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Early diet and the risk of allergy in the prospective birth cohort studies GINIplus and LISAplus. Selected results.

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Background

In Germany, the revised version of the S3 guideline for allergy prevention has recently been issued by the Task Force on Allergy Prevention.

The two prospective German birth cohort studies **GINIplus** and **LISAplus** have investigated the effects of

- maternal diet during pregnancy,
- exclusive breastfeeding, and
- solid food introduction

on allergic diseases later in childhood.

Therefore, we wanted to review our results in the light of these new recommendations.

Revised S3 guideline for allergy prevention (2009) – dietary recommendations

- **Maternal nutrition during pregnancy and breastfeeding:**

  no recommendation for any type of dietary restriction (avoidance of potent dietary allergens)

  protective effect of fish in the maternal diet during pregnancy and/or breastfeeding

- **Breastfeeding:**

  Infants should be exclusively breast-fed in the first four months

- **Feeding of children at risk with mother's milk substitutes:**

  If breastfeeding is not possible, partially or extensively hydrolyzed formula should be given till the end of the fourth month

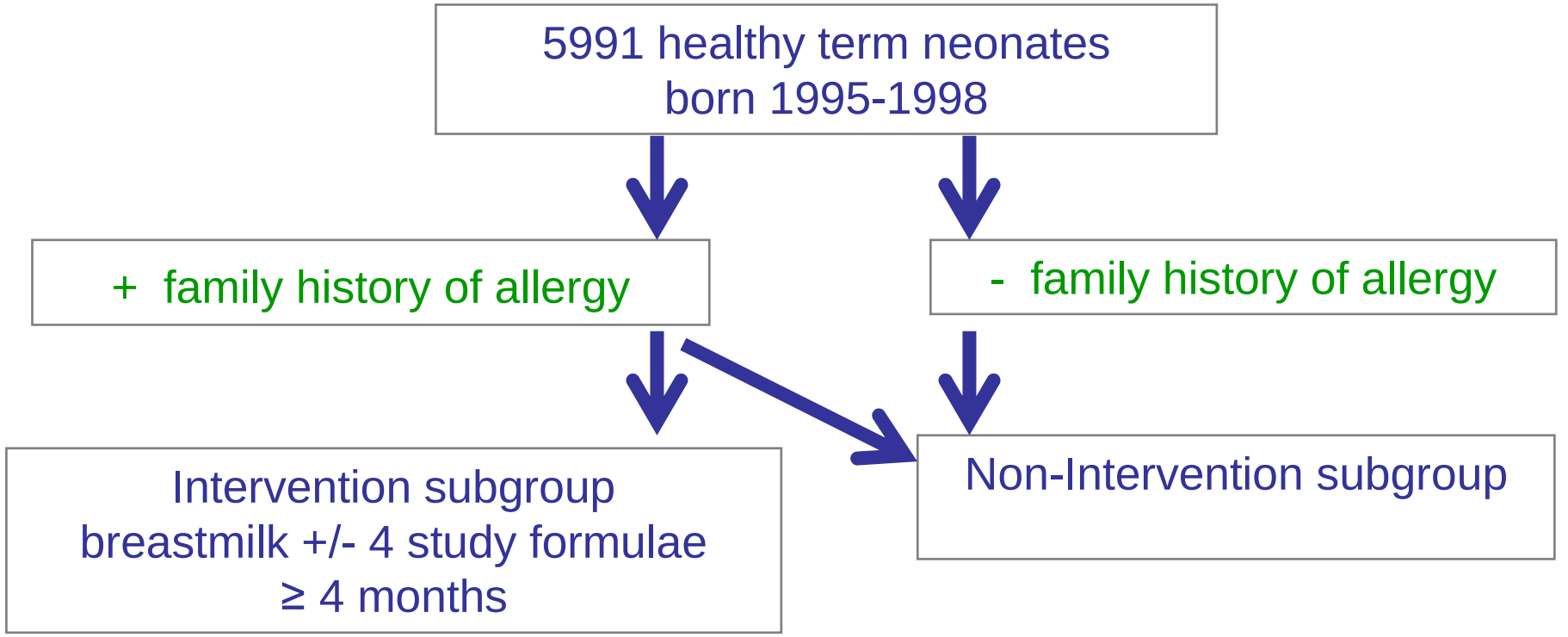
- **Solid food:**

  no recommendation for delaying the introduction of solid food beyond the end of the fourth month

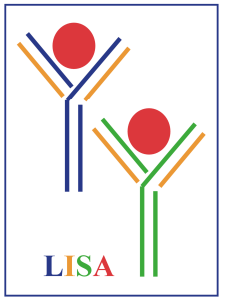
Study design – GINIplus Study

German Infant Nutritional Intervention Program

PLUS Air pollution and Genetics



Study design – LISAplus Study



Influence of Lifestyle-related factors on the Development of the Immune System and Allergic diseases

- Prospective birth cohort study, population-based
- Recruitment: 1997-1999
- 4 German cities: Munich, Leipzig, Wesel, Bad Honnef
- N=3097
- Follow-up at 6, 12, 18, 24 months and at 4, 6, 10 years
- Self-administered questionnaires, physical examination, blood drawing

Allergic outcomes

- Doctor-diagnosed eczema, allergic rhinitis, asthma (questionnaire based)
- Symptomatic eczema, allergic rhinitis, asthma (questionnaire based)
- Itchy rash (questionnaire based)
- Allergic sensitization against food allergens (RAST)
- Allergic sensitization against inhalant allergens (RAST)

Maternal diet during pregnancy

Semi-quantitative food frequency questionnaire (FFQ)

- last 4 weeks of pregnancy
- 5 categories ranging from "< 2 times/month or never" to "≥4 times/week"
- children were categorized into high or low maternal intake
- Food items: fats and vegetable oils, fish, vegetables, fresh fruit

Maternal diet and eczema and allergic sensitization in the offspring at 2 years

		Allergic Sensitisation against		
	Eczema	Any allergen	Food allergens	Inhalant allergens
	aOR (95% CI)	**aOR (95% CI)**	**aOR (95% CI)**	**aOR (95% CI)**
Margarine	1.49 (1.08-2.04)	0.85 (0.56-1.27)	0.80 (0.50-1.27)	0.93 (0.50-1.73)
Vegetable oils	1.48 (1.14-1.91)	0.88 (0.63-1.25)	0.91 (0.61-1.34)	0.89 (0.53-1.51)
Fish	0.75 (0.57-0.98)	1.02 (0.73-1.43)	1.01 (0.69-1.48)	0.94 (0.56-1.57)
Citrus fruit	1.03 (0.78-1.35)	1.82 (1.29-2.56)	1.73 (1.18-2.53)	1.72 (1.02-2.92)
Exotic fruit	0.85 (0.66-1.11)	0.77 (0.55-1.07)	0.84 (0.58-1.23)	0.64 (0.39-1.07)
Raw sweet pepper	0.97 (0.75-1.27)	1.45 (1.03-2.06)	1.16 (0.79-1.69)	2.16 (1.20-3.90)
Raw carrots	1.12 (0.85-1.46)	0.85 (0.61-1.18)	1.02 (0.69-1.49)	0.77 (0.47-1.28)
Celery	0.94 (0.67-1.31)	1.61 (1.07-2.41)	1.85 (1.18-2.89)	1.39 (0.74-2.58)
Nuts	0.85 (0.63-1.14)	0.92 (0.62-1.34)	1.10 (0.72-1.67)	0.84 (0.46-1.53)

Sausenthaler et al. AJCN 2007; 85:530-7.

Summary – Maternal diet during pregnancy

Verified by guidelines for allergy prevention:

protective

Not verified by guidelines for allergy prevention:

increasing allergy risk

Breastfeeding and eczema risk at 3 years

	aOR (95% CI)
Subgroup of GINI	
Physician-diagnosed eczema	0.64 (0.45-0.90)
Itchy rash	0.74 (0.44-1.23)

Laubereau et al. J Pediatr 2004; 144: 602-7.

Summary - Breastfeeding

Verified by guidelines for allergy prevention:

Exclusive breastfeeding during first 4 months is protective against the development of eczema

Solid food introduction

- **Timing of solid food introduction:**

  1st until 4th month

  5th/6th month

  7th until 12th month

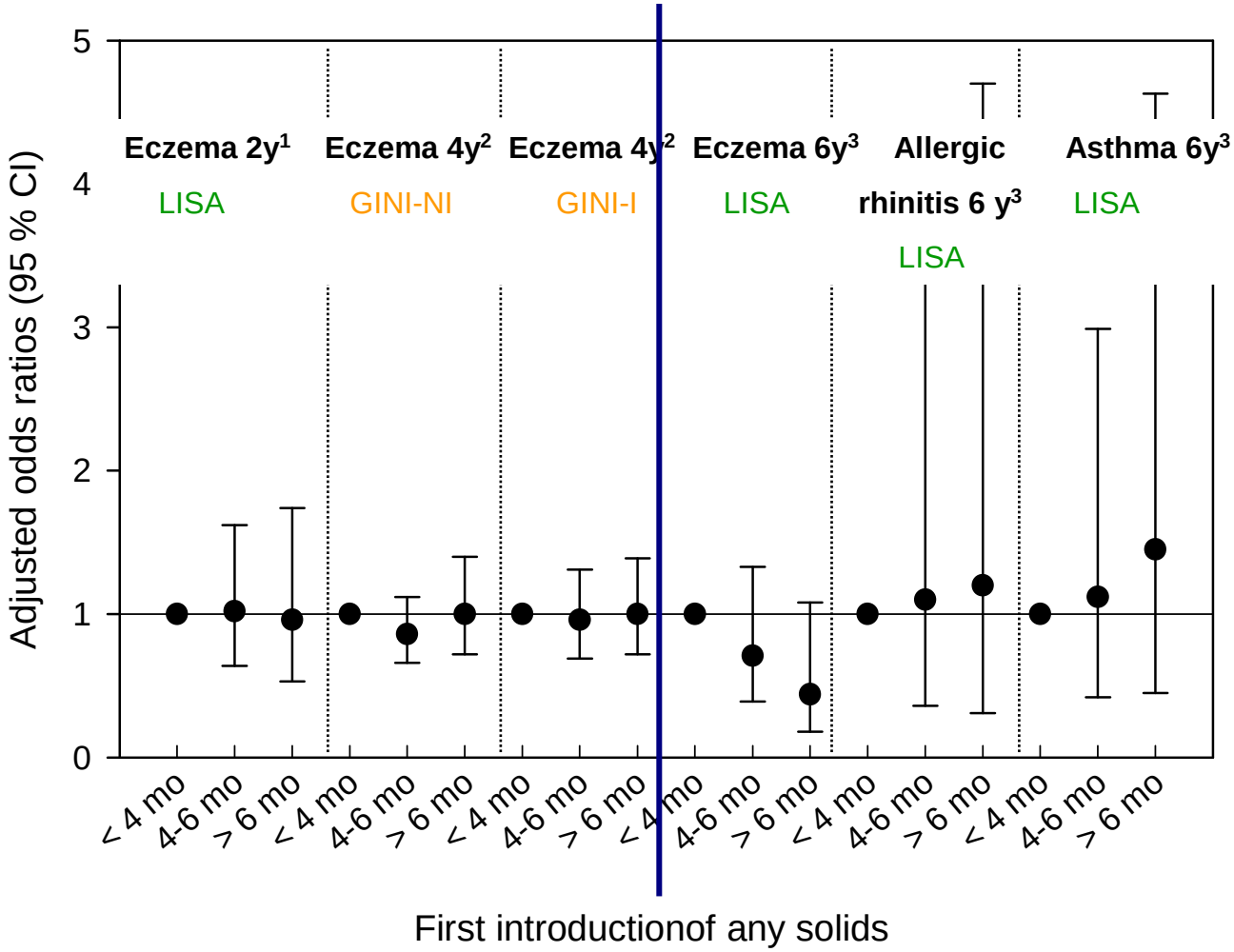
  Solid food not yet introduced

- **Solid food diversity at 4 and 6 months:**

  1-2 groups of food

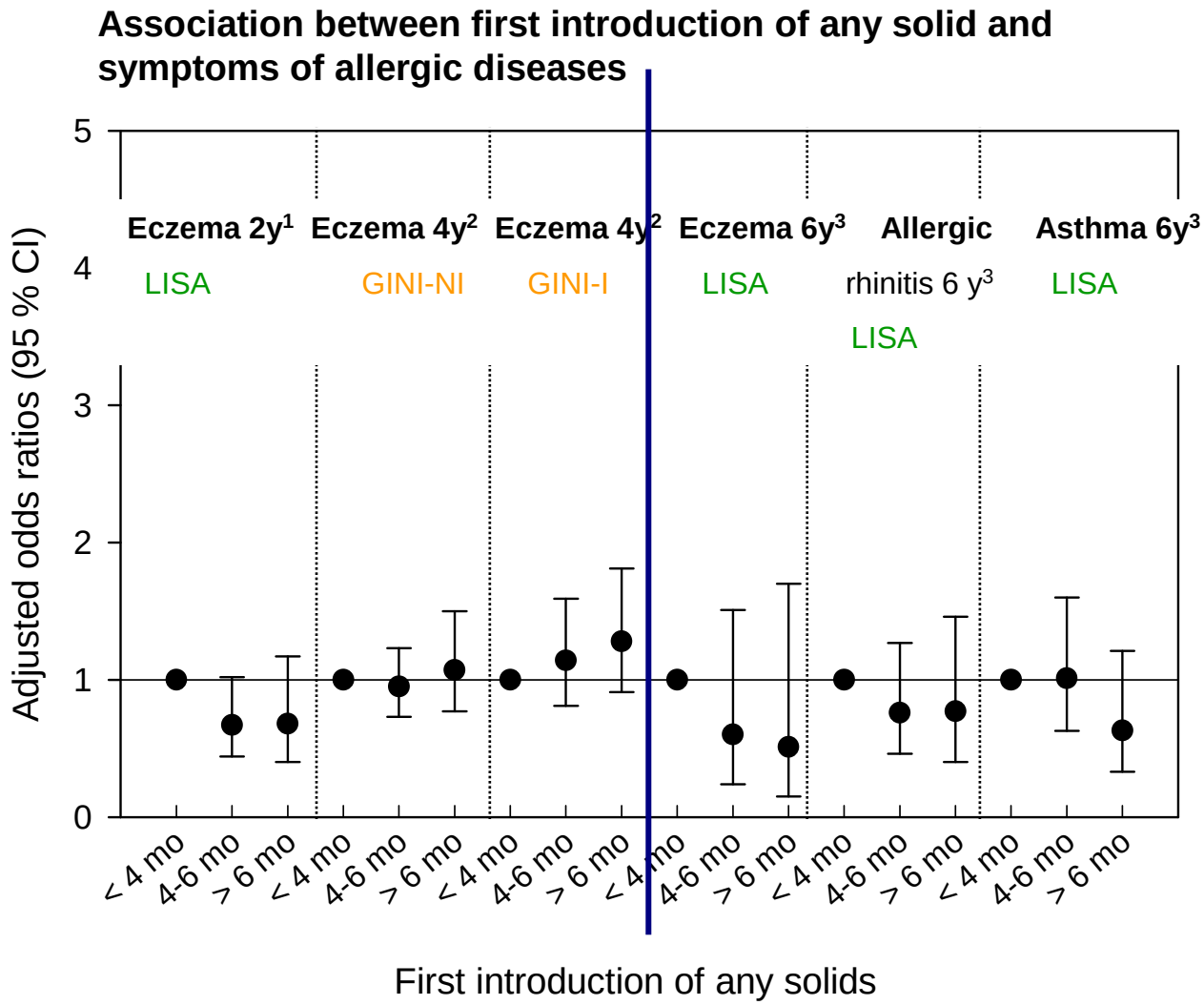
  3-8 groups of food

Association between first introduction of any solid and doctor diagnosis of allergic diseases



[1] Zutavern et al. *Pediatrics* 2006;117;401-411. [2] Filipiak et al. *J Pediatr* 2007; 151:352-8.

[3] Zutavern et al. *Pediatrics* 2008;121;e44-e52.



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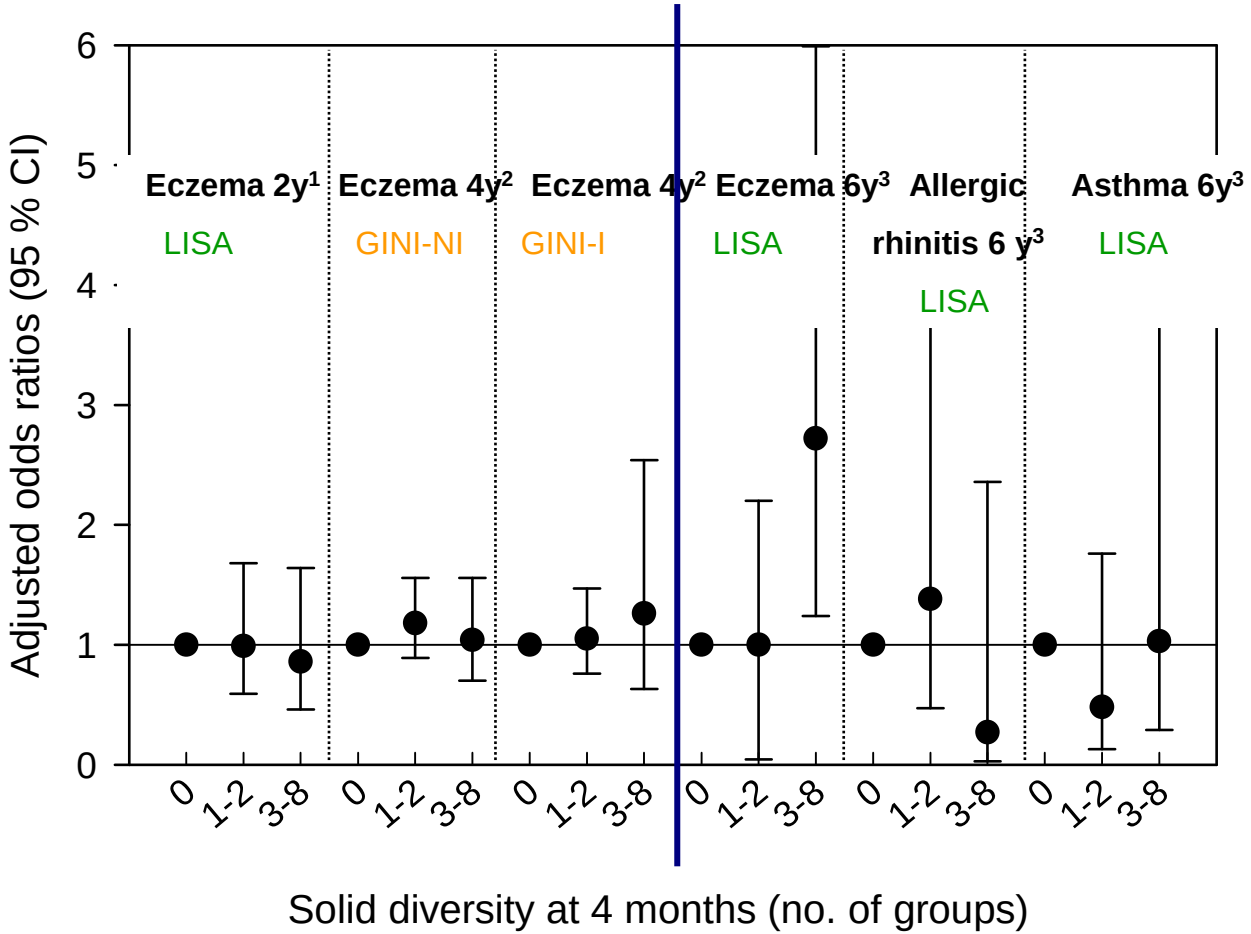
Association between solid diversity at 4 months and doctor diagnosis of allergic diseases



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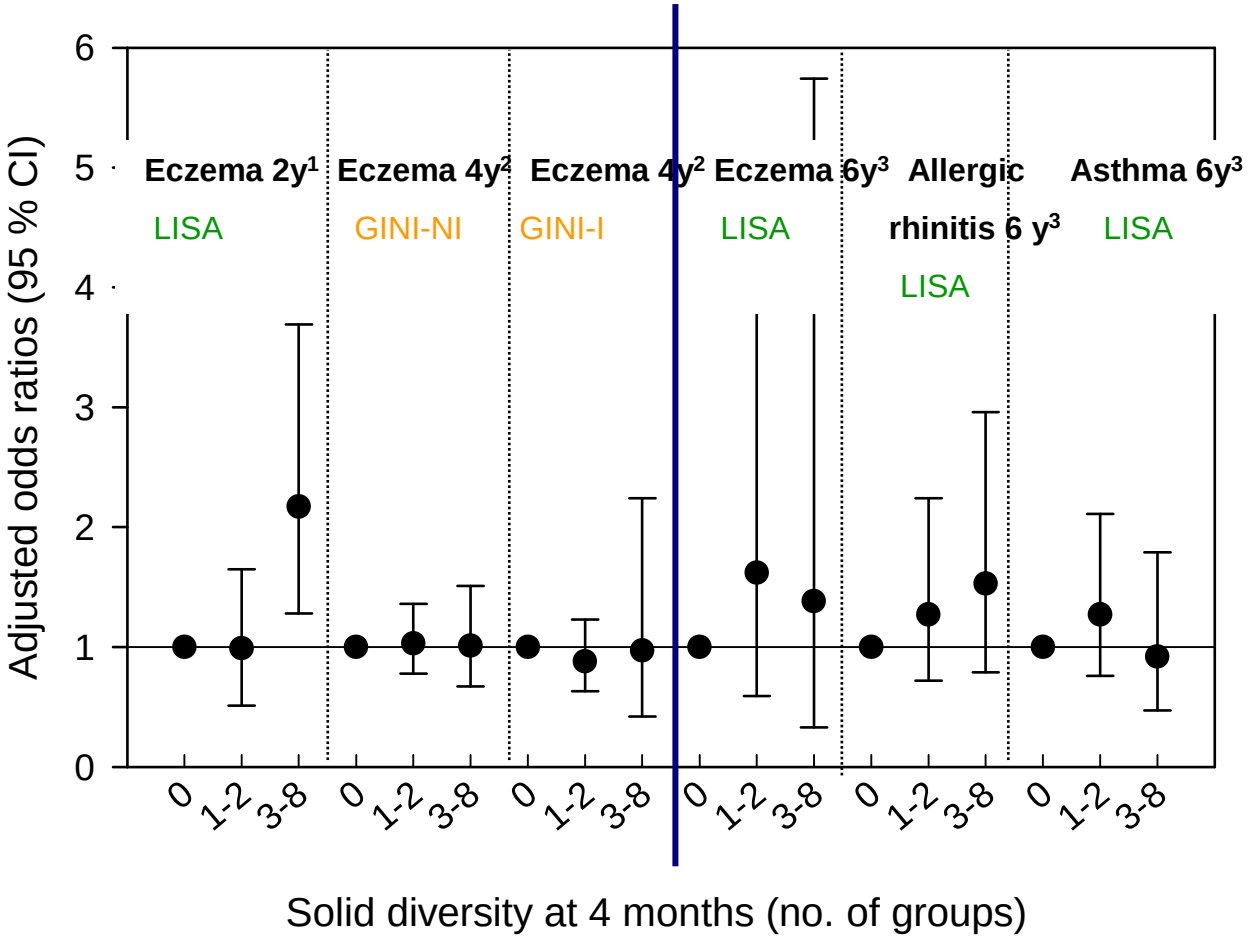
Association between solid diversity at 4 months and symptoms of allergic diseases



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[3] Zutavern et al. *Pediatrics* 2008;121;e44-e52.

Summary – Solid food introduction

Verified by guidelines for allergy prevention:

No consistent beneficial effect of delaying solid food introduction on atopic outcomes

Not verified by guidelines for allergy prevention:

A high diversity (3-8 groups) of solids at 4 months of life increased eczema risk in children without early skin or allergic symptoms.

Conclusions

The findings of the LISAplus and GINIplus study mainly support the new recommendations for allergy prevention.

However, in contrast to these recommendations, the intake of margarine, vegetable oils, citrus fruit, raw sweet pepper and celery during pregnancy as well as a high diversity of solid foods at the age of 4 months seemed to increase the risk for allergic outcomes, especially eczema in the two cohorts.

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Thank you for your attention!