SUPPLEMENTARY MATERIAL

Original article

Pro-inflammatory diet pictured in children with atopic dermatitis or food allergy: nutritional data of the LiNA cohort

Olivia Schütte¹, Larissa Bachmann¹, Nitin Shivappa²,³,⁴, James R. Hebert²,³,⁴, Janine F. Felix⁵,⁶, Stefan Röder¹, Ulrich Sack⁷, Michael Borte⁸, Wieland Kiess⁹, Ana C. Zenclussen¹,¹⁰ Gabriele I. Stangl¹¹,*, Gunda Herberth¹,*, Kristin M. Junge¹,¹¹,*

¹  Department of Environmental Immunology, Helmholtz Centre for Environmental Research – UFZ, Leipzig, Germany
² Cancer Prevention and Control Program, University of South Carolina, Columbia, SC 29208, USA
³ Department of Epidemiology and Biostatistics, Arnold School of Public Health, University of South Carolina, Columbia, SC 29208, USA
⁴ Department of Nutrition, Connecting Health Innovations LLC, Columbia, SC 29201, USA
⁵ The Generation R Study Group (Na-2918), Erasmus MC, University Medical Centre Rotterdam, Rotterdam, Netherlands
⁶ Department of Pediatrics, Erasmus MC, University Medical Centre Rotterdam, Rotterdam, The Netherlands
⁷ Institute of Clinical Immunology, Medical Faculty, University of Leipzig, Leipzig, Germany
⁸ Children’s Hospital, Municipal Hospital “St. Georg”, Leipzig, Germany
⁹ Centre for Pediatric Research Leipzig, University Hospital for Children & Adolescents, Medical Faculty, University of Leipzig, Germany
¹⁰ Perinatal Immunology, Saxonian Incubator for Clinical Translation (SIKT), Medical Faculty, University of Leipzig, Germany
¹¹ Institute for Agricultural and Nutritional Sciences, Martin Luther University Halle-Wittenberg, Halle/Saale, Germany

*shared authorship

Corresponding author:
Dr. Kristin Junge, Helmholtz-Centre for Environmental Research – UFZ, Department of Environmental Immunology, Permoserstrasse 15, 04318 Leipzig, phone: 0049 341 235 1550, mail: kristin.junge@ufz.de
### Supplementary Table S1: Atopic outcome characterisation

Prevalence of atopic dermatitis and food allergy within the first 10 years of life within the analysed LiNA sub-cohort (n=211) and IgE levels measured in serum samples at the age of 10 years.

|                         | Total cases | tIgE^a increased vs not increased | fx5^f increased vs not increased | sx1^f increased vs not increased |
|-------------------------|-------------|-----------------------------------|---------------------------------|---------------------------------|
|                         | n (%)       | n (%)                             | n (%)                           | n (%)                           |
| **Atopic dermatitis**   |             |                                   |                                 |                                 |
| positive                | 79 (37.4)   | 51 (76.2) / 16 (23.9)             | 17 (25.4) / 50 (74.6)           | 41 (61.2) / 26 (38.8)           |
| negative                | 132 (62.6)  | 65 (58.6) / 46 (41.4)             | 40 (36.0) / 71 (64.0)           | 11 (9.9) / 100 (90.1)           |
| **Food allergy**        |             |                                   |                                 |                                 |
| positive                | 25 (11.8)   | 19 (90.5) / 2 (9.5)               | 7 (33.3) / 14 (66.7)            | 15 (71.4) / 6 (28.6)            |
| negative                | 186 (88.2)  | 97 (61.8) / 60 (38.2)             | 21 (13.4) / 136 (86.6)          | 66 (42.0) / 91 (58.0)           |

^a,b,c,d 33 cases with missing IgE measurements at the age of 10 years, in detail ^a 12 ^b 21 ^c 4 ^d 29
^a increased: total IgE > 34.6 kU/L; ^f increased: specific IgE > 0.35 kU/L (CAP-class > 0)
**Supplementary Table S2: Nutritional data validation.** Comparison of average daily nutritional intake (absolute values) in 10 year old children from the LiNA- and EsKiMo cohort. Shown are median with 5. and 95. Percentile. Energy % - percentage of energy intake, RE – retinol equivalents, FE – folate equivalents (EsKiMo data from Mensink, G., Heseker, H., Richter, A., et al. (2007). *Forschungsbericht Ernährungsstudie als KIGGS-Modul (EsKiMo).*

| Nutrient                  | LiNA (n = 104) | Boys | EsKiMo (n = 93) | LiNA (n = 107) | Boys | EsKiMo (n = 99) |
|---------------------------|----------------|------|-----------------|----------------|------|-----------------|
| **Energy (kcal)**         |                |      |                 |                |      |                 |
| Median                    | 1954.0         |      | 1842.4          | 2254.8         |      | 1813.3          |
| 5. percentile             | 1250.5         |      | 1234.2          | 1675.7         |      | 1296.9          |
| 95. percentile            | 3084.6         |      | 2443.8          | 3498.8         |      | 2681.9          |
| Water (l)                 | 1.7            |      | 1.6             | 2.1            |      | 1.7             |
| **Macronutrients**        |                |      |                 |                |      |                 |
| Fat (energy %)            | 35.3           |      | 32.2            | 36.0           |      | 32.3            |
| Saturated FA (g)          | 18.5           |      | 28.4            | 39.0           |      | 28.3            |
| Polyunsaturated FA (g)    | 5.9            |      | 8.3             | 12.2           |      | 8.3             |
| Monounsaturated FA (g)    | 14.9           |      | 22.7            | 31.9           |      | 23.4            |
| Cholesterol (mg)          | 271.5          |      | 249.3           | 305.0          |      | 47.8            |
| Carbohydrates (energy %)  | 48.6           |      | 52.7            | 47.9           |      | 52.8            |
| Sugar (g)                 | 106.5          |      | 110.7           | 115.0          |      | 117.2           |
| Fibre (g)                 | 14.7           |      | 13.1            | 14.6           |      | 13.7            |
| Protein (energy %)        | 17.1           |      | 10.3            | 11.6           |      | 11.8            |
| **Minerals**              |                |      |                 |                |      |                 |
| Sodium (g)                | 2.0            |      | 1.3             | 2.5            |      | 2.2             |
| Potassium (g)             | 1.5            |      | 1.1             | 3.1            |      | 2.3             |
| Calcium (mg)              | 655.0          |      | 871.2           | 840.0          |      | 808.0           |
| Magnesium (mg)            | 266.0          |      | 294.1           | 321.0          |      | 285.9           |
| Phosphorus (mg)           | 1065.0         |      | 1068.7          | 1270.0         |      | 1097.7          |
| Iron (mg)                 | 9.2            |      | 10.4            | 10.3           |      | 9.3             |
| Zinc (mg)                 | 8.9            |      | 8.3             | 10.0           |      | 8.7             |
| Iodine (µg)               | 83.5           |      | 77.6            | 96.0           |      | 79.1            |
| **Vitamins**              |                |      |                 |                |      |                 |
| Vitamin A (RE (mg))       | 1.1            |      | 0.7             | 1.1            |      | 0.9             |
| Vitamin C (mg)            | 184.3          |      | 100.0           | 139.4          |      | 99.2            |
| Vitamin D (µg)            | 1.7            |      | 1.4             | 1.9            |      | 1.5             |
| Vitamin E (mg)            | 9.1            |      | 9.7             | 10.3           |      | 9.2             |
| Vitamin K (µg)            | 107.7          |      | 274.0           | 116.1          |      | 185.4           |
| Thiamine (mg)             | 1.2            |      | 1.2             | 1.5            |      | 1.5             |
| Riboflavin (mg)           | 1.3            |      | 1.5             | 1.6            |      | 1.6             |
| Niacin equivalents (mg)   | 27.0           |      | 21.7            | 29.8           |      | 22.0            |
| Pyridoxine (mg)           | 1.4            |      | 1.5             | 1.6            |      | 1.5             |
| Biotin (µg)               | 42.5           |      | 37.0            | 50.5           |      | 39.4            |
| Folic acid (FE (µg))      | 229.5          |      | 203.5           | 259.0          |      | 204.9           |
| Cyanocobalamin (µg)       | 4.1            |      | 3.6             | 5.0            |      | 4.2             |

- Energy %: percentage of energy intake, RE – retinol equivalents, FE – folate equivalents
- LiNA (n = 104)
- EsKiMo (n = 93)
- Boys (n = 107)
- EsKiMo (n = 99)
Supplementary Figure Legends

**Supplementary Figure S1: Flow chart.** Included study subjects in the current project and reasons for drop outs/missing data.

**Supplementary Figure S2: Single nutrient intake in all children.** Nutrient intake as % of the D-A-CH reference values (log10). Data are presented in violin plots as median (solid line) with 25th to 75th percentile (dotted line), n = 211. A: Macronutrient, B: Water soluble vitamins, C: Fat soluble vitamins, D: Minerals. CH: carbohydrates, Na: sodium, Cl: chloride, K: potassium, Ca: calcium, P: phosphorus, Mg: magnesium, Fe: iron, I: iodine, F: fluoride, Zn: zinc, Cu: copper, Mn: manganese, vit – vitamin

**Supplementary Figure S3: Single nutrient intake in girls and boys.** Sex – specific nutrient intake as % of the D-A-CH reference values (log10). Data are presented in violin plots as median (solid line) with 25th to 75th percentile (dotted line) for boys (green, n = 107) and for girls (orange, n = 104), *** significant difference (p < 0.05) between girls and boys (Mann-Whitney U-test) A: Macronutrient, B: Water soluble vitamins, C: Fat soluble vitamins, D: Minerals. CH: carbohydrates, Na: sodium, Cl: chloride, K: potassium, Ca: calcium, P: phosphorus, Mg: magnesium, Fe: iron, I: iodine, F: fluoride, Zn: zinc, Cu: copper, Mn: manganese, vit – vitamin