Allergy and Breast Feeding

CON (?)

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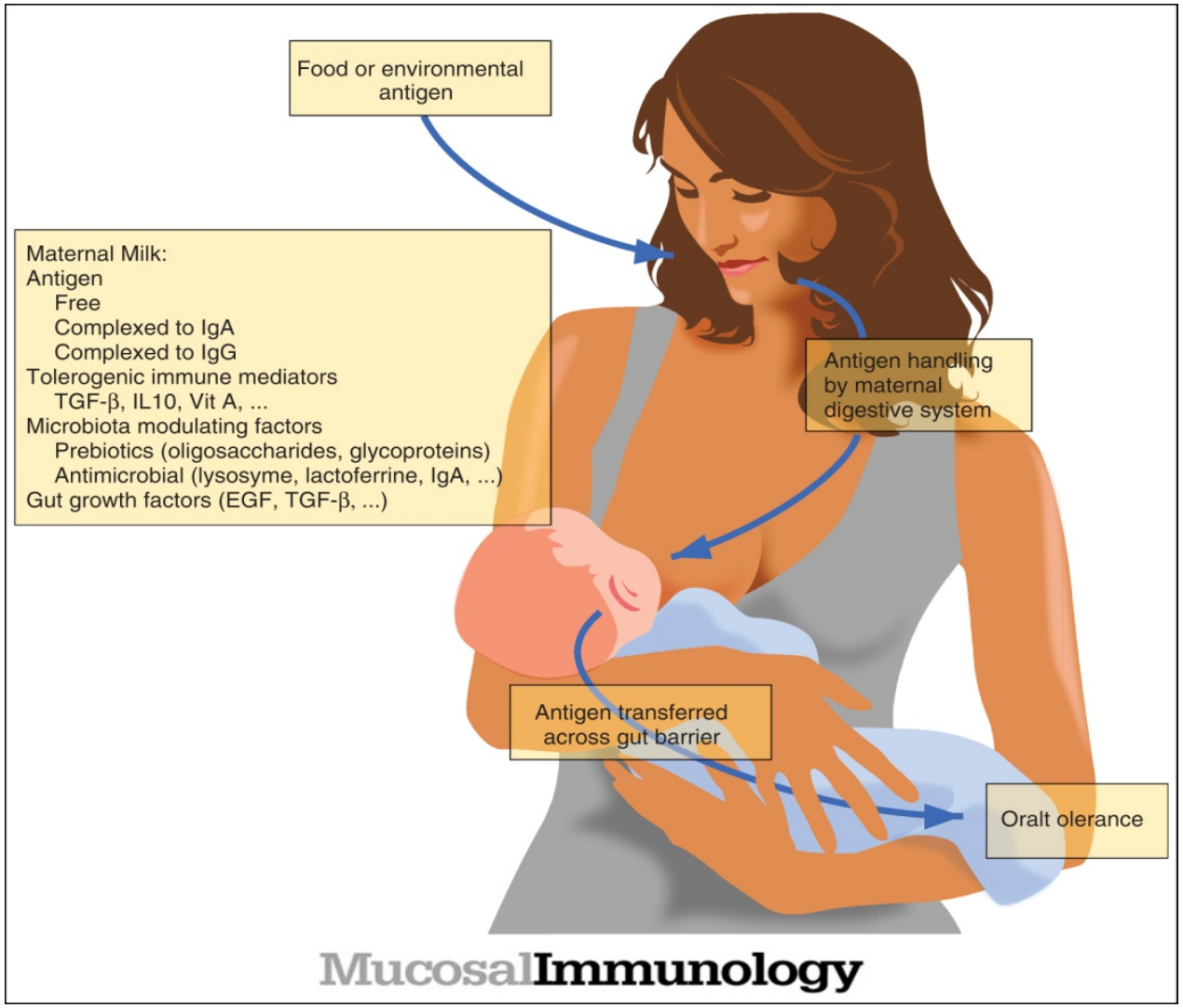
As a pediatrician…

are you crazy?

Breast milk is the best!

1. Nutritional
2. Psychological
3. Immunological
4. Financial

Breast milk → a living milk!



Mucosal Immunology advance online publication 19 May 2010.
doi:10.1038/mi.2010.25

Better questions might be…

1. Is there any milk better than breast milk?

   (cow? goat? monkey? soy? elephant?)

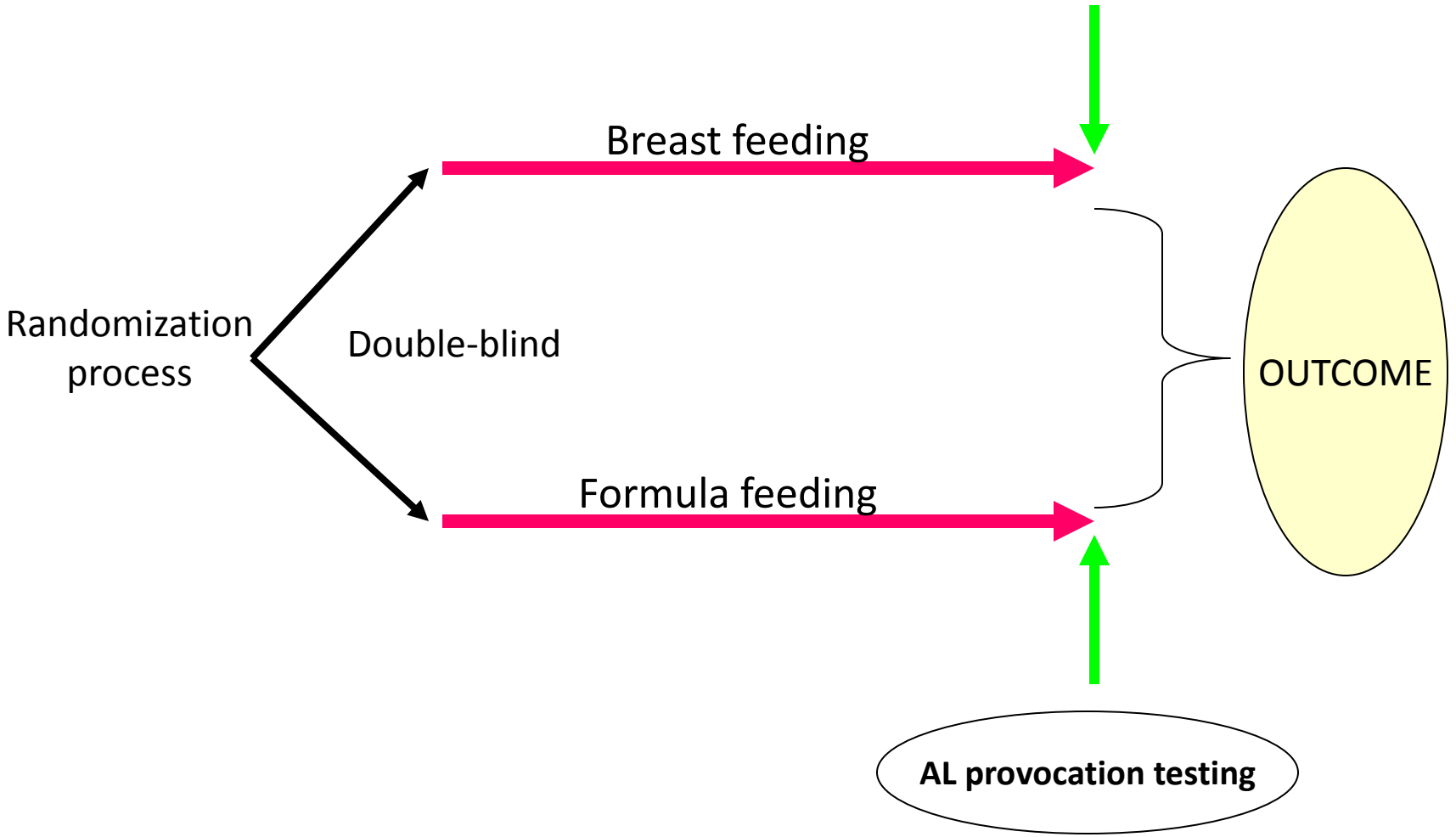
2. Can we improve the quality of breast milk?

Studies on breast feeding

- Difficult (ethics) → bias

- Results are controversial

Study design (breast feeding)



Maternal milk, but not formula, regulates the immune response to beta-lactoglobulin in allergy-prone rat pups.
Tolley KL, et al. J Nutr 2009, 139, 2145-51.

- Breast milk *versus* formula
- Challenge with beta-lactoglobulin at day 4
- Results: Th1 – Th2 markers
- Conclusion: … introducing an allergenic food with breast milk reduces immunological indicators of an allergic response…

Case

- 9 month old boy
- Totally breastfed
- 1st introduction of CM formula
- One minute after the first “bite”…

Skin prick testing to food allergens in breast-fed young infants with moderate to severe atopic dermatitis.

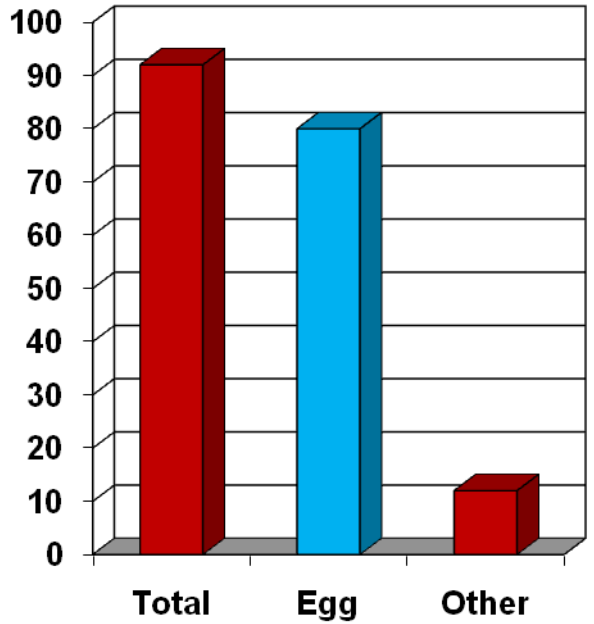
Rennick et al. Austr J Dermatol 2006, 47, 41-5.

- 59 infants
- moderate to severe AD
- exclusively breast fed
- mean age: 6.5 months

54/59 (91.5%) positive SPT !!!

Egg

Cow's milk
Peanuts
Wheat
Soy



Why egg?

- *False positive result*
- *Through breast milk*
- *Prenatal sensitization.*
- *Airborne sensitization*
- *Direct skin contact*

Allergy

GENES *(… and more)*

Allergy…

"a genetically determined feature"

- Role of epigenetic mechanisms on gene expression
- Role of the environment ***(pre- & postnatal environment)***

ANSWERS

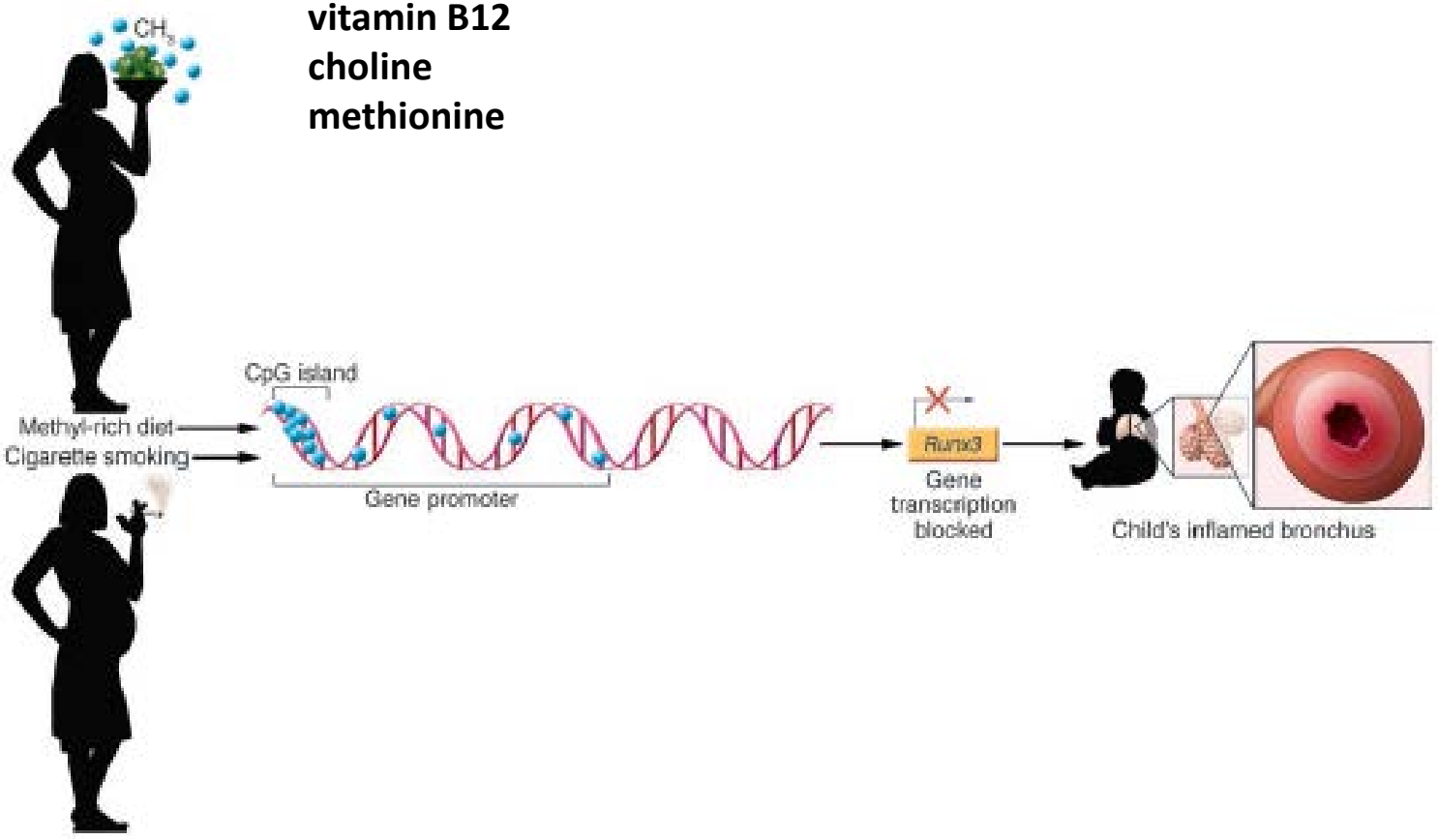
Breast milk is the best…

but not able to prevent all allergies.

Can we improve the anti-allergic features of breast milk? If so, how?

Prenatal maternal diet affects asthma risk in offspring

METHYL DONORS:
folate
vitamin B12
choline
methionine



Miller RL, J Clin Invest, 2008

Primary prevention during pregnancy.

Protective:

- Vitamin E
- Vitamin D
- Zinc
- Mediterranean diet
- Fish
- Bacterial products (probiotics)

(mainly from observational studies)

Maternal dietary antigen avoidance during pregnancy and/or lactation for preventing or treating atopic disease in the child.

Kramer MS, Kakuma R. Cochrane Database Syst Rev 2006; 3: CD000133

4 trials – 344 pregnant women

- *Prescription of an antigen avoidan[illegible]t to a high-risk woman during pregna[illegible] lactation is unlikely to reduce su[illegible]ly her child's risk of atopic diseases[illegible] a diet may adversely affect m[illegible]al and/or fetal nutrition.*

- How good were the diets?

Candidates to improve the anti-allergic features of breast milk.

1. Safe – Efficient

2. No pharmacological intervention

3. Natural products

↓

1. Bacterial products
2. Allergens (SLIT)
3. Parasites - worms

Probiotics in primary prevention of atopic disease: a randomized placebo-controlled trial.

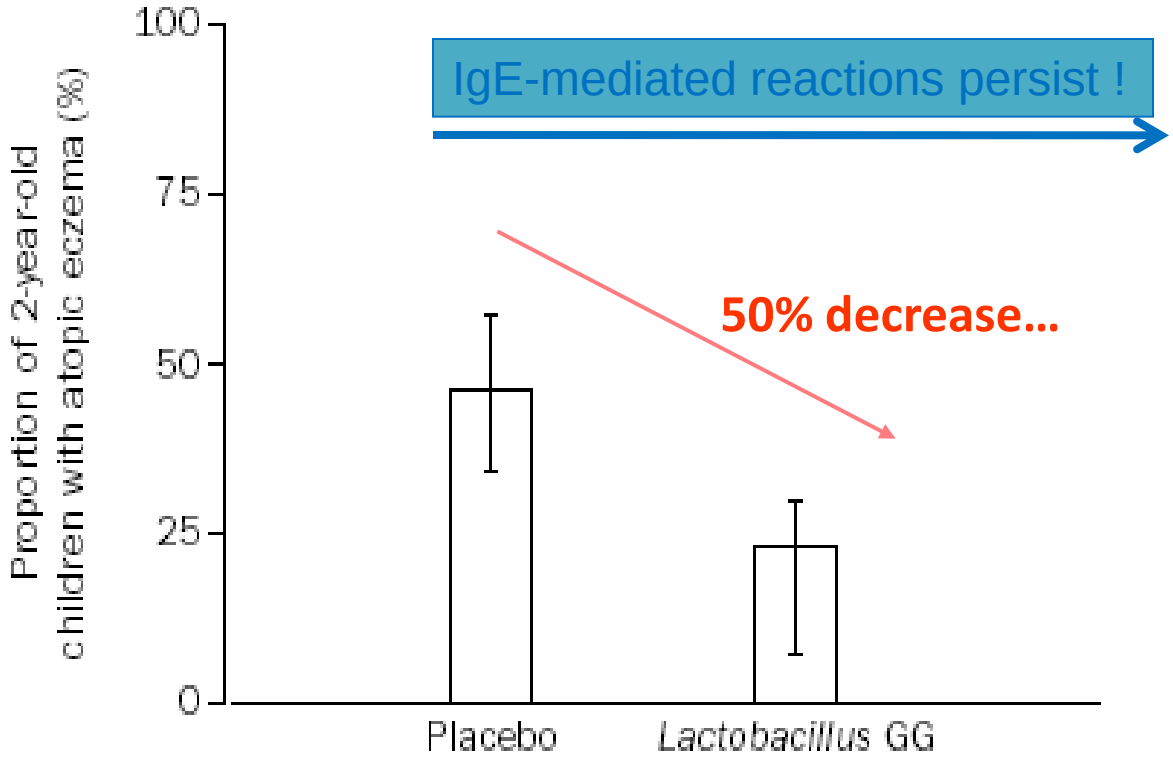


Figure 2: **Treatment effect of *Lactobacillus* GG on atopic disease**

Bars are 95% CI.

Kalliomaki M, Lancet. 2001; 357:1076

doi: 10.1111/j.1365-2222.2008.03061.x

Clinical and Experimental Allergy, 38, 1606–1614

ORIGINAL PAPER Clinical Mechanisms in Allergic Disease

Supplementation with *Lactobacillus rhamnosus* or *Bifidobacterium lactis* probiotics in pregnancy increases cord blood interferon-γ and breast milk transforming growth factor-β and immunoglobin A detection

S. L. Prescott*, K. Wickens†, L. Westcott*, W. Jung*, H. Currie*, P. N. Black‡, T. V. Stanley§, E. A. Mitchell¶, P. Fitzharris‖, R. Siebers†, L. Wu‡, J. Crane† and the Probiotic Study Group

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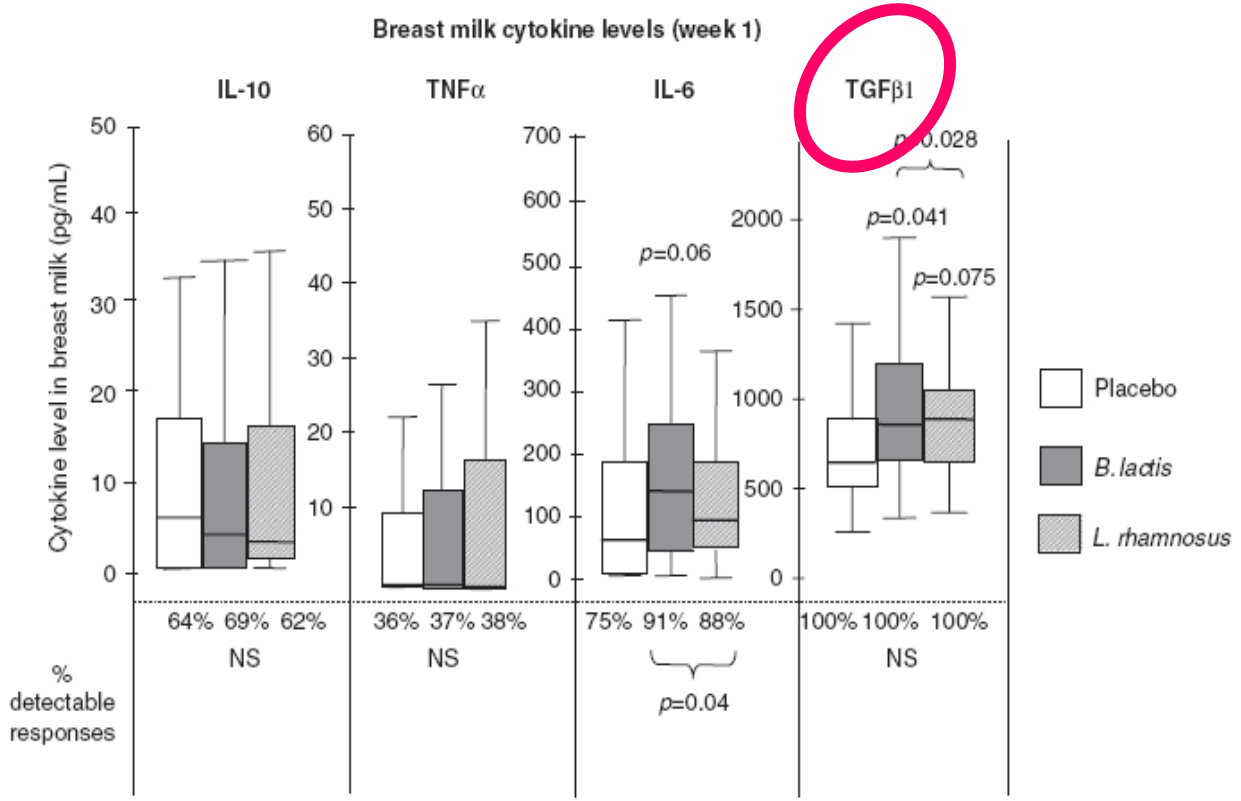

Fig. 4. Comparison of breast milk cytokine levels in study groups. The levels of IL-10, TNF-α and IL-6 are shown in breast milk samples from women in the placebo group ($n = 36$, clear bars), the *B. lactis* HN019 group ($n = 35$, grey bars) and the *L. rhamnosus* HN001 group ($n = 34$, crosshatched bars). The data are shown as median, interquartile ranges and 95% confidence intervals, and groups were compared by Mann–Whitney *U*-test. The proportion (%) with detectable levels is also shown (and compared with chi-square test). All significance levels are all shown in relation to the placebo group, including where both probiotic groups were combined for comparison with the placebo.

A systematic review of the importance of milk TGF-β on immunological outcomes in the infant and young child

range of immunological outcomes in infancy and early childhood, such as wheeze, atopy, eczema and the immunoglobulin switch. Twelve human studies were included in the review and 67% showed a positive association with TGF-β1 or TGF-β2 demonstrating protection against allergy-related outcomes in infancy and early childhood. High

Oddy & Rosales, PAI 2009

Effects of transforming growth factor-beta and formula feeding on systemic immune responses to dietary beta-lactoglobulin in allergy prone rats. Pentilla I. Pediatr Res 2006, 59, 650 – 5.

Formula versus formula + TGF-beta

TGF-beta in formula results in

1. decreased IgE production & MC activation
2. Increase in Th1 cytokines & IL10.

-Research Agenda -

"To improve the anti-allergic qualities of breast milk"

- Diets
- Supplements (PUFA)
- Bacterial products

Role of immunotherapy?

Prevention of new sensitizations in asthmatic children monosensitized to house dust mite by specific immunotherapy.

Pajno et al. Clin Exp Allergy 2001, 31, 1392-7.

- 134 children (SLIT = 75) with asthma/rhinitis and mono-allergic to HDM

- SLIT for 3 yrs + 3 yrs extra follow-up

- SPT / IgE after 6 yrs.

Prevention of new sensitizations in asthmatic children monosensitized to house dust mite by specific immunotherapy.

Pajno et al. Clin Exp Allergy 2001, 31, 1392-7.

Table 3. Drop-outs and new sensitizations

Patients	SIT Group	Control Group
Number of patients enrolled	75	63
Drop-outs	6	9
Patients followed-up for 6 years	69	54
New sensitizations		
None	52	18
Parietaria	11	16
Grass	5	12
Olive tree	5	8
Cat	3	7
Dog	0	2
Alternaria spp.	1	5
Mugwort	1	2

Role of parasitic infections?

Anthelminthic treatment during pregnancy is associated with increased risk of infantile eczema: randomized-controlled trial results.

Mpairwe H, Webb EL, Muhangi L, Ndibazza J, Akishule D, Nampijja M, Ngom WS, Tumusime J, Jones FM, Fitzsimmons C, Dunne DW, Muwanga M, Rodrigues LC, Elliott AM. Ped Allergy Immunol 2011, 22, 305 – 312.

… that exposure to maternal worm infections *in utero* may protect against eczema and wheeze in infancy.

The results for albendazole are also consistent with a direct drug effect. Further studies are required to investigate mechanisms of these effects, possible benefits of worms or worm products in primary prevention of allergy, and the possibility that routine deworming during pregnancy may promote allergic disease in the offspring.

Research Agenda…

… still extensive.

Research Agenda: Interventions during breast feeding?