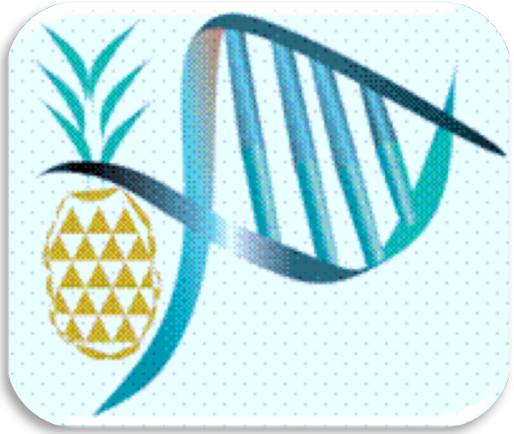
Brazil Micronutrient Project

Nestlé Institute of Health Sciences

Food history and micronutrient profile and their relation to DNA damage in children in Brazil



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BACKGROUND

Dietary pattern of children and adolescentes:

↑ High energy density food ↓ Fruits and vegetables

→ Insufficient intake of vitamins and minerals

Micronutrients → cellular protection as antioxidants

Acting in repair reactions of damaged DNA

Unrepaired DNA damage can lead to the development of carcinogenic or mutagenic changes in cells

TORAL N et al, 2007. BENEDET J. et al, 2013. KRAUSE, 2002. BENEDET J et al, 2013. COMINETTI C et al, 2011.

OBJECTIVES

Aim: To investigate the association between DNA damage and nutritional status in 9 to 13 years old children and adolescents

STUDY DESIGN

This is an observational cross-sectional clinical sub study of the project: ”Brazil Micronutrient Project“

Data were collected in April 2013

DESIGN OF EXPERIMENT

Data collection

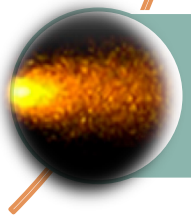
Anthropometry and body composition

9 to 13 years old healthy children Total of 141 subjects

Food history through FFQ & 24hr

After exclusion of under and over diet reports: 120 subjects

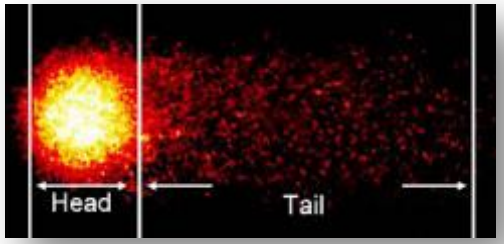
Blood sample for micronutrient dosage



DNA damage: electrophoresis in single cell gel (comet assay)

Software SPSS 20.0 for Statistical Analysis

Separation into 2 groups according DNA damage



- **Comet assay:** fragments of damaged DNA are separated in electrophoresis, forming a tail
- Tail intensity values:

  → Measures % of DNA in tail (damaged DNA)
- Classification proposed by Wollowski et al (1999)
- **Group 1:** 0 to 17% of damage (n=108)
- **Group 2:** 17,1% to 100% of damage (n=12)

RESULTS

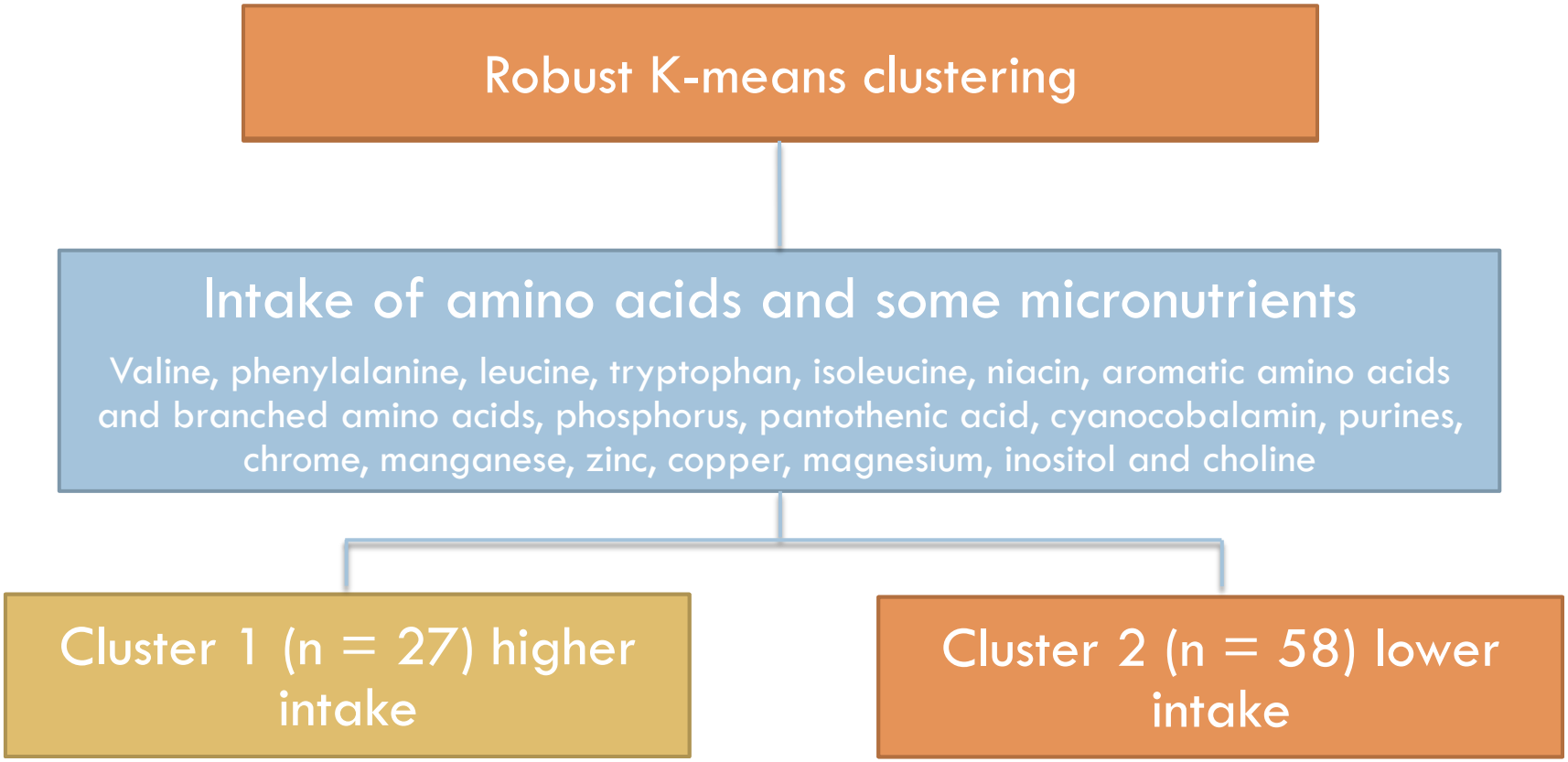
Separation into 2 groups according DNA damage

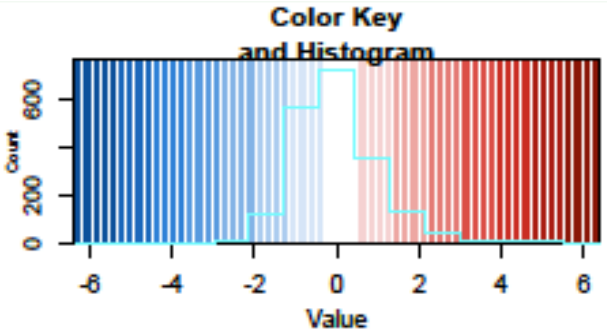
ANCOVA adjusted for BMI

	Group 1 (n=108)	Group 2 (n=12)	p value
Retinol	0,35 ±0,08	0,27 ±0,09	0,017
Beta-carotene	0,22 ±0,13	0,15 ±0,10	0,010
Riboflavin	3,10 (0,43; 15,05)	1,57 (0,74; 5,85)	0,046

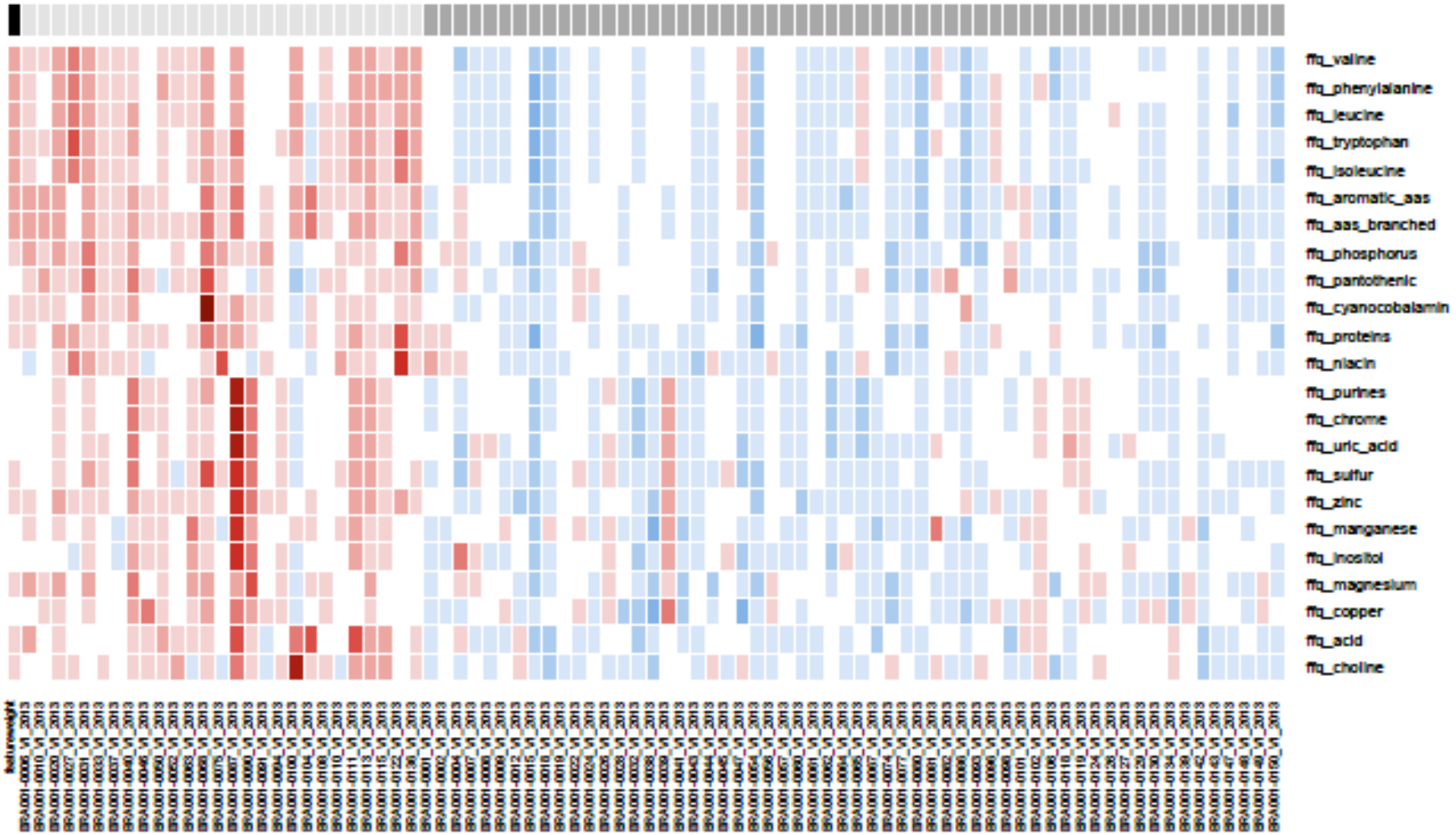
Lower values in the group with higher DNA damage

Separation into 2 groups according to nutrient intake patterns





Heatmap showing separation of the accurate FFQ reporters into 2 dietary patterns



RESULTS

Separation into 2 groups according to nutrient intake patterns

	Cluster 1 (n=27)	Cluster 2 (n=58)	p value
Tail intensity	9,41 ±4,17	11,54 ±4,9	0,056
Energy intake	1854,51 ±322,3	2234,05 ±535,8	0,001

Lower DNA damage and energy Intake in the cluster with higher intake of amino acids and micronutrients

DISCUSSION

These findings corroborates literature

- Konopacka et al (2000) concluded that after gamma radiation, lymphocytes treated with betacarotene presented lower DNA damage compared to the untreated ones.
- Morin et al (2007) found a protective role of retinol on oxidative DNA damage in rats.
- Manthey et al (2006) found that riboflavin deficiency was associated with an increase in DNA strand breaks.
- Minnet et al (2011) demonstrated an inverse relation between B12 status and DNA damage in children.

COLLINS et al, 1998. MANTHEY et al, 2006. MINNET et al, 2011
KONOPACKA et al, 2001. MORIN et al, 2007.

DISCUSSION

Several studies have demonstrated the protective role of vitamins and micronutrients against DNA damage

However, there is a lack of studies considering healthy children and DNA damage, and most of the studies do not analyze the role of **food intake pattern**

CONCLUSION

This study confirms the protective effect of micronutrients against DNA damage

These findings deserves attention!

Children are increasing energy density food intake lacking in micronutrients

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