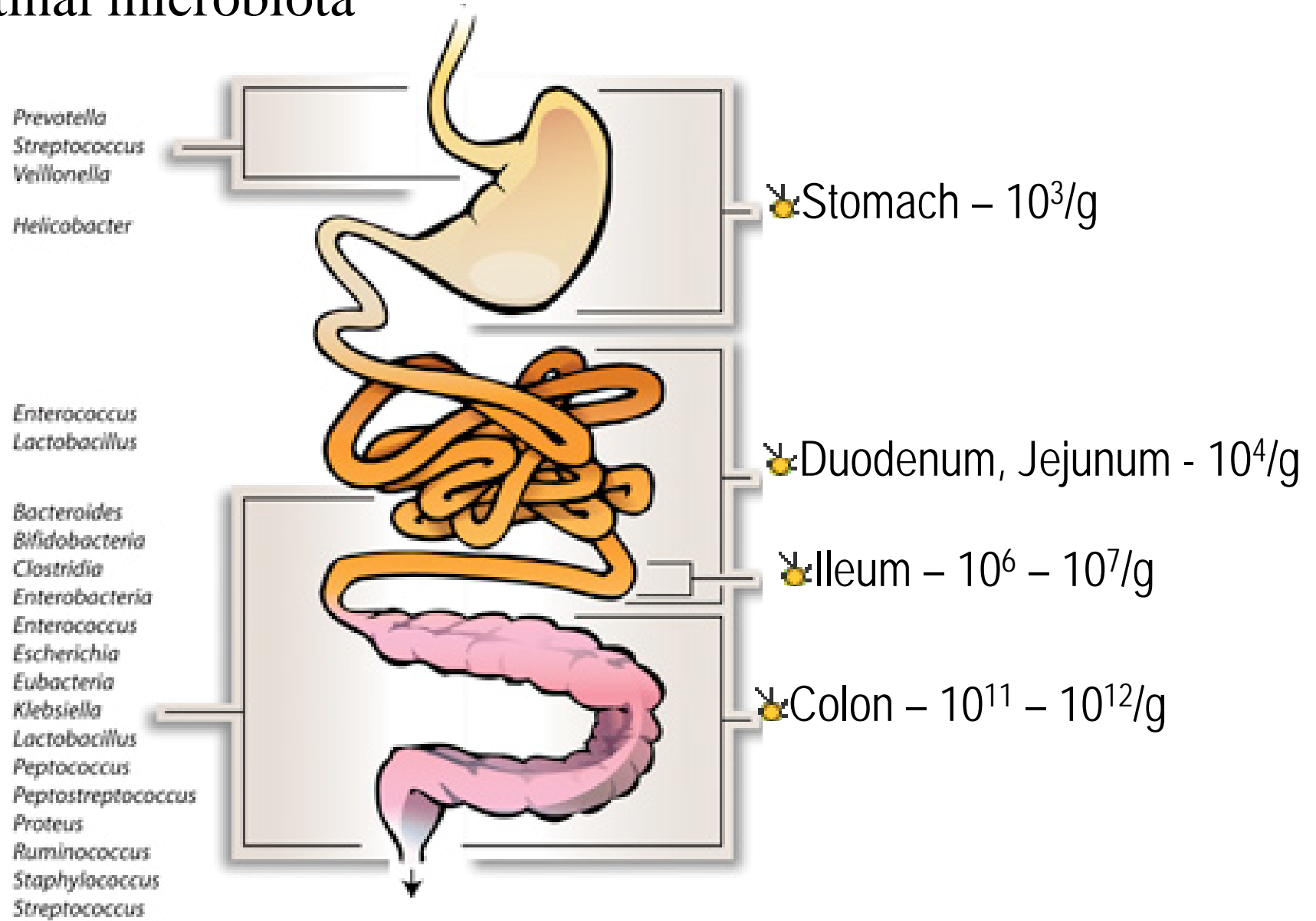


Probiotics and Prebiotics in Infectious Diseases



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Intestinal microbiota



Negative Effects

Positive Effects

Putrefaction, gas production

Bacteroides

Anaerobe cocci

Digestion of undigestible food

Vitamin production

Toxin production

Clostridium

Bifidobacteria

Short-chain fatty acid production

Potential carcinogenesis

Enterobakteria

Lactobacillus

Gas metabolism

E. coli

Immunoregulation

Inflammation

Staphilococcus

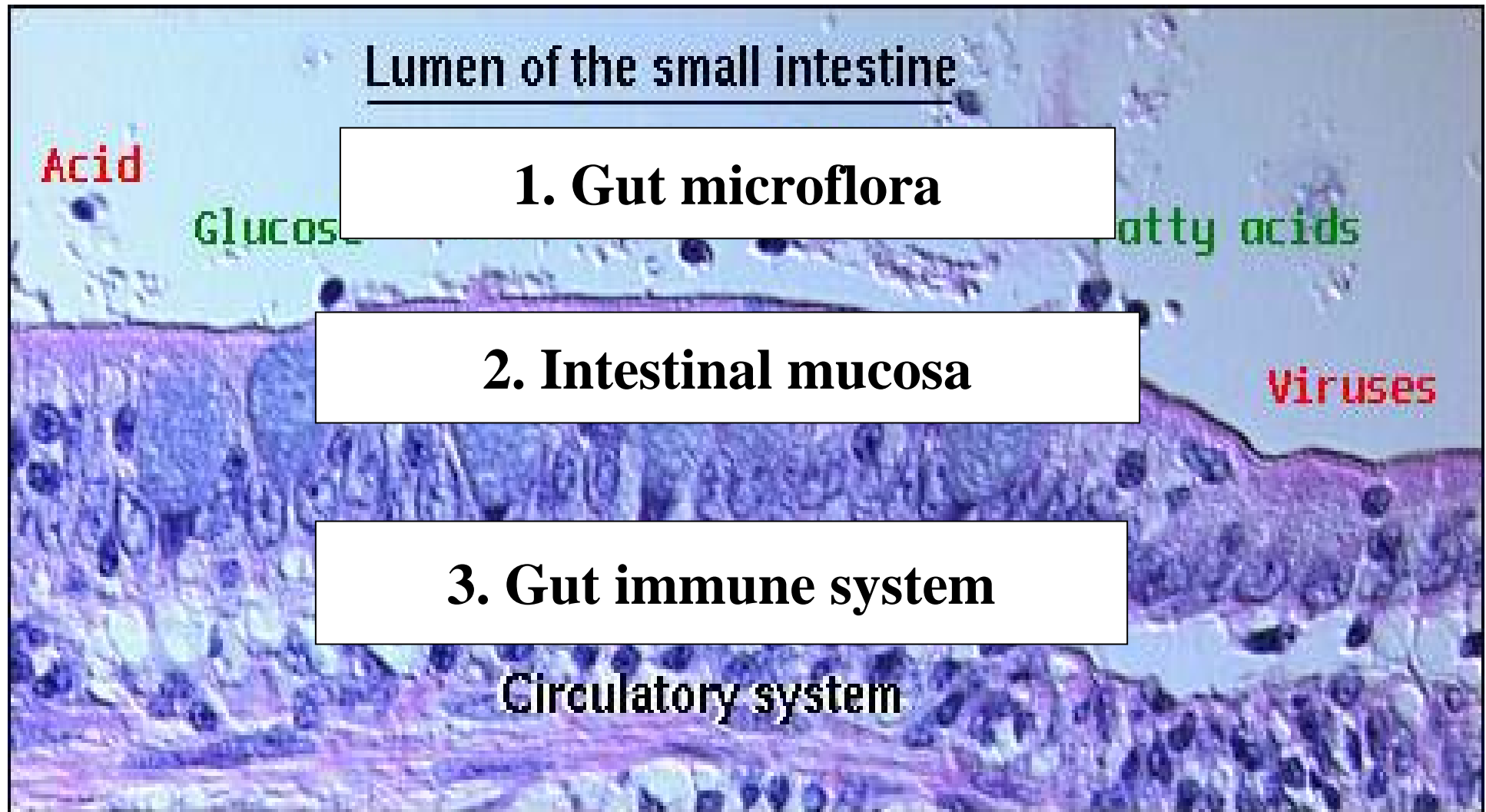
Colonisation resistance

Salmonella

Colonisation resistance

- When gut microbiota is once established it is very resistant to changes
- Competition between bacteria for food, place, adherence
- Production of antibacterial substances
- “Domestic bacteria” cooperate, however they are very aggressive to “new-comers”
- Gut immune system cooperate with “domestic microflora”

Intestinal “defence system”



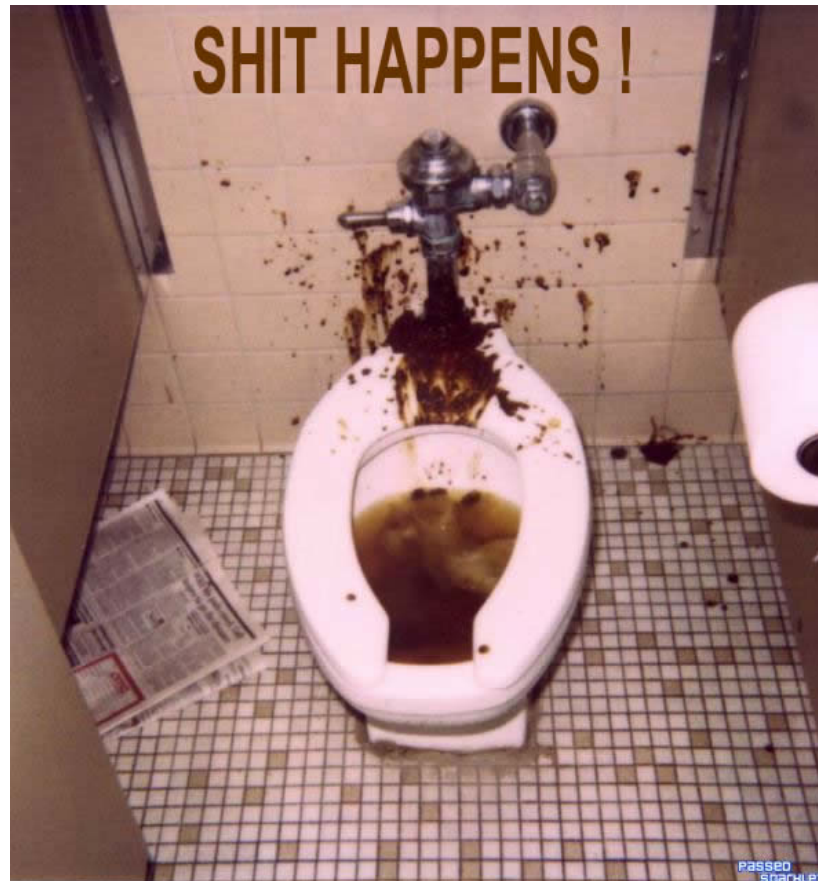
Probiotics

Living microorganisms which ingested in a sufficient quantity positively influence host's health

Prebiotics

Undigestible foodstuff which stimulate growth and activity of health-promoting gut microorganisms

Gastrointestinal infections



- Szajevska, Mrukowicz. JPGN 2001

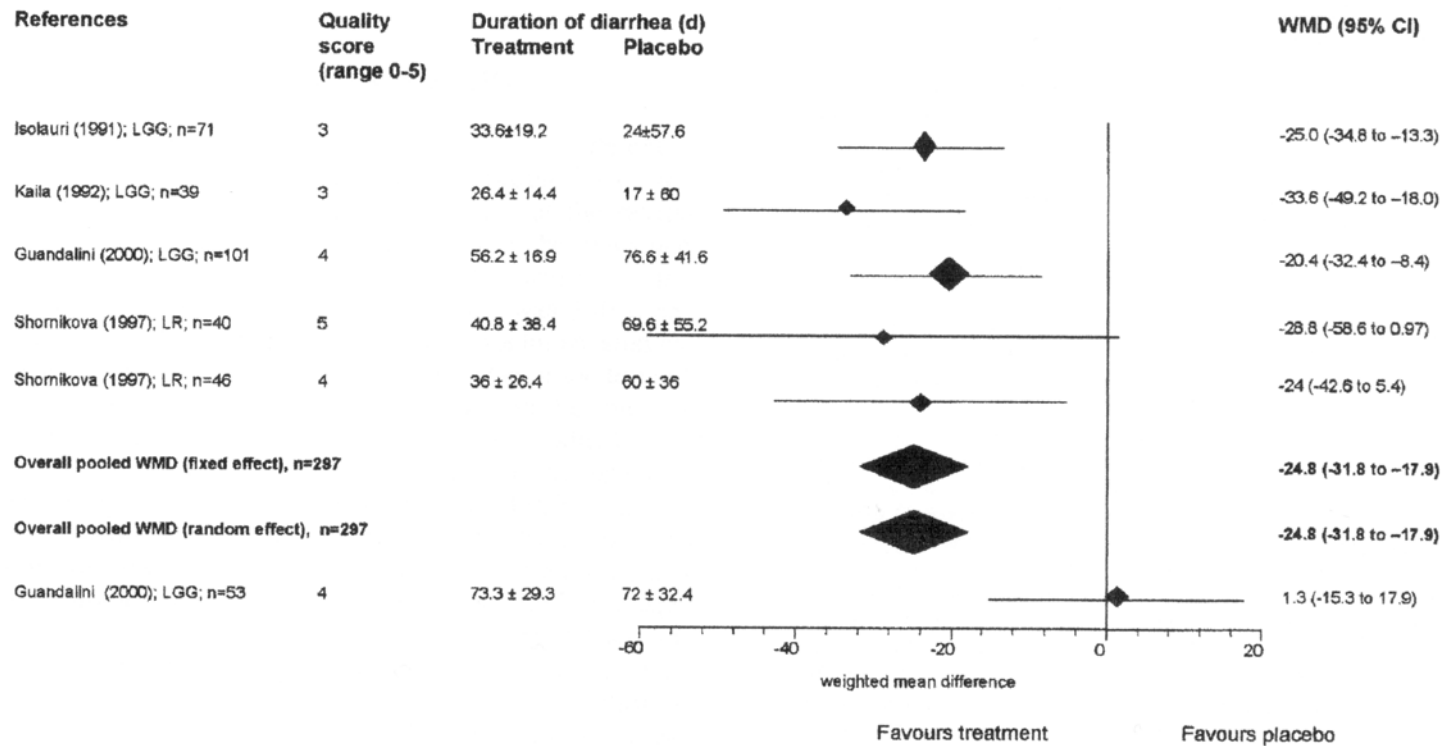


FIG. 3. Weighted mean differences (WMD; in hours) in the duration of rotaviral gastroenteritis between treatment with probiotics and placebo. For comparison, the effect of *Lactobacillus* GG (LGG) in invasive bacterial diarrhea is shown at the bottom of the forest plot. CI, confidence interval; LR, *Lactobacillus reuteri*.

Van Niel et al. Pediatrics 2002

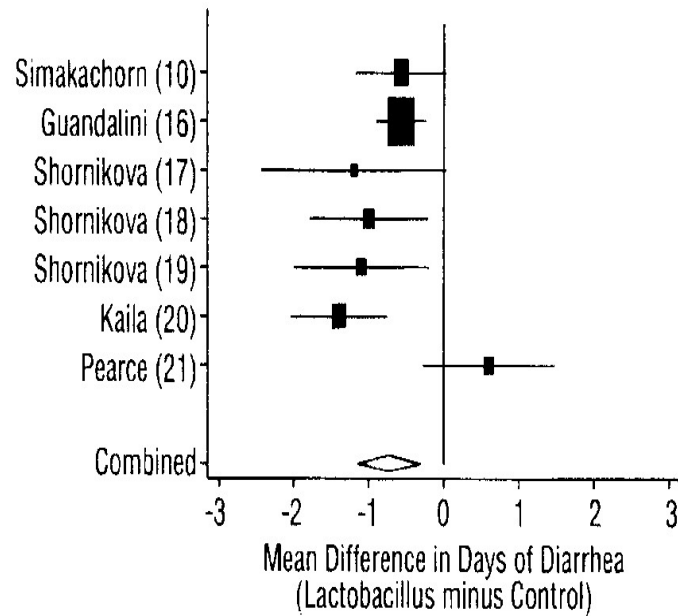


Fig 1. Diarrhea duration. Summary point estimate of reduction in diarrhea duration in 7 included studies that reported mean reduction and variance. Box size is proportional to the inverse of the magnitude of the study variance.

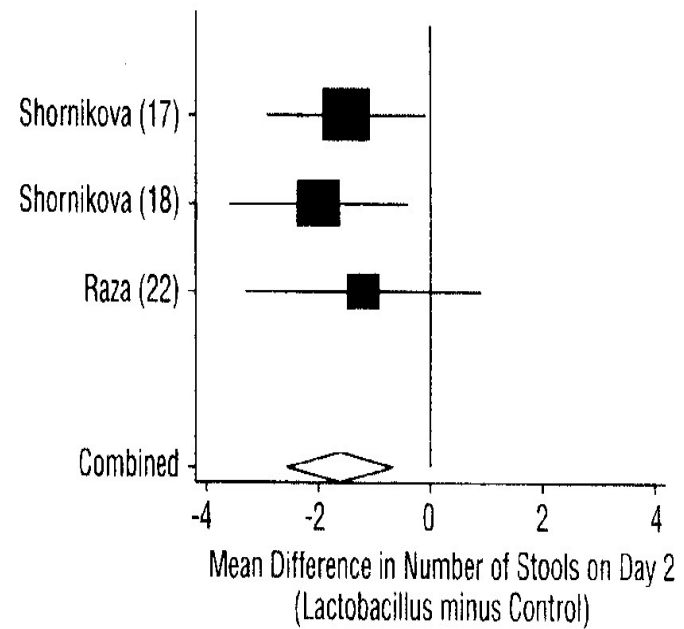


Fig 2. Diarrhea frequency. Summary point estimate of reduction in diarrhea frequency on day 2 in 3 included studies that reported mean reduction and variance. Box size is proportional to the inverse of the magnitude of the study variance.

Huang et al. Dig Dis Sci 2002

HUANG ET AL

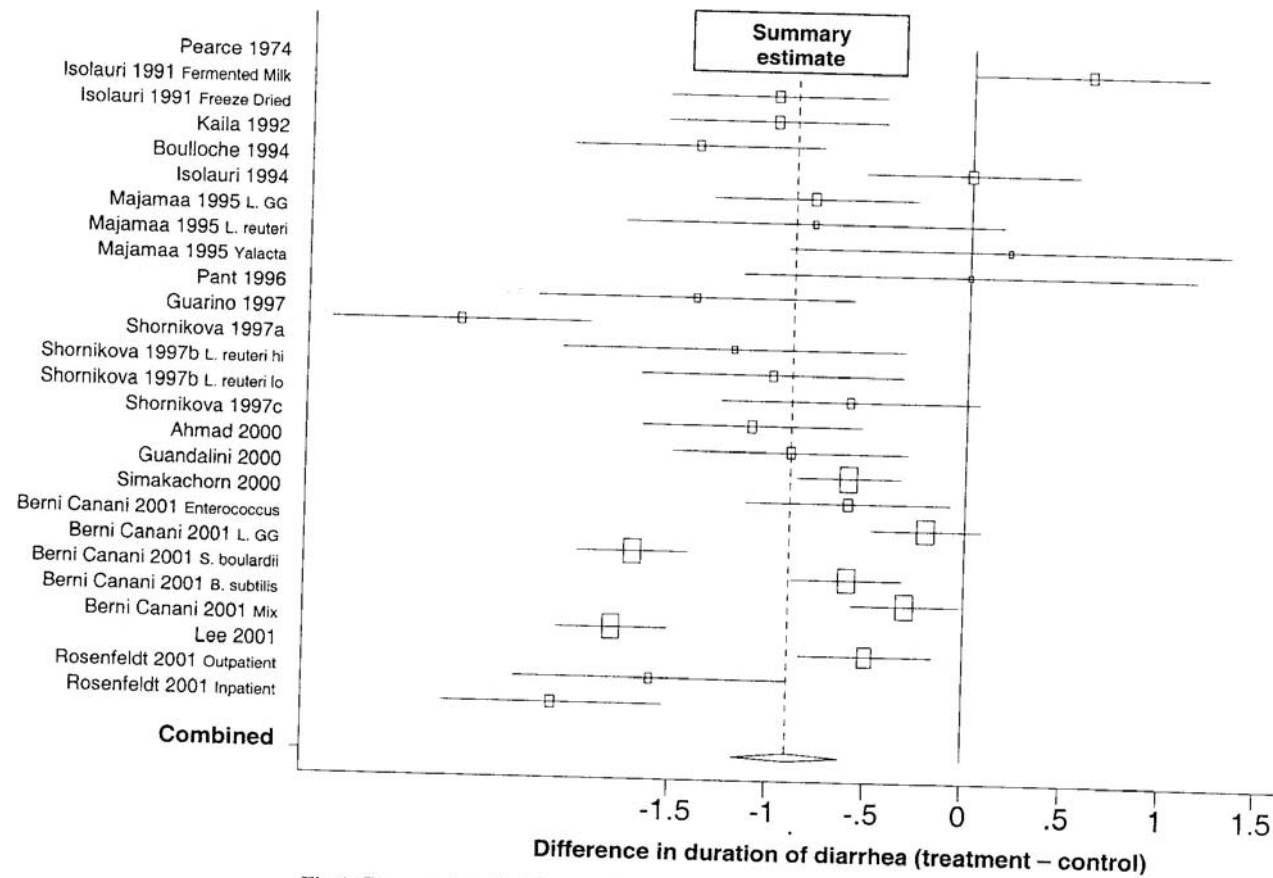
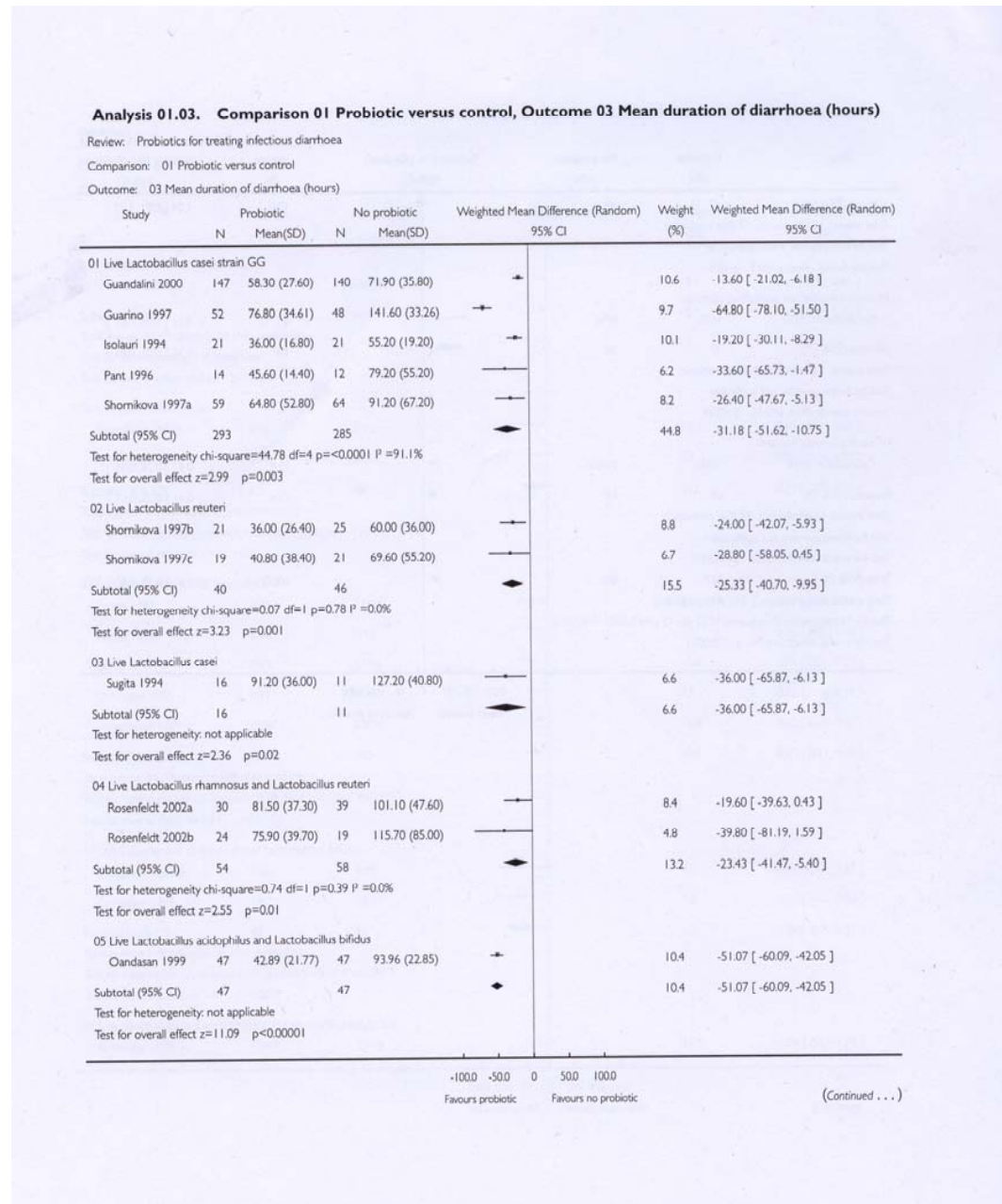


Fig 1. Forrest plot of all included studies. Duration of diarrhea in days.

Allen et al. Cochrane Database Syst Rev 2004



Prevention of acute gastroenteritis



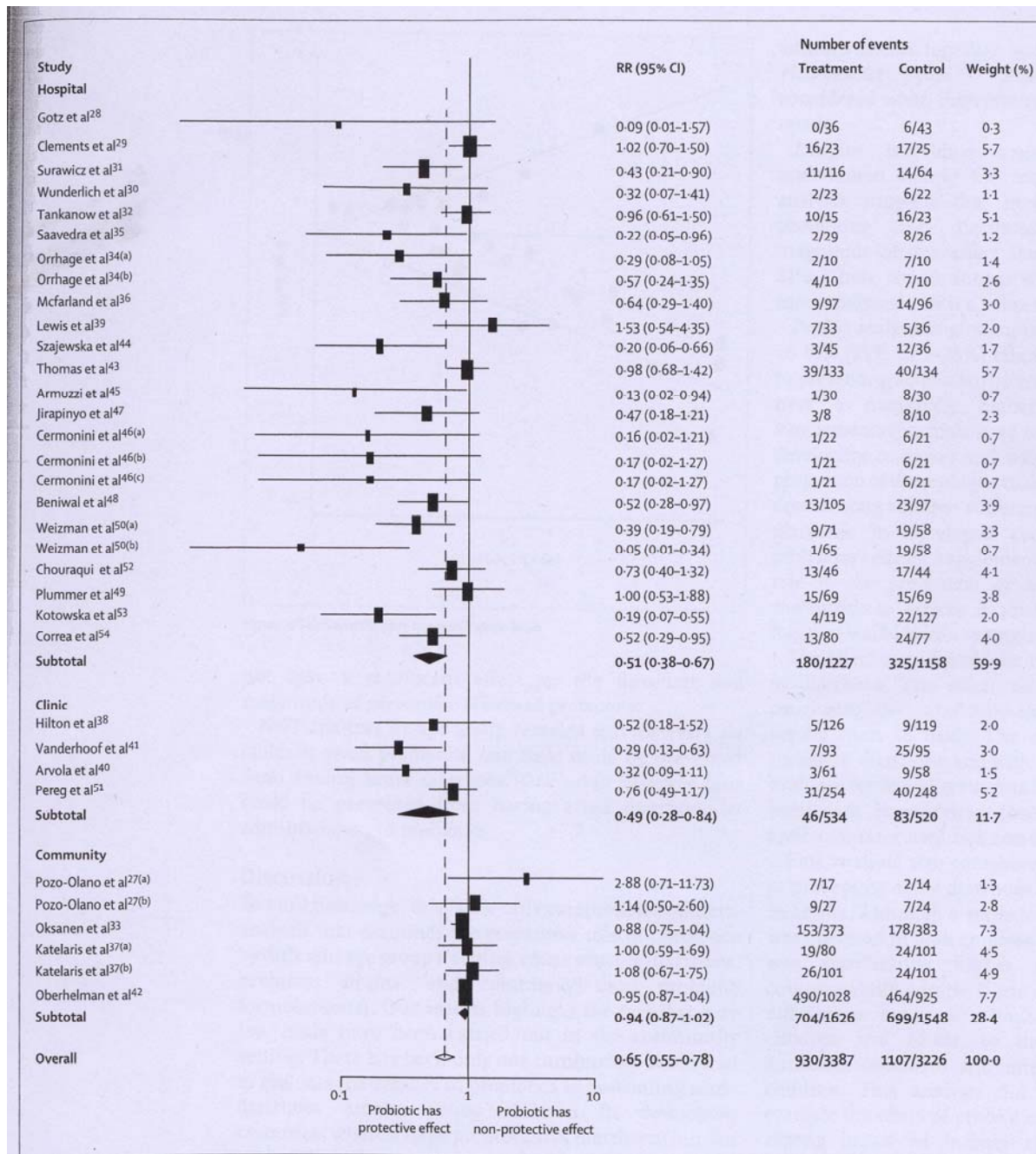


Figure 2: Effects of probiotics on diarrhoeal morbidity

The rectangles represent the risk ratios of the study and the size of the rectangle represents the weight given to each study in the meta-analysis. The black diamonds represent the overall risk ratios for the hospital-based studies, clinic-based studies, and community-based studies. The clear diamond and vertical broken line represent the overall risk ratio. The solid vertical line is the null value.

Sazawal et al.
Lancet Infect Dis 2006

- Probiotics shorten acute gastroenteritis for approximately 1 day
- Less severe clinical course
- More efficient in viral than bacterial infection
- To some extent prevent spreading of infectious agents

Antibiotic associated diarrhea



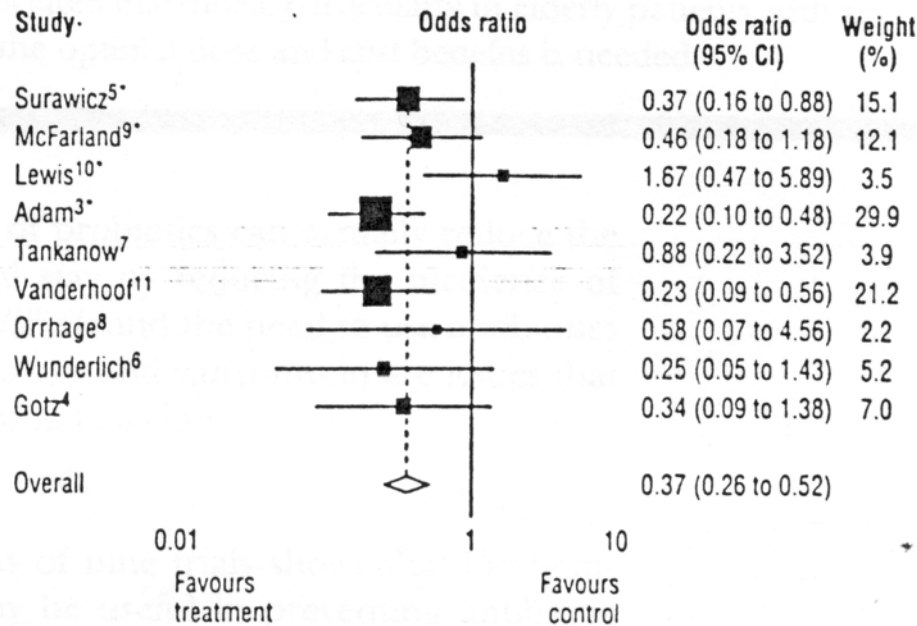


Fig 2 Plot of the log of odds ratios for the proportion of patients free of diarrhoea in treatment groups compared with control groups

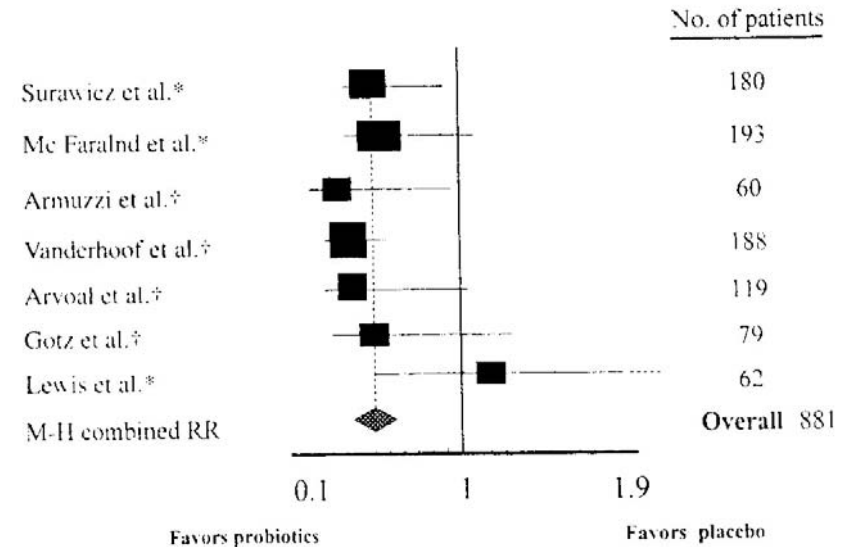
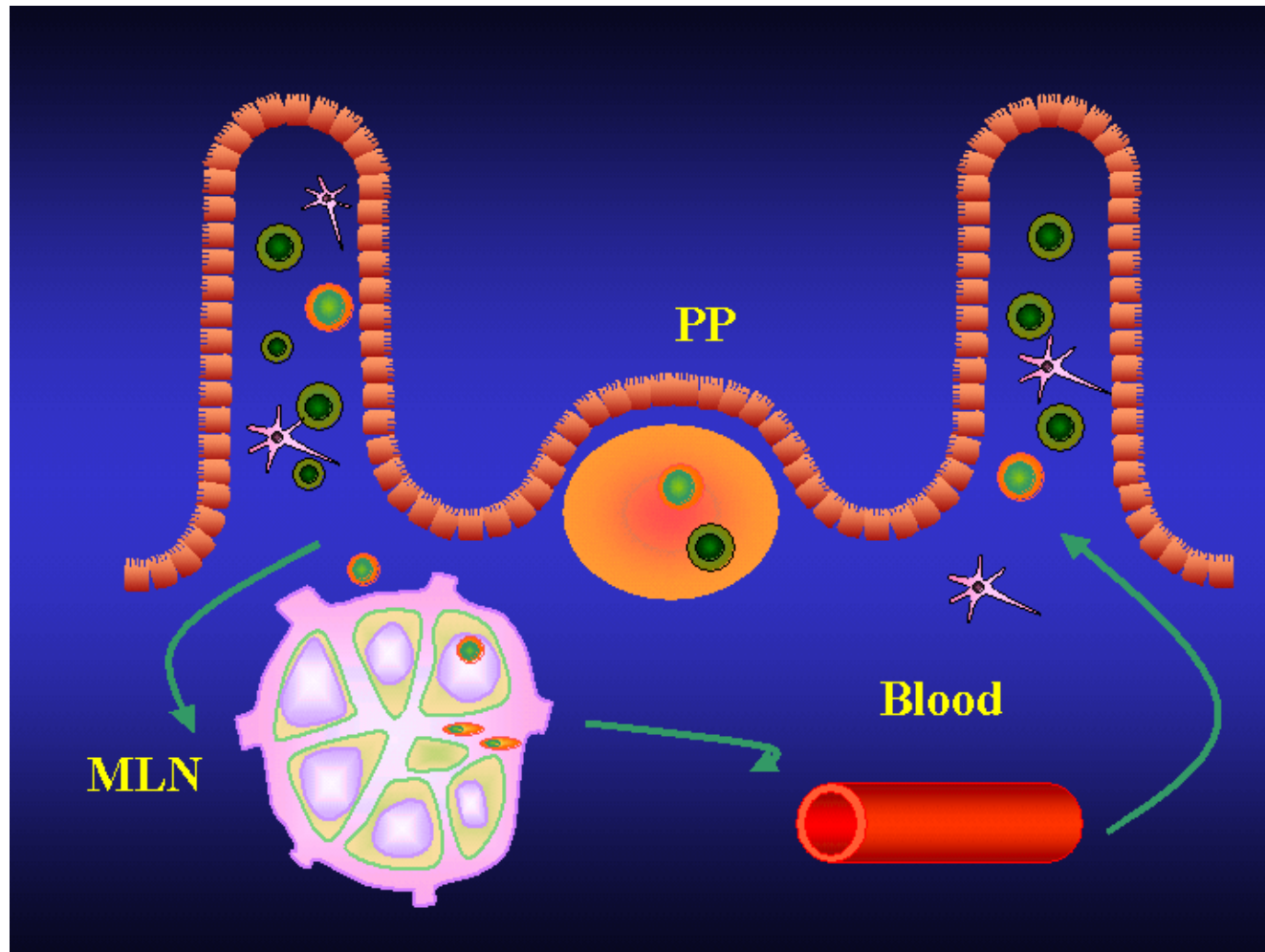
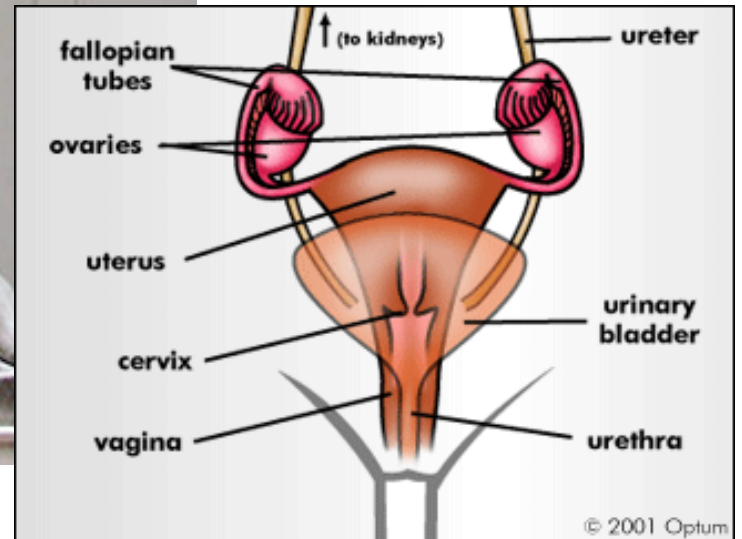
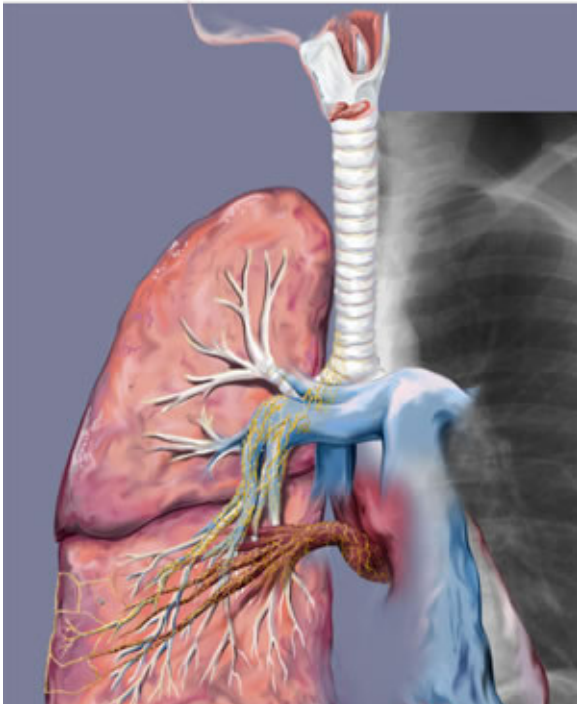


Figure 1. Forest diagram showing crude and combined risk ratios for eligible studies. *Study performed with *Saccharomyces boulardii*. †Study performed with *Lactobacillus* spp. M-H, Mantel-Haenszel; RR, relative risk.

Probiotics decrease incidence of AAD for about 40%

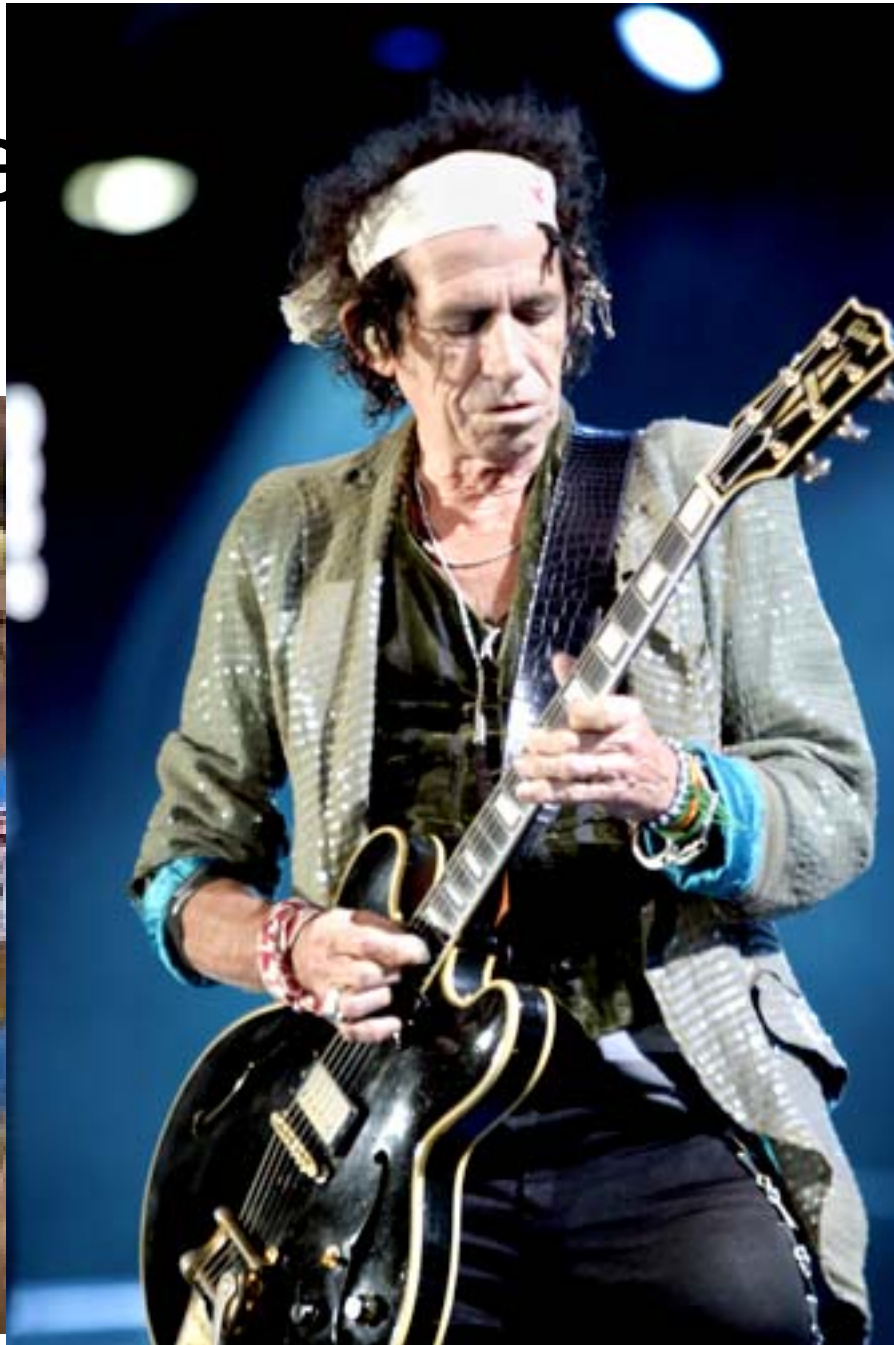
Extra-intestinal infections?



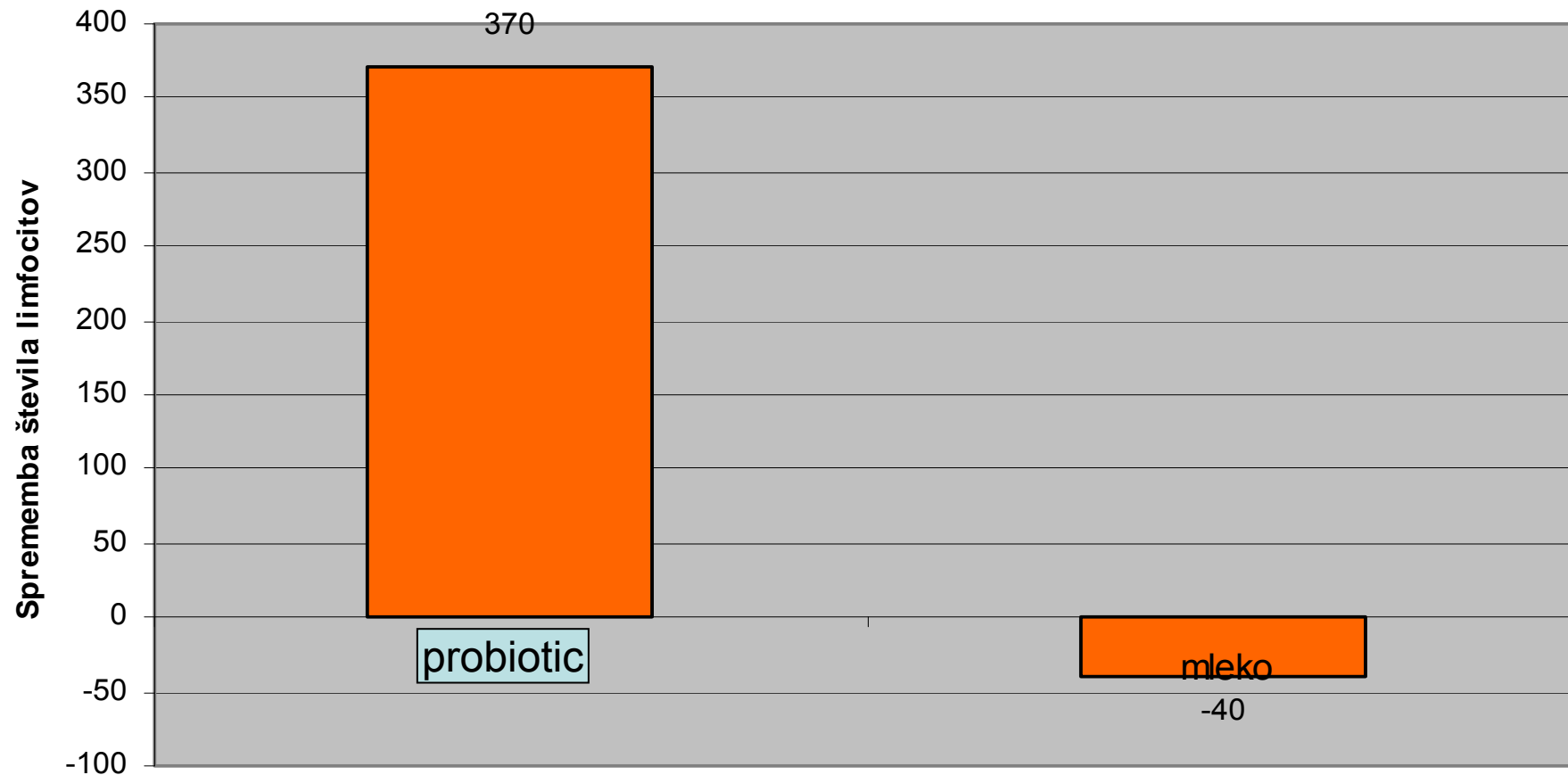


Ove

Stress



Probiotic enhance immune system during psychologic stress



Probiotics alleviate immune system depression after physical stress



Thank you for your attention!



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