



VITAMINAS E MINERAIS: QUANDO E COMO SUPLEMENTAR NA DIETA?

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Sumário

- Introdução
- Riscos Nutricionais
- Fortificação – Suplementação
- Artigos científicos
- Artigos científicos Lab - Nutrição FCF-USP
- Conclusões



Alimentação Brasileira e Riscos Nutricionais

*Padrão
alimentar
atual*

*Riscos
nutricionais*



- ✓ Alimentos altamente calóricos
- ✓ Alto consumo de lipídios e AGS
- ✓ *Baixa densidade de micronutrientes:*
 - Vitamina D
 - Vitamina A
 - Riboflavina
 - Ômega 3
 - Cálcio
 - Magnésio
 - Zinco
 - Selênio, etc
- ✓ *Alto consumo de sódio*

Alimentação Adequada ?



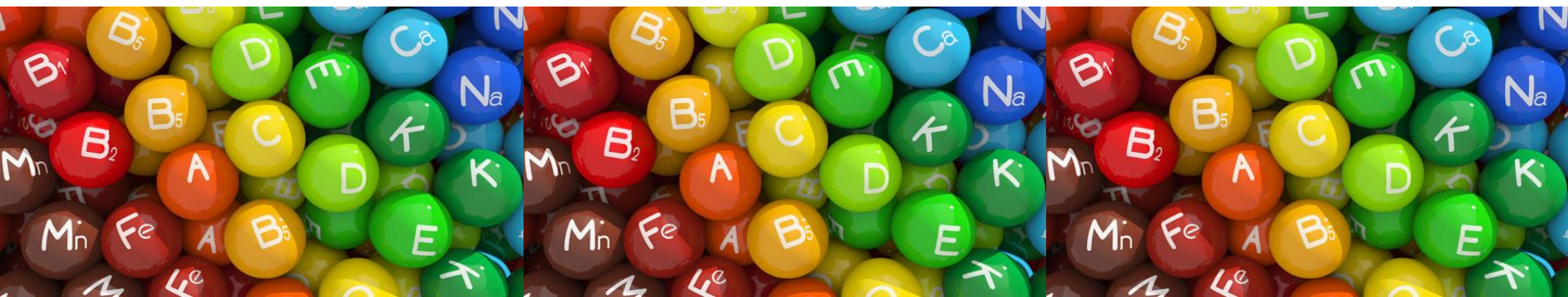
Guias para alimentação produzidos por vários países

- Dieta Mediterrânea
- Guias para Estados Unidos (FDA)
- Guias Alimentares para população brasileira
- Dentre outras.....



Fatores de Risco para Deficiência de Micronutrientes (1)

- Dietas monótonas com baixa densidade de micronutrientes
- Baixa ingestão de alimentos de origem animal
- Baixa prevalência de aleitamento materno
- Baixa densidade de micronutrientes nos alimentos para crianças > 6 meses (complementação leite materno)
- Aumento da demanda fisiológica na gestação e lactação



Fatores de risco para deficiência de micronutrientes (2)

- Estado nutricional deficiente
- Má absorção em razão de diarreias e parasitas intestinais
- Aumento da excreção
- Variações sazonais na disponibilidade de nutrientes
- Fatores sociais, pobreza, baixo nível educacional

Nutrientes nos alimentos

Teores de nutrientes nos alimentos:

- ✓ Variam com idade da planta, maturação, espécie, variedade, cultivar, dieta
- ✓ Meio ambiente (clima, solo, chuvas, estação do ano)
- ✓ Processamento (tempo de armazenamento, temperatura, método de preservação, preparação)



Fortificação vs. Suplementação

- ✓ **Fortificação** pode ser a escolha apropriada quando a ingestão de um determinado nutriente pela maioria da população é inadequada
- ✓ **Suplementação** quando as **necessidades específicas** de algum subgrupo da população **são maiores** do que as da população em geral (ex. crianças, adolescentes, gestantes, idosos e atletas)



Impacto dos Programas Fortificação

Micronutrientes	Impacto
Vitamina A	< 23% razão mortalidade < 70% na cegueira infantil
Iodo	> 13 pontos no QI
Ferro	< 20% mortalidade materna
Zinco	< 6% na mortalidade infantil < 27% incidência de diarreia crianças
Folato	< 50% incidência DTN

Suplementação



Quando Suplementar?

- Grupos de risco para deficiência:

- ❖ Gestantes e Crianças

- ❖ Adolescentes

- ❖ Adultos

- ❖ Idosos

- Importante: plano alimentar direcionado para o indivíduo, respeitando suas individualidades



Recomendações para Suplementação (1)



- Quando a ingestão alimentar de determinado nutriente estiver abaixo da recomendação média considerada para o indivíduo, associada a parâmetros bioquímicos que indiquem deficiência



Recomendações para Suplementação (2)



- Quando o indivíduo apresentar sinais e sintomas compatíveis com prejuízo de função de determinado nutriente



Recomendações para Suplementação (3)



- Quando existirem condições de doença que promovam a deficiência de um ou mais nutrientes em particular (considerando a farmacoterapia e as interações medicamentos vs nutrientes)



Suplementação e DCNT

- Doenças crônicas não transmissíveis: Obesidade, Diabetes, DCV, Câncer
- Estudos de suplementação com vitaminas, minerais, compostos bioativos, visando a redução do risco dessas doenças tem apresentado resultados conflitantes
- A maioria deles mostra que havendo deficiência os resultados são positivos. Entretanto, em populações cujos indivíduos apresentam estado nutricional adequado, o excesso poderia ter efeitos adversos

Artigos Científicos



Gestantes e Crianças



Epigenetics of Inflammation, Maternal Infection, and Nutrition^{1–3}

Kate J Claycombe,^{4*} Catherine A Brissette,⁵ and Othman Ghribi⁵

⁴USDA–Agricultural Research Service, Grand Forks Human Nutrition Research Center, Grand Forks, ND; and ⁵Department of Basic Sciences, University of North Dakota School of Medicine and Health Sciences, Grand Forks, ND

Abstract

Importância da alimentação materna, evitando alta ingestão de lipídeos, baixa ingestão de proteína e de micronutrientes (Zn, vit.D, Fe, ác. fólico, vit. A, iodo, etc...) além de compostos bioativos, para ↓ DCNT

Keywords: epigenetics, immunity, inflammation, nutrients, macrophages, obesity

J Nutr 2015;145:1109S–15S.

Developmental Influences in Utero

Offspring Response

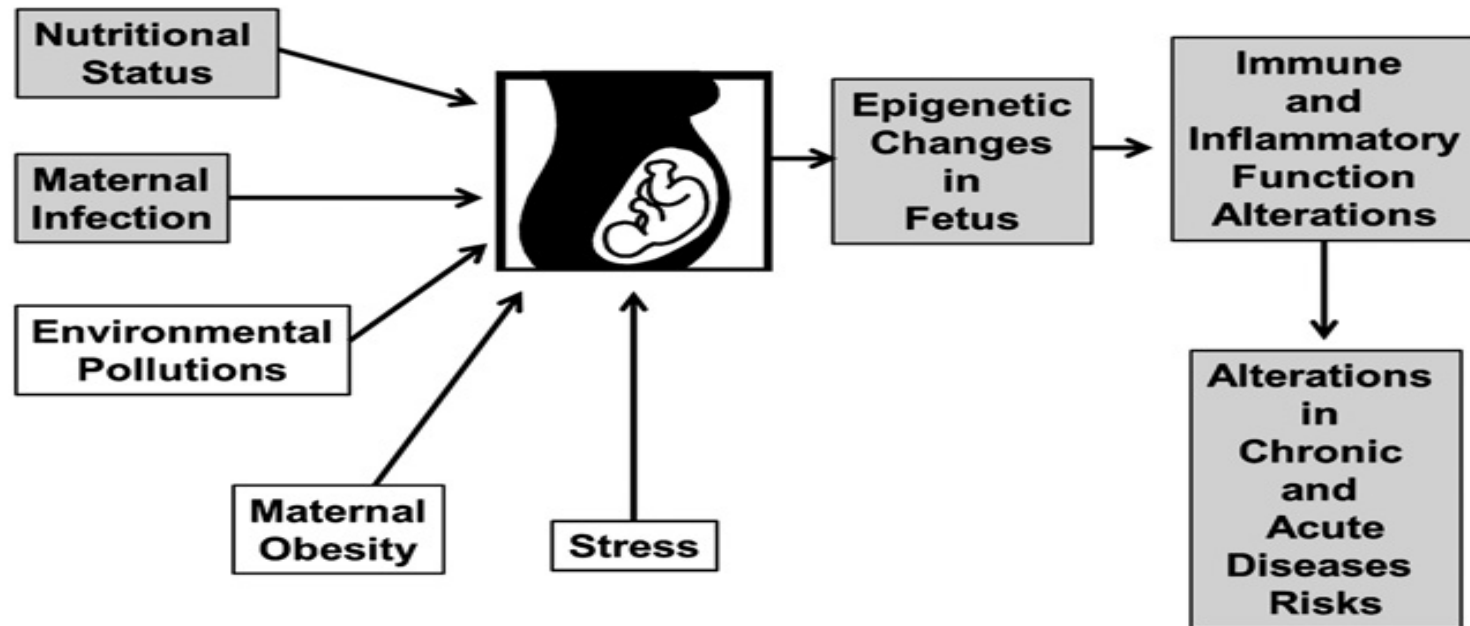


FIGURE 1 Epigenetic regulators of immune and inflammatory functions in offspring. Maternal nutrient intake, infection, obesity, environmental pollution, and stress contribute to epigenetic changes in the fetus by DNA methylation and histone modifications. These epigenetic changes, in turn, alter immune function and inflammatory responses by activating inflammatory cytokines and chemokines, resulting in increased risk of acute and chronic diseases in offspring.

Gestational changes in iodine status in a cohort study of pregnant women from the United Kingdom: season as an effect modifier¹⁻³

Sarah C Bath, Victoria L Furmidge-Owen, Christopher WG Redman, and Margaret P Rayman

ABSTRACT

Background: Iodine is required throughout pregnancy for thyroid hormone production, which is essential for fetal brain development. Studies of iodine status in pregnant women from the United Kingdom (UK) have focused on early gestation (<16 wk). Data on the effect of advancing gestation on urinary iodine excretion are conflicting, with suggestions of both an increase and a decrease.

Objectives: The aims were to evaluate iodine status in a cohort of UK pregnant women and to explore how it changes throughout

Iodo é importante para síntese de hormônios pela glândula tireoide. De grande importância para o desenvolvimento cerebral do feto. Este estudo avaliou a excreção de iodo de gestantes em diferentes momentos e concluiu que essas se encontravam em deficiência moderada de iodo, podendo ser considerado problema de Saúde Pública. [Am J Clin Nutr, 2015.](#)

increased with advancing gestation, and there was a significant interaction between gestational week and season ($P = 0.026$). For a 1-wk increase in gestation, the iodine-to-creatinine ratio increased by a factor of 1.05 (95% CI: 1.02, 1.08) in winter and by a factor of 1.04 (95% CI: 1.00, 1.08) in summer.

Conclusions: This group of UK pregnant women was mildly-to-moderately iodine deficient at all trimesters, which is of public health concern. The finding that the iodine-to-creatinine ratio increased over the course of gestation may not be generalizable to populations with different iodine status from ours and merits further investigation. This trial was registered at www.isrctn.com as ISRCTN37927591.

Am J Clin Nutr 2015;101:1180–7.

Micronutrients and pregnancy; effect of supplementation on pregnancy and pregnancy outcomes: *a systematic review*

Taddese Alemu Zerfu^{1,2*} and Henok Taddese Ayele^{1,3}

Abstract

Introduction: Every year more than 20 million infants are born with low birth weight worldwide. About 3.6 million infants die during the neonatal period. More than one third of child deaths are thought to be attributable to maternal and child under nutrition.

Objectives: To systematically review the effect of supplementing various combinations and types of micronutrients

Os autores concluem que a suplementação é recomendada, principalmente em países onde existe maior incidência de pobreza. Recomendam mais estudos para estabelecimento das doses.

prevention of pre-eclampsia. The remaining articles reviewed, showed significant benefit of multiple micronutrients supplementation during pregnancy in reducing low birth weight, small for Gestational Age births as compared to the usual iron-folate supplements.

Conclusions: Supplying micronutrients, mainly multiple micronutrients have beneficial effect in reducing the risk of low birth weight and other complications. Further studies at various combination and doses of micronutrient supplements are recommended.

Zerfu and Ayele *Nutrition Journal* 2013, **12**:20
<http://www.nutritionj.com/content/12/1/20>

Nutritional risk among Brazilian children 2 to 6 years old: A multicenter study

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Preschool children

ABSTRACT

Objective: To estimate the nutritional risk in children 2 to 6 y old.

Methods: The sample consisted of 3058 children enrolled in public and private schools in nine Brazilian cities. The assessment of nutrient intake was based on 1-d data combining direct individual weighing of foods and a food diary. A second evaluation of food consumption was conducted in a subsample to estimate the usual intake.

Results: There was low prevalence of inadequate intake of vitamin B6 (<0.001%), riboflavin

Estudo realizado no Brasil, mostra para a faixa etária de 2 a 6 anos baixa ingestão de Ca, vit. D e vit. E

of inadequate calcium intake was approximately 45%. Sodium intake was higher than the upper intake level in 90% of children younger than 4 y and 73% of children older than 4 y.

Conclusions: The prevalence of inadequate dietary intake was low for most nutrients. However, fiber, calcium, and vitamin D and E intakes were lower than recommended. Moreover, children consumed large amounts of sodium and saturated fat.

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Serum Folate but Not Vitamin B-12 Concentrations Are Positively Associated with Cognitive Test Scores in Children Aged 6–16 Years^{1,2}

Cathy T. Nguyen, Edward J. Gracely, and Brian K. Lee*

Drexel University, School of Public Health, Philadelphia, PA

Abstract

Estudo com 5365 crianças de 6-16 anos observou que maiores concentrações de folato foram associadas com melhor desempenho cognitivo. Sem associação para B₁₂.

J.Nutr. 143: 500 - 504, 2013

scores after adjusting for various covariates. For example, compared with the lowest quartile of folate, children in the highest quartile scored 3.28 points or 0.19 SD units higher on the reading test ($P < 0.05$). Vitamin B-12 was not associated with any of the test scores. In the largest study to date, higher folate concentrations were associated with better reading and block design scores. These associations appear to be biologically plausible and merit further study. J. Nutr. 143: 500–504, 2013.

Adolescentes



Food intake and meal patterns of adolescents, São Paulo, Brazil

Consumo alimentar e padrão de refeições de adolescentes, São Paulo, Brasil

GREISSE, V.S.L et col.

Rev Bras Epidemiol
2010; 13(3): 1-10

Abstract

Objective: In order to assess the food intake and meal patterns of adolescents, a cross-sectional study was conducted with 228 adolescents from a public school in SP, Brazil. **Methods:** Energy, macronutrients, calcium, iron and vitamin A intake were evaluated. The food pattern was compared with the eating patterns established by the Food Pyramid for Adolescents. Meal frequency was verified to determine meal skipping. Descriptive statistics and Chi-square were used. **Results:** The mean energy intake was 66% lower than the recommendations, the carbohydrate intake was 50% lower, the fat intake was 50% higher and the protein intake was 40% higher. Among the studied adolescents, 21% skipped breakfast and a third have snacks instead of lunch or dinner. **Conclusion:** The adolescents presented an energy insufficient diet with inadequate fruit and vegetable intake. The meal patterns were satisfactory, but breakfast should be encouraged.

Key words: adolescents, food consumption, food guide, feeding.

Table 2 – Distribution of energy consumption, macronutrients, calcium, iron, and vitamin A intake by gender. Ilhabela, SP, 2006.

Variáveis	Male		Female		Total		p
	N	%	N	%	N	%	
Energy (kcal)							
Below recommended		70	70	63	151	66	0,282
Above recommended		30	42	37	77	34	
Carbohydrates							
Below 55%		47	51	45	105	46	0,074
Above 75%		0	5	4,4	5	2	
55 to 75%		53	57	50	118	52	
Lipids							
Below 15%		1	4	3,5	5	2	0,379
Above 30%		48	51	45	106	47	
15 to 30%		51	58	51	117	51	
Proteins							
Below 10%		13	16	14	31	14	0,951
Above 15%		40	46	41	92	40	
10 to 15%		47	51	45	105	46	
Vitamin A							
Abaixo recomendado	99	86	82	73	181	79	0,012*
Acima recomendado	16	14	31	27	47	21	
Calcium							
Below recommended		90	108	96	212	93	0,129
Above recommended		10	5	4	16	7	
Iron							
Below recommended		12	46	41	60	26	< 0,001*
Above recommended		88	67	59	168	74	
Total		100	113	100	228	100	

*p<0,05

Adultos



Macronutrient consumption and inadequate micronutrient intake in adults

Rev Saúde Pública 2013;47(1 Supl)

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Flávia dos Santos Barbosa^{II}

Washington Leite Junger^{III}

Edna Massae Yokoo^{IV}

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ABSTRACT

OBJECTIVE: To estimate energy and nutrient intake and prevalence of inadequate micronutrient intake among Brazilian adults.

METHODS: Data from the National Dietary Survey, from the 2008-2009 Household Budget Survey, were used. Food consumption was evaluated through food record on two non-consecutive days. A total of 21,003 individuals (52.5% women), between 20-59 years old, participated in the survey. Usual nutrient intake was estimated according to the National Cancer Institute method. The Estimated Average Requirement (EAR) cut-off points were used to determine the prevalence of inadequate micronutrient intake. For manganese and potassium, the Adequate Intake (AI) was used as cut-off. Sodium intake was compared with the Tolerable Upper Intake Level (UL). The probability approach was used to determine the prevalence of inadequate iron intake. The data were analyzed according to the location of the household (urban or rural) and macro regions of Brazil.

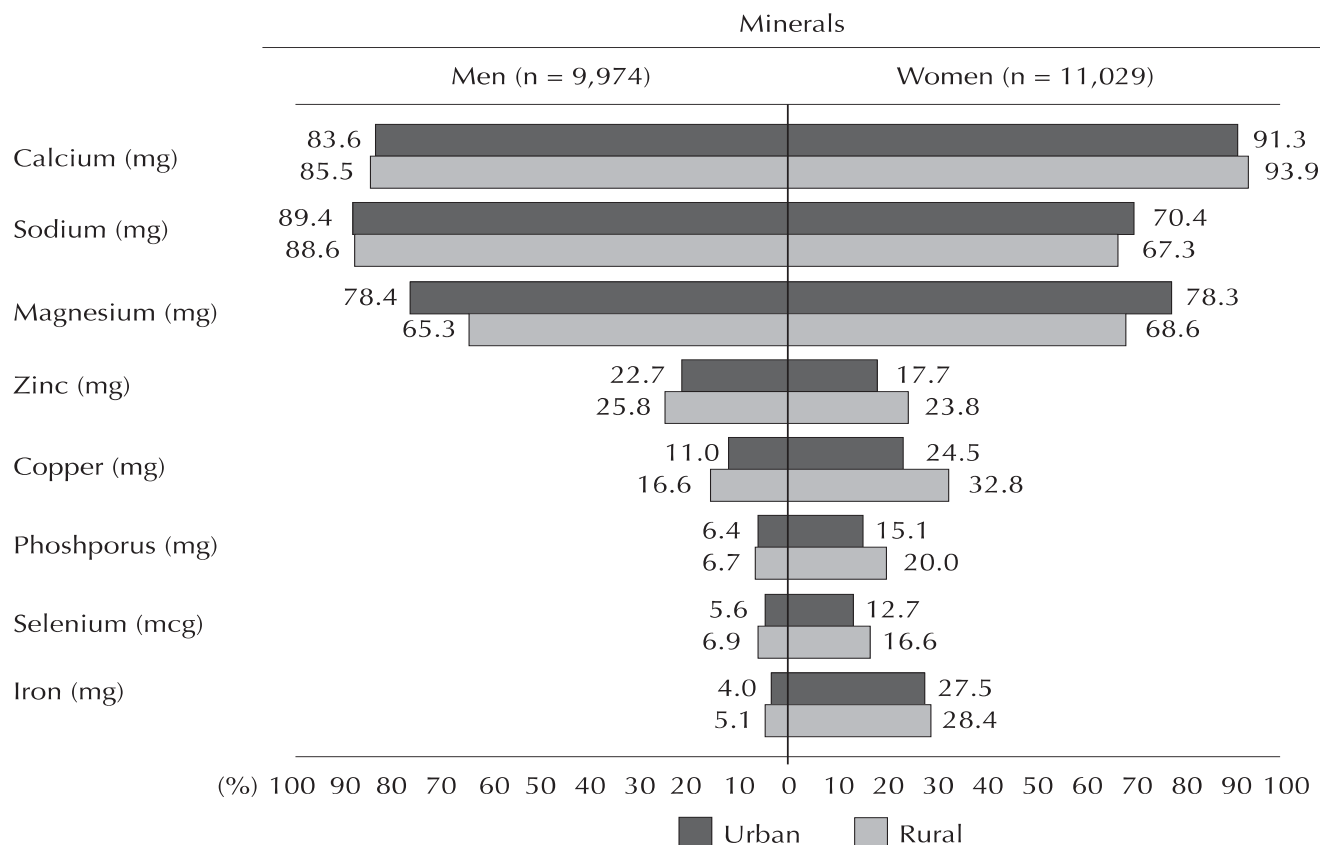
RESULTS: The mean energy intake was 2,083 kcal among men and 1,698 kcal among women. Prevalence of inadequacy equal to or greater than 70% were observed for calcium among men and magnesium, vitamin A, and sodium among both men and women. Prevalence equal to or greater than 90% were found for calcium in women and vitamins D and E in both genders. Prevalence lower than 5% were found for iron in men and for niacin in men and women. In general, prevalence of inadequate intake was higher in the rural area and in the Northeast region.

CONCLUSIONS: Energy intake was higher among individuals who live in urban areas and in the North region. The greatest risk groups of inadequate micronutrient intake were women and those living in rural areas and in the Northeast region.

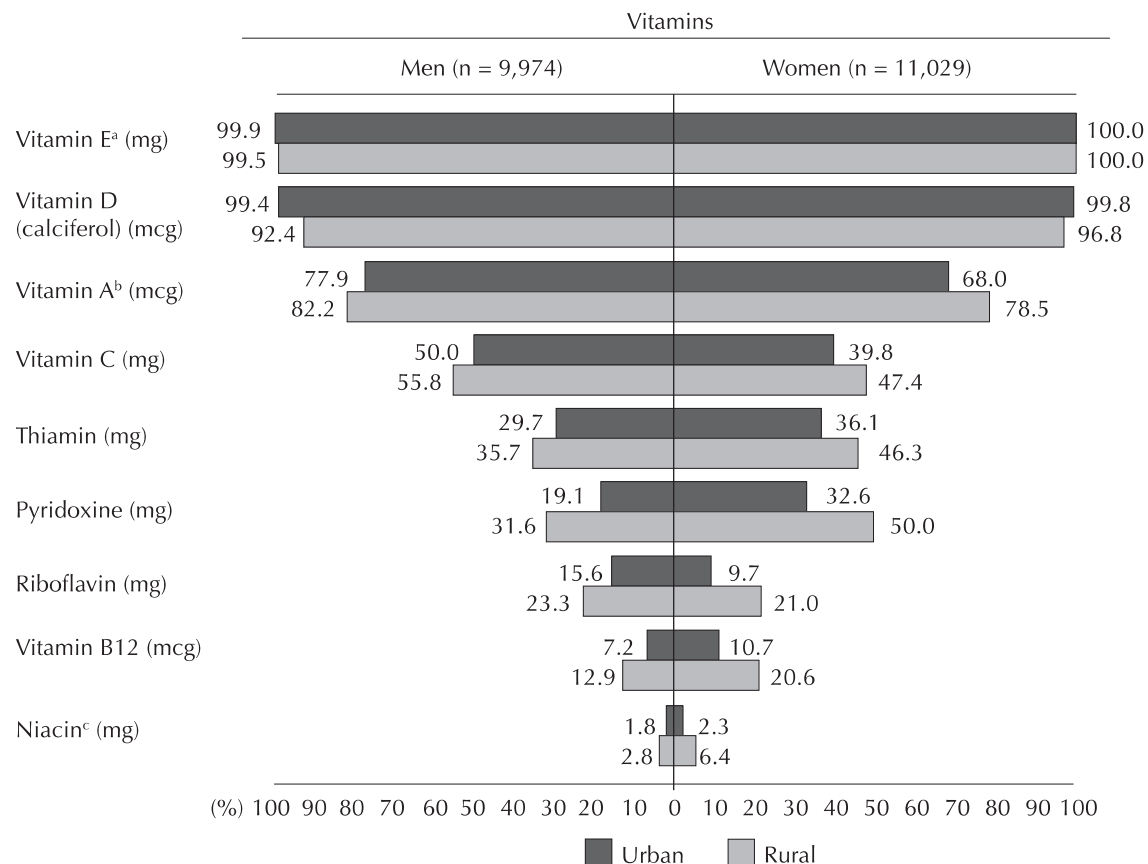
Rev Saúde Pública
2013 , 47 (sup1)

% Inadequação em Adultos – Minerais

Micronutrient inadequacy in adults Araujo MC et al



% Inadequação em Adultos – Vitaminas



^a Total alpha-tocopherol

^b Retinol activity equivalents

^c Niacin equivalents

Figure 1. Prevalence of inadequate micronutrients intake according to sex and location of household. Brazil, 2008-2009.

French adults' cognitive performance after daily supplementation with antioxidant vitamins and minerals at nutritional doses: a post hoc analysis of the Supplementation in Vitamins and Mineral Antioxidants (SU.VI.MAX) trial¹⁻³

Emmanuelle Kesse-Guyot, Léopold Fezeu, Claude Jeandel, Monique Ferry, Valentina Andreeva, Hélène Amieva, Serge Hercberg, and Pilar Galan

ABSTRACT

Background: Antioxidant properties of some vitamins and trace elements may help to prevent cognitive decline.

Objective: The aim of the current study was to estimate the long-term effects of antioxidant nutrient supplementation on the cognitive performance of participants in the Supplementation in Vitamins

4447 participantes, 120 mg Vit. C; 6 mg β caroteno; 30 mg Vit. E; 100 μ g Se; 20 mg Zn; 8 anos. Verificaram que foi positiva para memória verbal, principalmente para não fumantes e com deficiência de Vit. C ao início. [Am J Clin Nutr 2011](#)

tween antioxidant supplementation and cognitive functions, in the full sample and by subgroups, were estimated through ANOVA and expressed as mean differences and 95% CIs. Subgroup analyses were performed according to baseline characteristics.

Results: Subjects receiving active antioxidant supplementation had better episodic memory scores (mean difference: 0.61; 95% CI: 0.02, 1.20). PCA indicated 2 factors that were interpreted as showing verbal memory and executive functioning. Verbal memory was improved by antioxidant supplementation only in subjects who were nonsmokers or who had low serum vitamin C concentrations at baseline.

Conclusion: This study supports the role of an adequate antioxidant nutrient status in the preservation of verbal memory under certain conditions. This trial was registered at clinicaltrials.gov as NCT00272428. *Am J Clin Nutr* 2011;94:892–9.

Impact of voluntary fortification and supplement use on dietary intakes and biomarker status of folate and vitamin B-12 in Irish adults¹⁻⁴

Sinéad M Hopkins, Michael J Gibney, Anne P Nugent, Helene McNulty, Anne M Molloy, John M Scott, Albert Flynn, JJ Strain, Mary Ward, Janette Walton, and Breige A McNulty

ABSTRACT

Background: Ireland has traditionally operated a liberal policy of voluntary fortification, but little is known about how this practice, along with supplement use, affects population intakes and status of folate and vitamin B-12.

Objective: The aim was to examine the relative impact of voluntary fortification and supplement use on dietary intakes and biomarker status of folate and vitamin B-12 in Irish adults.

Design: Folic acid and vitamin B-12 from fortified foods and supplements were estimated by using brand information for participants

Impacto da fortificação folato e B-12 voluntária e/ou suplementos, associada aos biomarcadores de estado nutricional. Concluíram que o grupo mulheres jovens, de maior necessidade para prevenção do DTN, foram as que apresentaram parâmetros mais baixos, necessitando controle.

ciated with significantly higher serum vitamin B-12 concentrations relative to nonconsumers ($P < 0.001$). Two-thirds of young women had suboptimal RBC folate for protection against neural tube defects (NTDs); among nonconsumers of folic acid, only 16% attained optimal RBC folate.

Conclusions: The consumption of voluntarily fortified foods and/or supplement use was associated with significantly higher dietary intakes and biomarker status of folate in Irish adults. Of concern, the majority of young women remain suboptimally protected against NTDs. *Am J Clin Nutr* 2015;101:1163–72.

Am J Clin Nutr 2015;101:1163–72.

Assessing the association between the methylenetetrahydrofolate reductase (*MTHFR*) 677C>T polymorphism and blood folate concentrations: a systematic review and meta-analysis of trials and observational studies^{1–5}

Becky L Tsang, Owen J Devine, Amy M Cordero, Claire M Marchetta, Joseph Mulinare, Patricia Mersereau, Jing Guo, Yan Ping Qi, Robert J Berry, Jorge Rosenthal, Krista S Crider, and Heather C Hamner

ABSTRACT

Background: The methylenetetrahydrofolate reductase (*MTHFR*) 677C>T polymorphism is a risk factor for neural tube defects. The T allele produces an enzyme with reduced folate-processing capacity, which has been associated with lower blood folate concentrations.

Objective: We assessed the association between *MTHFR* C677T genotypes and blood folate concentrations among healthy women aged 12–49 y.

Design: We conducted a systematic review of the literature published from January 1992 to March 2014 to identify trials and

Metanálise avaliou que a presença desse polimorfismo pode reduzir a concentração de folato no sangue sendo fator de risco para DTN (defeito tubo neural). Indicando necessidade suplementação nesses casos. [Am.J.Clin.Nut. 2015](#)

of 11 (51.4%; 95% CrI: 17%, 77%), 12 (52.1%; 95% CrI: 17%, 77%), 13 (56.9%; 95% CrI: 17%, 77%), 14 (60.7%; 95% CrI: 17%, 77%), 15 (64.5%; 95% CrI: 17%, 77%), 16 (68.3%; 95% CrI: 17%, 77%), 17 (72.1%; 95% CrI: 17%, 77%), 18 (75.9%; 95% CrI: 17%, 77%), 19 (79.7%; 95% CrI: 17%, 77%), 20 (83.5%; 95% CrI: 17%, 77%), 21 (87.3%; 95% CrI: 17%, 77%), 22 (91.1%; 95% CrI: 17%, 77%), 23 (94.9%; 95% CrI: 17%, 77%), 24 (98.7%; 95% CrI: 17%, 77%), 25 (100%; 95% CrI: 17%, 77%), 26 (100%; 95% CrI: 17%, 77%), 27 (100%; 95% CrI: 17%, 77%), 28 (100%; 95% CrI: 17%, 77%), 29 (100%; 95% CrI: 17%, 77%), 30 (100%; 95% CrI: 17%, 77%), 31 (100%; 95% CrI: 17%, 77%), 32 (100%; 95% CrI: 17%, 77%), 33 (100%; 95% CrI: 17%, 77%), 34 (100%; 95% CrI: 17%, 77%), 35 (100%; 95% CrI: 17%, 77%), 36 (100%; 95% CrI: 17%, 77%), 37 (100%; 95% CrI: 17%, 77%), 38 (100%; 95% CrI: 17%, 77%), 39 (100%; 95% CrI: 17%, 77%), 40 (100%; 95% CrI: 17%, 77%), 41 (100%; 95% CrI: 17%, 77%), 42 (100%; 95% CrI: 17%, 77%), 43 (100%; 95% CrI: 17%, 77%), 44 (100%; 95% CrI: 17%, 77%), 45 (100%; 95% CrI: 17%, 77%), 46 (100%; 95% CrI: 17%, 77%), 47 (100%; 95% CrI: 17%, 77%), 48 (100%; 95% CrI: 17%, 77%), 49 (100%; 95% CrI: 17%, 77%), 50 (100%; 95% CrI: 17%, 77%), 51 (100%; 95% CrI: 17%, 77%), 52 (100%; 95% CrI: 17%, 77%), 53 (100%; 95% CrI: 17%, 77%), 54 (100%; 95% CrI: 17%, 77%), 55 (100%; 95% CrI: 17%, 77%), 56 (100%; 95% CrI: 17%, 77%), 57 (100%; 95% CrI: 17%, 77%), 58 (100%; 95% CrI: 17%, 77%), 59 (100%; 95% CrI: 17%, 77%), 60 (100%; 95% CrI: 17%, 77%), 61 (100%; 95% CrI: 17%, 77%), 62 (100%; 95% CrI: 17%, 77%), 63 (100%; 95% CrI: 17%, 77%), 64 (100%; 95% CrI: 17%, 77%), 65 (100%; 95% CrI: 17%, 77%), 66 (100%; 95% CrI: 17%, 77%), 67 (100%; 95% CrI: 17%, 77%), 68 (100%; 95% CrI: 17%, 77%), 69 (100%; 95% CrI: 17%, 77%), 70 (100%; 95% CrI: 17%, 77%), 71 (100%; 95% CrI: 17%, 77%), 72 (100%; 95% CrI: 17%, 77%), 73 (100%; 95% CrI: 17%, 77%), 74 (100%; 95% CrI: 17%, 77%), 75 (100%; 95% CrI: 17%, 77%), 76 (100%; 95% CrI: 17%, 77%), 77 (100%; 95% CrI: 17%, 77%), 78 (100%; 95% CrI: 17%, 77%), 79 (100%; 95% CrI: 17%, 77%), 80 (100%; 95% CrI: 17%, 77%), 81 (100%; 95% CrI: 17%, 77%), 82 (100%; 95% CrI: 17%, 77%), 83 (100%; 95% CrI: 17%, 77%), 84 (100%; 95% CrI: 17%, 77%), 85 (100%; 95% CrI: 17%, 77%), 86 (100%; 95% CrI: 17%, 77%), 87 (100%; 95% CrI: 17%, 77%), 88 (100%; 95% CrI: 17%, 77%), 89 (100%; 95% CrI: 17%, 77%), 90 (100%; 95% CrI: 17%, 77%), 91 (100%; 95% CrI: 17%, 77%), 92 (100%; 95% CrI: 17%, 77%), 93 (100%; 95% CrI: 17%, 77%), 94 (100%; 95% CrI: 17%, 77%), 95 (100%; 95% CrI: 17%, 77%), 96 (100%; 95% CrI: 17%, 77%), 97 (100%; 95% CrI: 17%, 77%), 98 (100%; 95% CrI: 17%, 77%), 99 (100%; 95% CrI: 17%, 77%), 100 (100%; 95% CrI: 17%, 77%). S/P folate concentrations measured by using protein-binding assays (PBAs) also showed this pattern but to a greater extent (e.g., CC > TT: 20%; 95% CrI: 17%, 22%). In contrast, RBC folate concentrations measured by using PBAs did not show the same pattern and are presented in the Supplemental Material only.

Conclusions: Meta-analysis results (limited to the MA, the recommended population assessment method) indicated a consistent percentage difference in S/P and RBC folate concentrations across *MTHFR* C677T genotypes. Lower blood folate concentrations associated with this polymorphism could have implications for a population-level risk of neural tube defects. *Am J Clin Nutr* 2015;101:1286–94.

Effects of Vitamin and Mineral Supplementation on Stress, Mild Psychiatric Symptoms, and Mood in Nonclinical Samples: A Meta-Analysis

SARA-JAYNE LONG, BSc AND DAVID BENTON, DSc

Objective: Biochemical processes in the brain affect mood. Minor dietary inadequacies, which are responsible for a small decline in an enzyme's efficiency, could cumulatively influence mood states. When diet does not provide an optimal intake of micronutrients, supplementation is expected to benefit mood. This meta-analysis evaluated the influence of diet supplementation on mood in non-clinical samples. **Methods:** Databases were evaluated and studies were included if they considered aspects of stress, mild psychiatric

Suplementação vitaminas e minerais melhorou o estresse, sintomas psiquiátricos moderados e humor.

CI = 0.48–0.16; $p < .001$), but not depression (SMD = 0.20; 95% CI = 0.42–0.030; $p < .089$). Fatigue (SMD = 0.27; 95% CI = 0.40–0.146; $p < .001$) and confusion (SMD = 0.225; 95% CI = 0.38–0.07; $p < .003$) were also reduced. **Conclusions:** Micronutrient supplementation has a beneficial effect on perceived stress, mild psychiatric symptoms, and aspects of everyday mood in apparently healthy individuals. Supplements containing high doses of B vitamins may be more effective in improving mood states. Questions about optimal levels of micronutrient intake, optimal doses, and active ingredients arise. **Key words:** anxiety, depression, minerals, mood, stress, vitamins.

Psychosomatic Medicine 75:144–153 (2013)

Suplementação em IDOSOS



Symposium 8: Drugs and nutrition Important drug–nutrient interactions

Pamela Mason

The Rectory, Gwernesney, Usk, Monmouthshire NP15 1HF, UK

O uso de medicamentos, principalmente de forma crônica, pode interagir com os nutrientes, ↓ efeito do medicamento, bem como ↓ biodisponibilidade do nutriente. Em geral, pacientes com câncer são aqueles que mais utilizam suplementos de minerais e vitaminas. Profissionais de saúde devem ficar atentos.

Drugs: Nutrients: Supplements: Interactions: Cytochrome P450 enzymes

Proceedings of the Nutrition Society (2010), 69, 551–557

Review

The anorexia of ageing: Physiopathology, prevalence, associated comorbidity and mortality. A systematic review[☆]

Vincenzo Malafarina^{a,*}, Francisco Uriz-Otano^a, Lucía Gil-Guerrero^b, Raquel Iniesta^c

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Nutritional intervention

ABSTRACT

The physiological processes of ageing and factors prevalent in the elderly such as comorbidities and polypharmacy often cause loss of appetite in the elderly, which we call anorexia of ageing. Social factors, together with changes in the sensory organs, can be important causes of a reduction in both appetite and ingestion. This review assesses the regulation of appetite in the elderly and the development of anorexia of ageing. It also examines the prevalence of this type of anorexia, its associated comorbidities and mortality rates. We have reviewed 27 studies, with a total of 6208 patients. These reported changes in the secretion and response of both central and peripheral hormones that regulate appetite. Anorexia, very prevalent among hospitalized and institutionalized elderly people, is associated with comorbidity and represents a predictive factor for mortality. No treatment for it has been proved to be effective. The mechanism regulating ingestion in elderly people is complex and difficult to resolve. Comorbidity as a cause or a consequence of anorexia of ageing has become a research field of great interest in geriatrics. A

Fatores fisiológicos do envelhecimento associados a polifarmácia podem ser responsáveis pela anorexia (diminuição do apetite) do idoso. Fator de risco para desnutrição. Portanto, existe necessidade de cuidados nutricionais e eventual suplementação.

Micronutrients supplementation and nutritional status in cognitively impaired elderly persons: a two-month open label pilot study

Christine AF von Arnim^{1*}, Stephanie Dismar², Cornelia S Ott-Renzer², Nathalie Noeth¹, Albert C Ludolph¹ and Hans K Biesalski²

Abstract

Background: Malnutrition is a widespread problem in elderly people and is associated with cognitive decline. However, interventional studies have produced ambiguous results. For this reason, we wanted to determine the

Suplementação para idosos necessita ser avaliada com cuidado, com ajustes para grupos específicos. Dependendo do estado nutricional anterior, as doses necessitam ser ajustadas, assim como o tempo adequado para verificação do efeito

health status. Our data underline the necessity of determining micronutrient status and support the use of additional assessments for general health and quality of life in nutritional supplementation trials.

Keywords: B vitamins, Intracellular antioxidative status, Mini nutritional assessment, Micronutrient supplement

von Arnim *et al. Nutrition Journal* 2013, **12**:148
<http://www.nutritionj.com/content/12/1/148>

Micronutrient (Zn, Cu, Fe)–gene interactions in ageing and inflammatory age-related diseases: Implications for treatments

Eugenio Mocchegiani*, Laura Costarelli, Robertina Giacconi, Francesco Piacenza, Andrea Basso, Marco Malavolta

Translational Research Center in Nutrition and Ageing, Scientific and Technologic Area, Italian National Research Centres on Ageing (INRCA), Ancona, Italy

A B S T R A C T

In ageing, alterations in inflammatory/immune response and antioxidant capacity lead to increased susceptibility to diseases and loss of mobility and agility. Various essential micronutrients in the diet are

Suplementação de Fe, Zn e Cu para idosos deve ser recomendada com cautela, considerando a dificuldade de estabelecer deficiência ou excesso. Necessidade de biomarcadores mais sensíveis.

zinc polymorphisms or inflammatory proteins or proteins related to the delivery of the micronutrients to various organs and tissues. In this last context, we report the protein-metal speciation analysis in order to have, coupled with micronutrient–gene interactions, a more complete picture of the individual need in micronutrient supplementation or chelation to achieve healthy ageing and longevity.

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Suplementação vs DCNT



Multivitamin use and cardiovascular disease in a prospective study of women¹⁻³

Susanne Rautiainen, I-Min Lee, Pamela M Rist, J Michael Gaziano, JoAnn E Manson, Julie E Buring, and Howard D Sesso

ABSTRACT

Background: Although multivitamins are widely used, there are limited prospective studies investigating their association with both long- and short-term risk of cardiovascular disease (CVD).

Objective: The objective was to investigate how multivitamin use is associated with the long- and short-term risk of CVD.

Design: A prospective cohort study was conducted of 37,193 women from the Women's Health Study aged ≥ 45 y and free of CVD and cancer at baseline who were followed for an average of 16.2 y. At baseline, women self-reported a wide range of lifestyle, clinical, and dietary factors. Women were categorized into 1) no current use and 2) current use of multivitamins. Duration and updated measures over the course of the follow-up to address short-term effects

Estudo 37193 mulheres > 45 anos, que faziam ou não uso de suplementos e risco DCV. Período de 16 anos. Conclusão: Sem diferença significativa. Am J Clin Nutr 2015

baseline multivitamin use and major CVD events among women aged ≥ 70 y (P -interaction = 0.04) and those consuming < 3 servings/d of fruit and vegetables (P -interaction = 0.01). When updating information on multivitamin use during the course of follow-up, no associations were observed for major CVD events (HR: 0.91; 95% CI: 0.82, 1.02), MI (HR: 0.89; 95% CI: 0.74, 1.06), stroke (HR: 0.91; 95% CI: 0.78, 1.06), and CVD death (HR: 0.91; 95% CI: 0.71, 1.16).

Conclusions: In this study of middle-aged and elderly women, neither baseline nor time-varying multivitamin use was associated with the long-term risk of major CVD events, MI, stroke, cardiac revascularizations, or CVD death. Additional studies are needed to clarify the role of multivitamins on CVD. *Am J Clin Nutr*

2015;101:144-52

Selenium Supplementation and Prostate Cancer Mortality

Stacey A. Kenfield, Erin L. Van Blarigan, Natalie DuPre, Meir J. Stampfer, Edward L. Giovannucci*, June M. Chan*

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*Authors contributed equally to this work.

Correspondence to: Stacey A. Kenfield, ScD, Helen Diller Family Cancer Research Building, MC 3110, 1450 3rd Street, University of California, San Francisco, San Francisco, CA 94158-9001 (e-mail: KenfieldS@urology.ucsf.edu).

Autores chamam a atenção para a suplementação de Se (> 140 µg/d) após diagnóstico de câncer de próstata, pode ↑ risco de mortalidade

during a median follow-up of 7.8 years. Crude rates per 1000 person-years for prostate cancer death were 5.6 among selenium nonusers and 10.5 among men who consumed 140 or more µg/day. Crude rates per 1000 person-years were 28.2 vs 23.5 for all-cause mortality and 28.4 vs 29.3 for biochemical recurrence, for nonuse vs highest-dose categories, respectively. In multivariable analyses, men who consumed 1 to 24 µg/day, 25 to 139 µg/day, and 140 or more µg/day of supplemental selenium had a 1.18 (95% confidence interval [CI] = 0.73 to 1.91), 1.33 (95% CI = 0.77 to 2.30), and 2.60-fold (95% CI = 1.44 to 4.70) greater risk of prostate cancer mortality compared with nonusers, respectively, $P_{\text{trend}} = .001$. There was no statistically significant association between selenium supplement use and biochemical recurrence, cardiovascular disease mortality, or overall mortality.

Conclusion: Selenium supplementation of 140 or more µg/day after diagnosis of nonmetastatic prostate cancer may increase risk of prostate cancer mortality. Caution is warranted regarding usage of such supplements among men with prostate cancer.

JNCI J Natl Cancer Inst (2015) 107(1): dju360

Calcium and phosphorus intake and prostate cancer risk: a 24-y follow-up study^{1–3}

Kathryn M Wilson, Irene M Shui, Lorelei A Mucci, and Edward Giovannucci

ABSTRACT

Background: High calcium intake has been associated with an increased risk of advanced-stage and high-grade prostate cancer. Several studies have found a positive association between phosphorus intake and prostate cancer risk.

Objectives: We investigated the joint association between calcium

Estudo de 24 anos de seguimento, observou que > ingestão Ca (2000 mg/dia), poderia ter efeito na piora do câncer de próstata, com período de latência de 12 a 16 anos após exposição e diagnóstico. Para P de 0-8 anos. Autores concluem que excesso de P promoveria > risco. [Am J Clin Nutr, 2015.](#)

phorus had independent effects for different time periods between exposure and diagnosis. Calcium intake was associated with an increased risk of advanced-stage and high-grade disease 12–16 y after exposure, whereas high phosphorus was associated with increased risk of advanced-stage and high-grade disease 0–8 y after exposure.

Conclusions: Phosphorus is independently associated with risk of lethal and high-grade prostate cancer. Calcium may not have a strong independent effect on prostate cancer risk except with long latency periods. *Am J Clin Nutr* 2015;101:173–83.

Association between intakes of magnesium, potassium, and calcium and risk of stroke: 2 cohorts of US women and updated meta-analyses¹⁻⁴

Sally N Adebamowo, Donna Spiegelman, Walter C Willett, and Kathryn M Rexrode

ABSTRACT

Background: Prospective data on the relation of magnesium, potassium, and calcium intakes with stroke risk are inconsistent, and to our knowledge, the effect of a combined mineral diet score has not been examined.

Objective: We examined associations between intakes of magnesium, potassium, and calcium and risk of incident stroke in 86,149 women in the Nurses' Health Study (NHS) I and 94,715 women in

**Associação inversa entre > consumo Mg, K e Ca e DCV
(> 100 mg/dia Mg; 300 mg/dia Ca e 1000 mg/dia K).
Valores de consumo semelhantes à dieta mediterrânea.**

women in the highest compared with the lowest quintiles of a combined mineral diet score were 0.72 (95% CI: 0.65, 0.81) for total stroke, 0.78 (95% CI: 0.66, 0.92) for ischemic stroke, and 0.80 (95% CI: 0.61, 1.04) for hemorrhagic stroke. In the updated meta-analyses of all prospective studies to date, the combined RR of total stroke was 0.87 (95% CI: 0.83, 0.92) for a 100-mg/d increase in magnesium intake, 0.91 (95% CI: 0.88, 0.94) for a 1000-mg/d increase in potassium intake, and 0.98 (95% CI: 0.94, 1.02) for a 300-mg/d increase in calcium intake.

Conclusions: A combined mineral diet score was inversely associated with risk of stroke. High intakes of magnesium and potassium but not calcium were also significantly associated with reduced risk of stroke in women. *Am J Clin Nutr* 2015;101:1269-77.

Am J Clin Nutr 2015;101:1269-77.

Improving neuropathy scores in type 2 diabetic patients using micronutrients supplementation[☆]

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ABSTRACT

Aim: The aim of the present study was to determine if micronutrients supplementation can improve neuropathy indices in type 2 diabetes.

Materials and methods: In this randomized, double-blind, placebo-controlled clinical trial, 75 patients with type 2 diabetes were randomly assigned to one of the following groups: Group 1: micronutrients (chromium (250 µg), selenium (250 µg), zinc (10 µg), vitamin B12 (10 µg) and folic acid (1 mg)), Group 2: placebo.

Results: 67 patients completed the study. Neuropathic symptoms based on the MNSI questionnaire improved from 3.45 to 0.64 ($p = 0.001$) in group MVB, from 3.96 to 1.0 ($p = 0.001$) in group MV and from 2.54 to 1.95 in placebo group after 4 months. There was no significant difference between three treatment groups in MNSI examinations after 4 months supplementations. Over 4 months of treatment, patients showed no significant changes in glycemic control, capillary blood flow or electrophysiological measures in MV and MVB groups compared with placebo group.

Conclusions: These studies suggest that micronutrients supplementation might ameliorate diabetic neuropathy symptoms.

Suplementação com micronutrientes mostrou melhorar a neuropatia diabética

Vitamin supplementation on the risk of venous thrombosis: results from the MEGA case-control study¹⁻⁴

Biljana A Vučković, Nienke van Rein, Suzanne C Cannegieter, Frits R Rosendaal, and Willem M Lijfering

ABSTRACT

Background: Whether vitamin supplements decrease venous thrombosis risk is controversial. Previous reports did not all take confounding fully into account, either by randomization or by extensive adjustment.

Objective: The aim of our study was to determine whether vitamin

Nesse estudo, a suplementação com vitaminas ↓ em 37% os eventos pesquisados, entretanto quando os indivíduos foram comparados com seus pares e feitos os ajustes estatísticos, os autores chegaram à conclusão que não houve diferenças. [Am J Clin Nutr. 2015](#)

0.77). The fully adjusted ORs for vitamin A, vitamin B-6, vitamin B-12, folic acid, vitamin C, vitamin D, vitamin E, and multivitamin use were in the same range. However, when patients were compared with partner controls, ORs attenuated to unity. Results were similar for provoked and unprovoked events, as well as for deep vein thrombosis and pulmonary embolism.

Conclusions: After extensive adjustments, vitamin supplementation was no longer associated with a decreased risk of venous thrombosis in this study. Previous positive results may have been spurious as a result of uncontrolled confounding. *Am J Clin Nutr* 2015;101:606–12.

Resultados de Estudos

Lab. Nutrição e Minerais – FCF – USP



Universidade de São Paulo



Minerais em Dietas Brasileiras

Minerais	Ca (mg)	Na (g)	Mg (mg)	Fe (mg)	Zn (mg)	Cu (mg)	Se (µg)	Referência
Dietas								
Nordeste	440	nd	nd	16,7	8,1	nd	nd	Pedrosa & Cozzolino
Manaus – AM	438	3,5	252	11,2	8,7	1,13	98	Yuyama & Cozzolino
Santa Catarina I	287	2,0	158	6,4	5,2	0,69	55,3	Tramonte & Cozzolino
Santa Catarina II	508	3,6	122	11,6	9,8	1,21	114,5	Tramonte & Cozzolino
Cuiabá - MT	356	nd	192	12,5	9,9	1,12	60,0	Boaventura & Cozzolino
São Paulo – idosos	377	1,2	nd	5,2	3,5	0,32	30,0	Cordeiro & Cozzolino
São Paulo – adultos	636	3,7	nd	19,0	11,6	nd	53,0	Mafrá & Cozzolino
São Paulo I AG	525	nd	313	15,8	10,4	1,46	36,0	Favaro & Cozzolino
DRI	1000	0,5	320-420	8-18	8-11	0,9	55	NRC

ZINCO

Histórico

- Essencialidade do Zn para o ser humano somente foi demonstrada em 1961, por Ananda Prasad.



Sinais da Deficiência Grave de Zn

- ✓ Retardo do crescimento
- ✓ Atraso na maturação sexual e óssea
- ✓ Lesões da pele
- ✓ Diarréia
- ✓ Alopecia
- ✓ Inapetência
- ✓ Aumento da susceptibilidade a infecções
- ✓ Mudanças de comportamento

Valores de Ponto de Corte para Deficiência de Zn $\mu\text{g/dL}$

Em jejum e horario do dia	Crianças	Mulheres > 10 anos	Homens > 10 anos
Em jejum de manhã	-	70	74
Sem jejum de manhã	65	66	70
Tarde	57	59	61

WHO, UNICEF, IAEA, iZincG (De Benoist 2007, Hotz, 2003, iZincG 2004,



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HUMAN
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Journal of Human Nutrition and Dietetics

RESEARCH PAPER

Zinc absorption in Brazilian subjects fed a healthy meal

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Keywords

bioavailability, Brazil, isotope labeling, single meal, zinc.

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Ribeiro M.A., Cominetti C., Kakazu M.H., Sarkis J.E.S., Dainty J., Fox T.E. & Cozzolino S.M.F. (2013) Zinc absorption in Brazilian subjects fed a healthy meal. *J Hum Nutr Diet*.
doi:10.1111/jhn.12119

Abstract

Background: The high amounts of phytic acid present in diets from developing countries are considered as important inhibitors of zinc (Zn) absorption. The present study aimed to assess the fractional absorption of Zn from a meal containing common Brazilian foods using the stable isotope technique.

Methods: Twelve men, aged 19–42 years, were fed a healthy experimental diet comprising lettuce, tomato, French fries, steak with onions, rice, beans, papaya, orange, pineapple, and passion fruit juice. Each subject received one intravenous dose of enriched ^{70}Zn , and the lunch was extrinsically labelled with enriched ^{67}Zn . Urinary ^{67}Zn and ^{70}Zn enrichments were assessed by inductively coupled plasma mass spectrometry.

Results: The labelled meal phytate : Zn molar ratio was very divergent with respect to chemically determined and calculated data. Subjects presented a normal Zn nutritional status before and after the study. The mean Zn absorption from the labelled meal was 30% (range 11–47%).

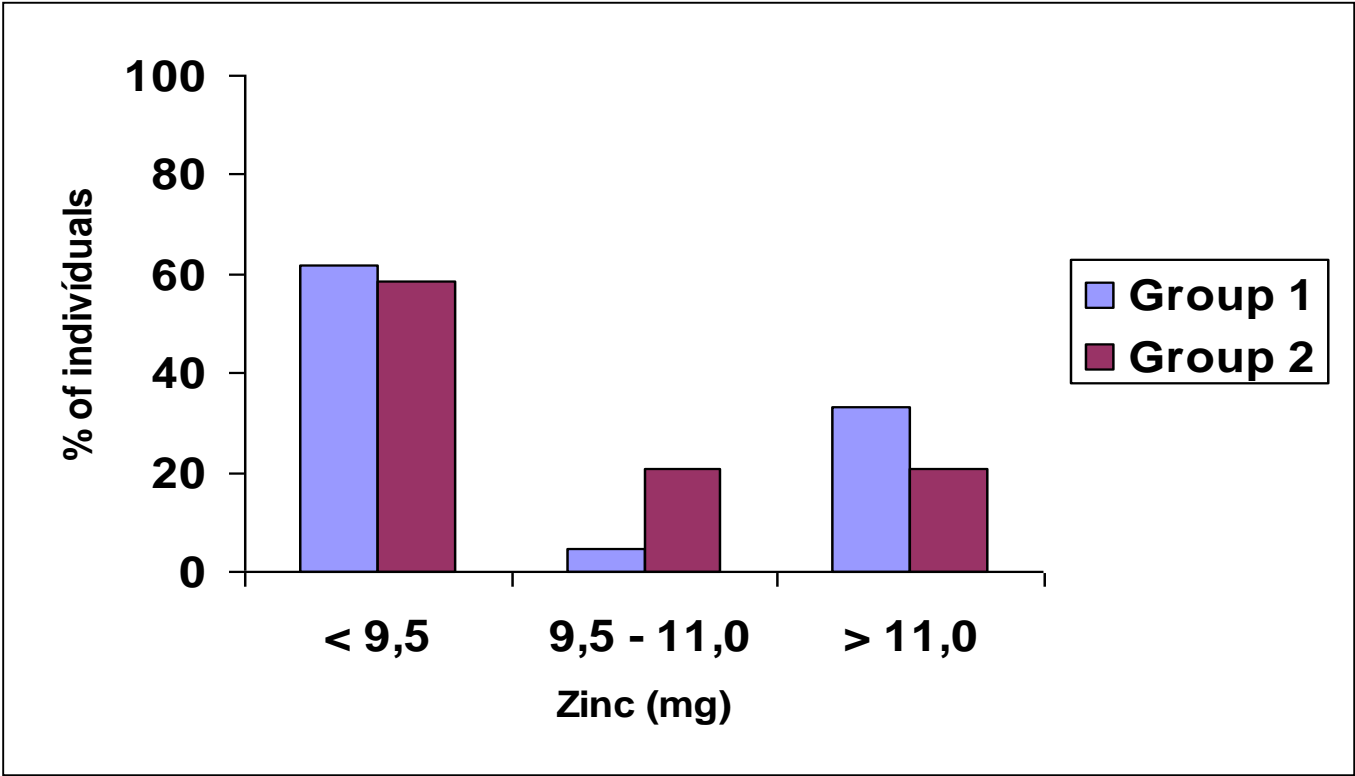
Conclusions: According to the World Health Organization parameters, the results denote a moderate/high Zn bioavailability in the evaluated meal, with a variability in the absorption percentage that is similar to other studies. The data show that a typical Brazilian meal, with an adequate energy amount and a balanced macronutrient distribution, presents a Zn bioavailability in accordance with the worldwide recommended standard.

Biodisponibilidade de Zn na refeição brasileira típica é de moderada a alta

Ingestão Zn gestantes- (1º. e 2º. Trimestre) -Dissertação

Mestrado

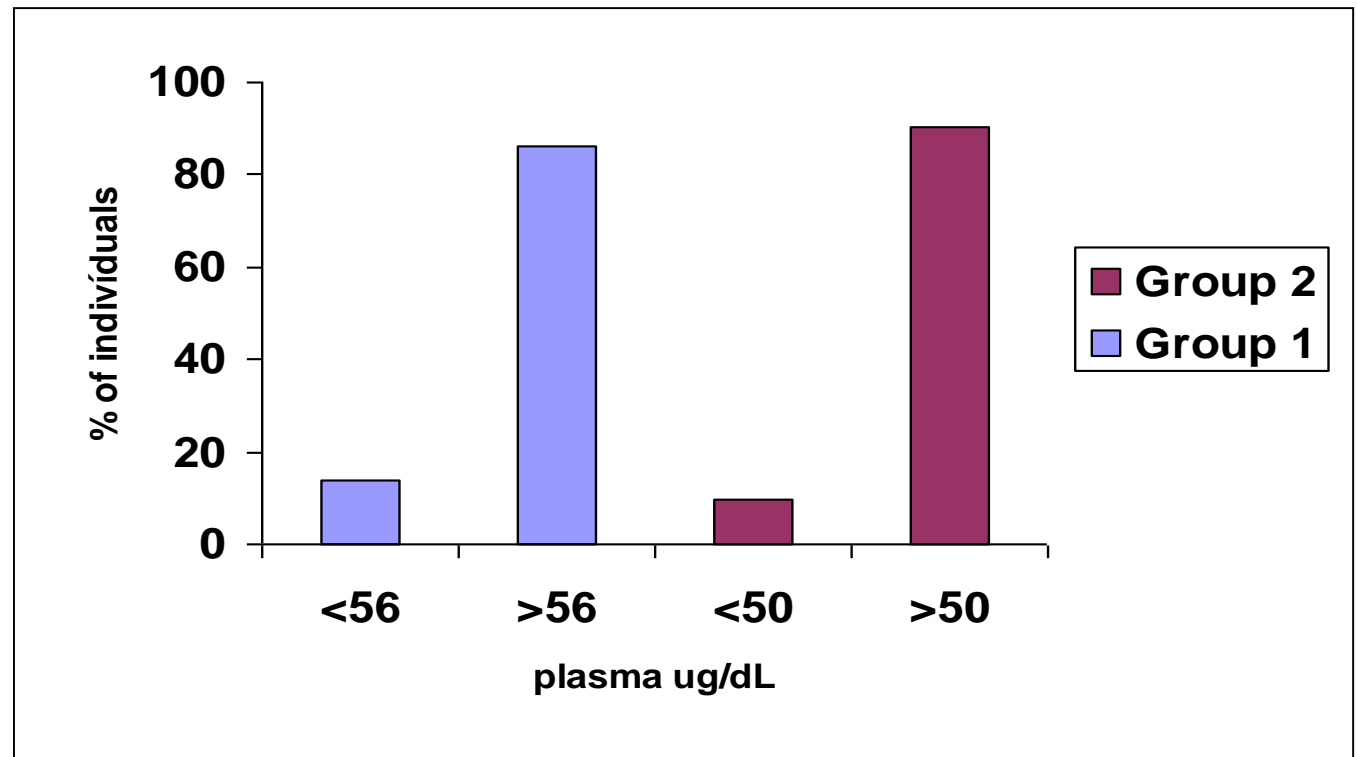
Chioccola, G e Cozzolino, SMF



Zinc intake (mg/dia)

Estudo 2: Gestantes- Distribuição de acordo com Zn plasma (1º. e 2º.Trimestre)

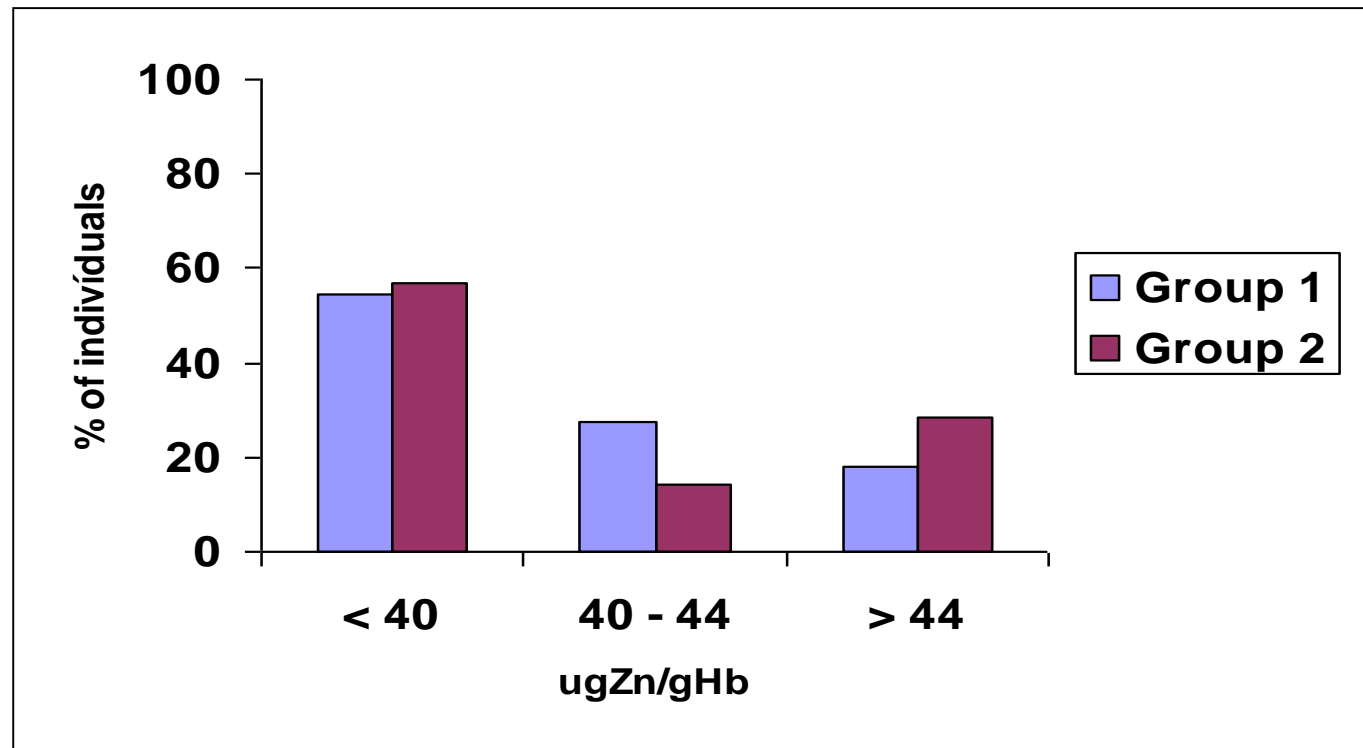
Chioccola, G e Cozzolino, SMF



Percentual distribution for plasma Zn ($\mu\text{g/dL}$)

Estudo 2: Gestantes - Distribuição em relação aos valores de referência para Zn Eritrócito (1º. e 2º. Trimestres)

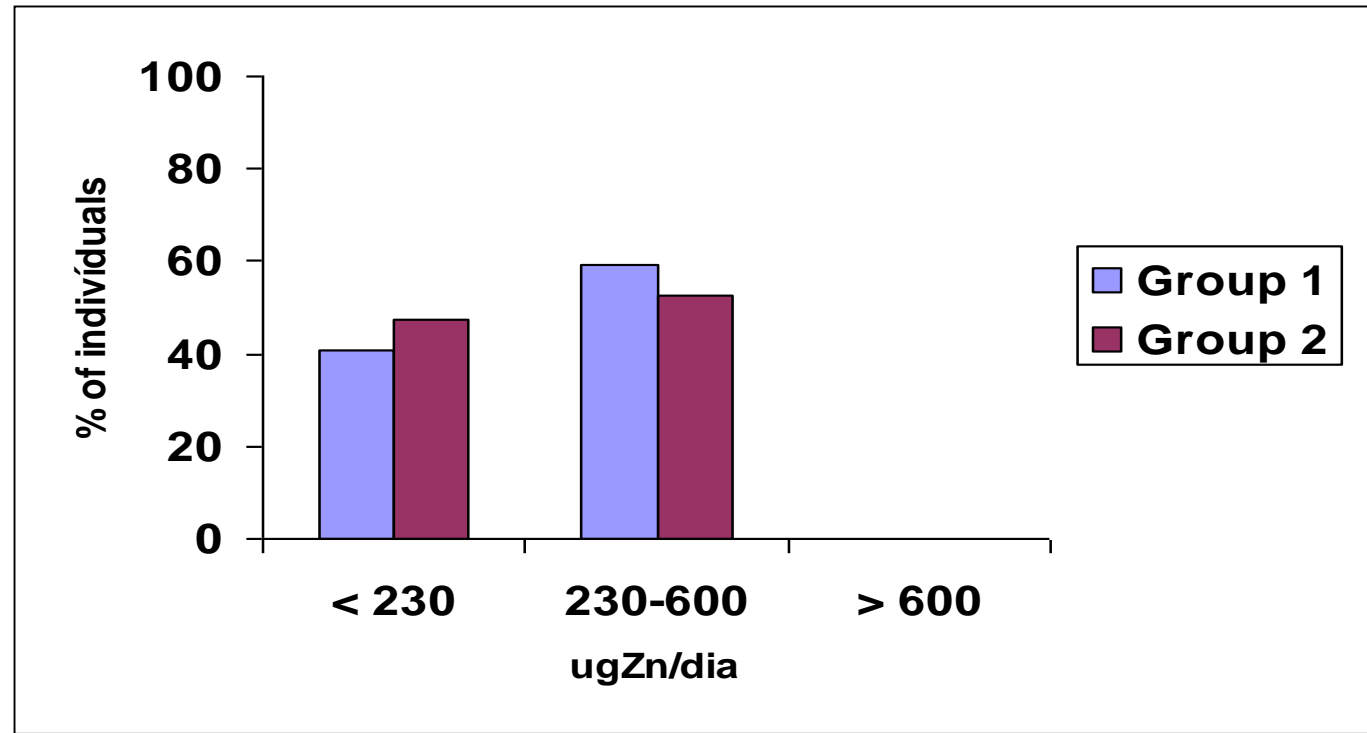
Chioccola, G e Cozzolino, SMF



Percentual distribution for erythrocyte zinc ($\mu\text{gZn/gHb}$)

Estudo 2: Gestantes- Distribuição em relação aos valores de referência para excreção urinária de Zn (1º. E 2º. Trimestre)

Chioccola, G & Cozzolino, SMF

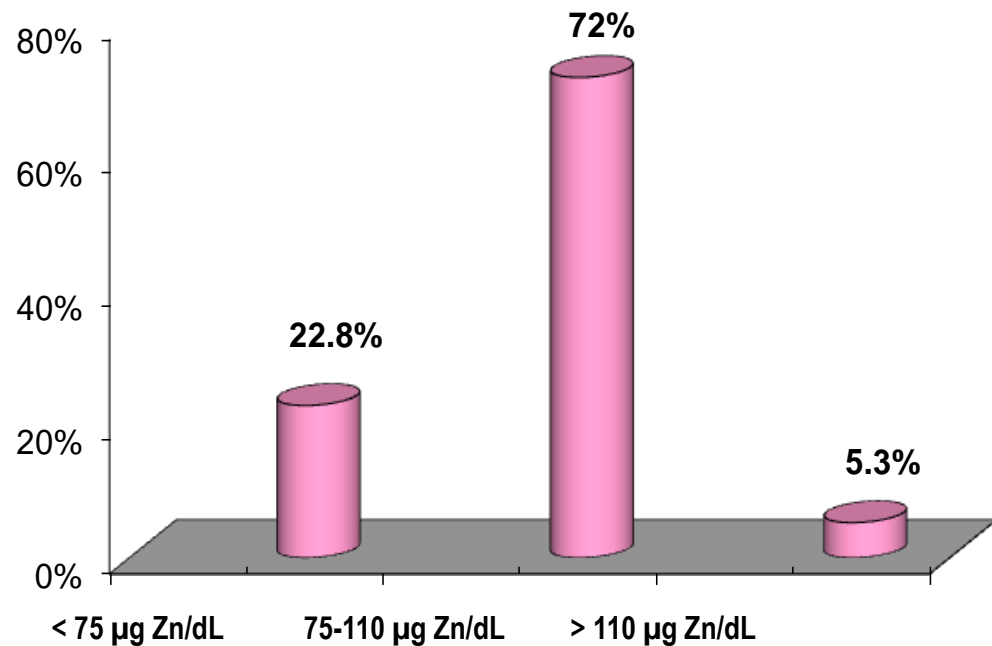


Percentual distribution for urinary zinc ($\mu\text{gZn}/24\text{h}$)

Estudantes Universitários - dissertação de Mestrado

Rondán Flores, LM e Cozzolino, SMF

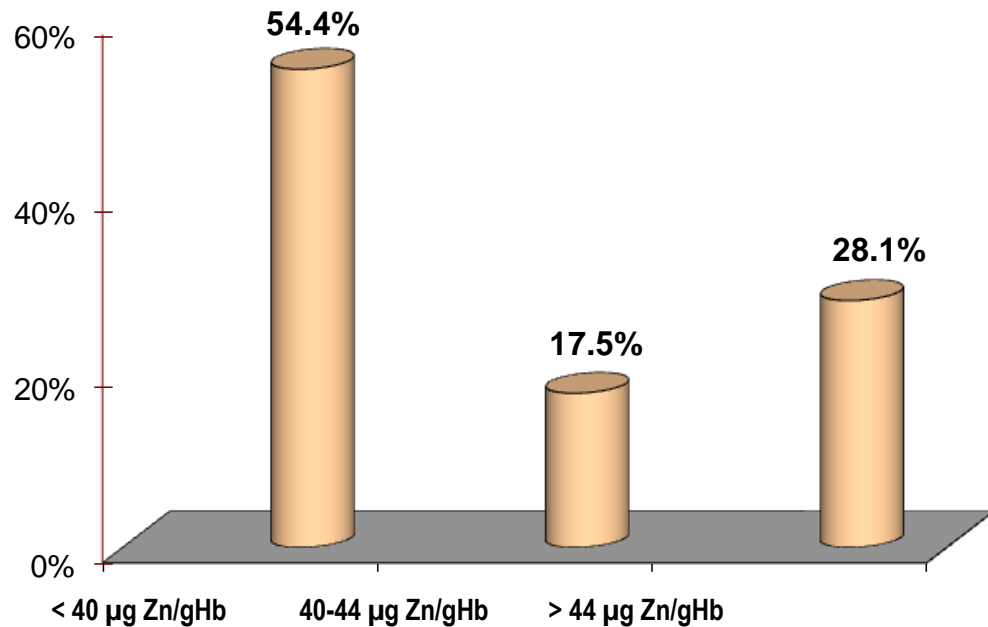
Plasma Zn



Estudantes Universitários

Rondán Flores, LM e Cozzolino, SMF

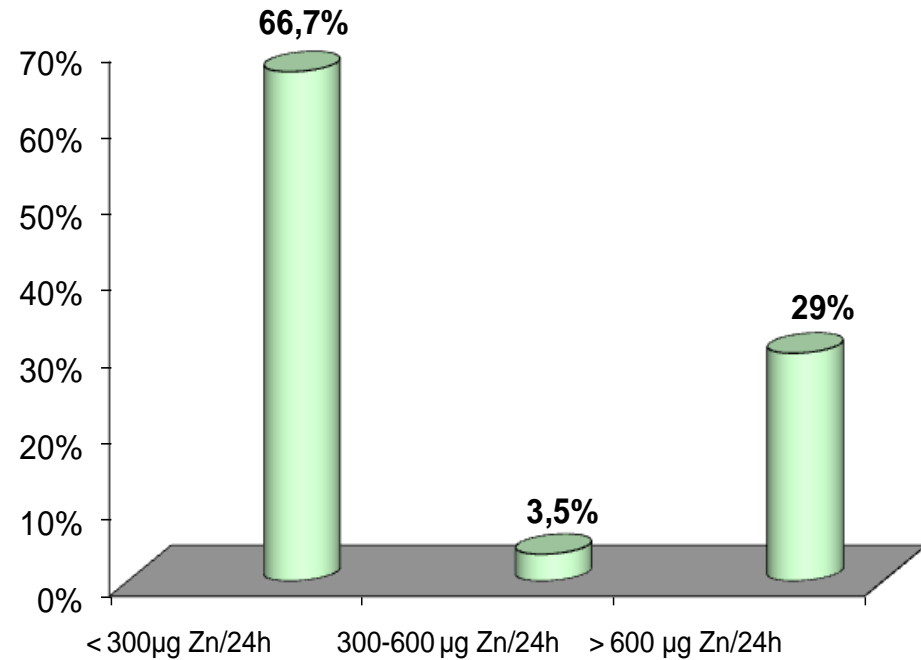
Erythrocyte Zn



Estudo3: Estudantes Universitários

Rondán Flores, LM e Cozzolino, SMF

Urinary Zn



Article

Biological Trace Element Research

August 2013, Volume 154, Issue 2, pp 168-177

Dietary Intervention Causes Redistribution of Zinc in Obese Adolescents

Simone Cardoso Freire; Fisberg,M. ; Cozzolino,S.M.F.

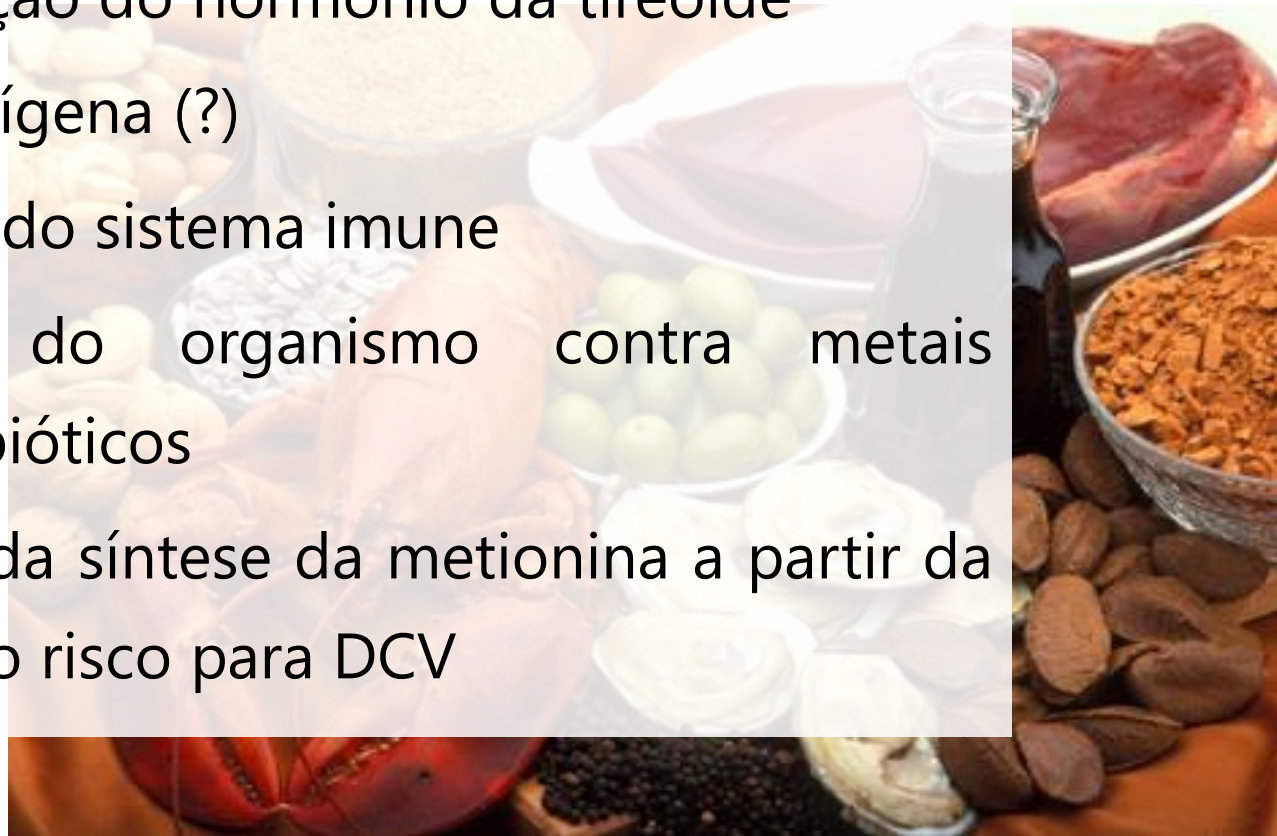
A intervenção nutricional promovendo perda de peso, melhorou a distribuição do zinco nesses indivíduos, o mesmo já observado em trabalho anterior (Cominetti e colab.)

Selênio

Selênio

Funções biológicas conhecidas:

- ✓ Defesa contra estresse oxidativo
- ✓ Regulação da ação do hormônio da tireóide
- ✓ Ação anticancerígena (?)
- ✓ Potencialização do sistema imune
- ✓ Destoxificação do organismo contra metais pesados e xenobióticos
- ✓ Favorecimento da síntese da metionina a partir da homocisteína ↓ o risco para DCV



Selênio - Deficiência

Doença de Keshan: cardiomiopatia endêmica

Sinais:

- ★ Degeneração dos músculos;
- ★ Fibrose no miocárdio;
- ★ Cardiomegalia;
- ★ Isquemia do miocárdio;
- ★ Eletrocardiograma anormal;
- ★ Edema pulmonar;
- ★ 5% dos doentes tem hipertrofia do fígado.

Ocorre com ingestão < 11 ug/ dia

(FOX e FAIRWEATHER-T, 1999; ESTADOS UNIDOS, 2000).

Selênio - Excesso

Toxicidade - 850 ug/ dia

(ESTADOS UNIDOS – NCR, 2001).

Dentre os sinais de toxicidade de selênio:

- náuseas,
- odor de alho na respiração
- perda de cabelo
- unhas quebradiças com pontos brancos
- lesões na pele
- fadiga
- irritabilidade, entre outros`.

(SILVA, 2002; WHO, 1993)

Recomendações de Ingestão de Se

Idade	EAR (μg)	RDA(μg)	UL (μg)
0-6 meses	15 (AI)		45
7-12 meses	20 (AI)		60
1-3 anos	17	20	90
4-8 anos	23	30	150
9-13 anos	35	40	280
14-18 anos	45	55	400
19-50 anos	45	55	400
51-70 ou >	45	55	400

Selenium in *Phaseolus vulgaris* - Brazil

Martens, A; Gonzaga, I; & Cozzolino, SMF, 2002

- Ceará 1.179 $\mu\text{g/g}$
- Pará 0.139 $\mu\text{g/g}$
- Amazonas 1 0.099 $\mu\text{g/g}$
- Pernambuco 0.094 $\mu\text{g/g}$
- Alagoas 0.061 $\mu\text{g/g}$
- Amazonas 2 0.043 $\mu\text{g/g}$
- Minas Gerais1 0.042 $\mu\text{g/g}$

- Minas Gerais 2 0.041 $\mu\text{g/g}$
- Pernambuco 2 0.027 $\mu\text{g/g}$
- São Paulo 1 0.027 $\mu\text{g/g}$
- Mato Grosso Sul 0.020 $\mu\text{g/g}$
- Goiás 0.018 $\mu\text{g/g}$
- São Paulo 2 0.018 $\mu\text{g/g}$
- São Paulo 3 0.016 $\mu\text{g/g}$



Composição Centesimal de Nozes Brasileiras

Nutrientes				
Umidade %	0,44	0,72	1,8	9,8
Proteína %	16,0	16,1	15,4	15,5
Lípides %	69,5	71,3	70,7	58,4
Carboidratos %	10,8	8,3	9,2	6,7
Cinzas %	3,3	3,1	3,2	2,7
Fibra %	-	-	-	5,7
Selênio µg/g	115,5	74,3	58,1	22,7
Energia kcal	732,5	743,6	733,5	622,0

Composição Química- Fração Lipídica

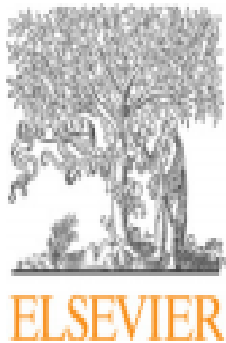


Frações	g/100g de castanha
Lípides Totais	69,8 \pm 0,93
SFA	16,4 \pm 0,24
MUFA	22,6 \pm 0,32
PUFAS	27,7 \pm 0,36

Composição Química (2)



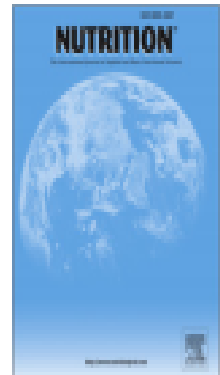
FRAÇÕES	mg/g de castanha desengordurada
FPA (Free Phenolic Acids)	6,95
SPA (Soluble Phenolic Acids)	4,11
IPA (Insoluble Phenolic Acids)	1,76



Contents lists available at ScienceDirect

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Applied nutritional investigation

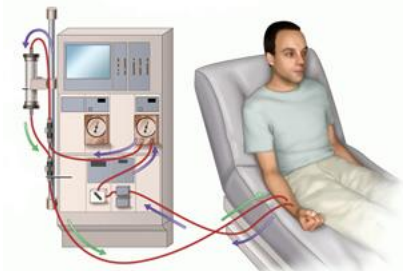
Effect of Brazil nut supplementation on the blood levels of selenium and glutathione peroxidase in hemodialysis patients

M.B. Stockler-Pinto M.S.^{a,*}, D. Mafra Ph.D.^b, N.E. Farage R.D.^c, G.T. Boaventura Ph.D.^b, S.M.F. Cozzolino Ph.D.^a

^a University of São Paulo, Faculty of Pharmaceutical Sciences, São Paulo, Brazil

^b Clinical Nutrition Department, Faculty of Nutrition, Federal Fluminense University, Niterói, Brazil

^c Renalcor Clinic, NutriRim, Rio de Janeiro, Brazil



Selênio



81 pacientes em hemodiálise

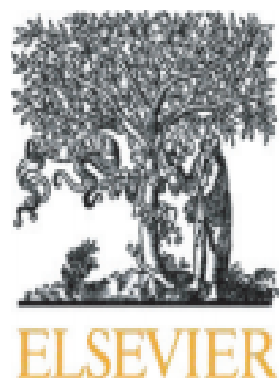
Suplementação: 1 castanha/dia (5 g – 58,1 µg Se/g) por três meses

Biomarcador	Pré-Suplementação	Pós- Suplementação
Se plasmático (µg/L)	18,8 ± 17,4	104,0 ± 65,0
Se eritrocitário (µg/L)	72,4 ± 37,9	244,1 ± 119,5
Atividade da GPx (U/gHb)	46,6 ± 14,9	55,9 ± 23,6

**Melhora da capacidade antioxidante dos
pacientes em hemodiálise**



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Brazilian nut consumption improves selenium status and glutathione peroxidase activity and reduces atherogenic risk in obese women

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37 mulheres obesas grau III

Suplementação: 1 castanha/dia ($58,1 \pm 3,0 \mu\text{g/g}$) – 8 semanas

Variável	Pré-Suplementação	Pós- Suplementação
Se plasmático ($\mu\text{g/L}$)	55.7 ± 13.3	132.5 ± 34.9
Se eritrocitário ($\mu\text{g/L}$)	60.5 ± 22.6	205.9 ± 42.0
Atividade da GPx ($\mu\text{g/g}$ Hb level)	36.6 ± 17.1	53.6 ± 20.4



37 mulheres obesas grau III

Suplementação: 1 castanha/dia ($58,1 \pm 3,0 \mu\text{g/g}$) – 8 semanas

Variável	Pré-Suplementação	Pós- Suplementação
Colesterol total (mg/dL)	171.0 ± 27.8	175.5 ± 26.6
HDL-c (mg/dL)	37.6 ± 13.6	44.5 ± 13.4
LDL-c (mg/dL)	114.0 ± 29.6	110.0 ± 22.8
Triglicérides (mg/dL)	110.3 ± 87.9	108.6 ± 41.5
Índice de Castelli I	5.0 ± 1.8	4.2 ± 1.1
Índice de Castelli II	3.4 ± 1.7	2.7 ± 1.0



Selênio

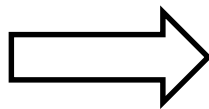
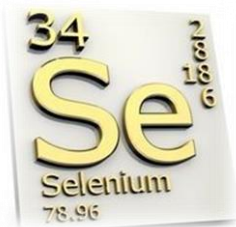
Interação Gene - Nutriente



Genômica nutricional = associações importantes entre a presença de polimorfismos com o consumo de nutrientes.



Melhor compreensão de como a nutrição pode influenciar nas vias de homeostase metabólica e diminuir risco de doenças.



Polimorfismos na região codificadora dos genes de selenoproteínas podem alterar a incorporação de Se e influenciar sua capacidade antioxidante.

Selênio

Nutrition 27 (2011) 891–896



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Applied nutritional investigation

Associations between glutathione peroxidase-1 Pro198Leu polymorphism, selenium status, and DNA damage levels in obese women after consumption of Brazil nuts

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Características do Estudo

37 mulheres obesas mórbidas suplementadas com 1 nóz de castanha do Brasil que forneceu cerca de 290 mg de Se por dia, durante 8 semanas.

Selênio

Genótipos – GPx1 códon 198	n (%)
Pro/Pro	18 (48.7%)
Pro/Leu	14 (37.8%)
Leu/Leu	5 (13.5%)



Table 3

Plasma and erythrocyte Se concentrations, erythrocyte GPx activity, and comet length before and after 8 wk of consumption of Brazil nuts^{*}

	Baseline			After supplementation		
	Pro/Pro (n = 18)	Pro/Leu (n = 14)	Leu/Leu (n = 5)	Pro/Pro (n = 18)	Pro/Leu (n = 14)	Leu/Leu (n = 5)
Plasma Se (µg/L)	54.0 ± 12.1	55.2 ± 14.0	62.7 ± 16.0	126.6 ± 21.3 [†]	134.4 ± 40.4 [†]	148.3 ± 45.0 [†]
Erythrocyte Se (µg/L)	60.8 ± 18.5	65.0 ± 37.6	59.7 ± 23.1	200.8 ± 33.1 [†]	207.3 ± 39.5 [†]	220.2 ± 76.0 [†]
Erythrocyte GPx (U/g Hb)	38.5 ± 18.0	33.0 ± 12.4	31.4 ± 19.6	57.4 ± 21.5 [§]	51.7 ± 19.7 [§]	45.2 ± 19.1 [§]
Comet length (µm)	80.8 ± 18.5	67.6 ± 24.3	92.1 ± 12.8	64.2 ± 16.4	68.5 ± 21.7	111.4 ± 46.3 [¶]

GPx1, glutathione peroxidase-1; Hb, hemoglobin; Se, selenium

^{*} Data are separated according to GPx1 Pro198Leu polymorphism. All values are presented as mean ± SD.

[†] Significantly different from baseline; $P < 0.001$ for Pro/Pro and Pro/Leu, $P < 0.05$ for Leu/Leu (Wilcoxon's test).

[‡] Significantly different from baseline; $P = 0.00$ for Pro/Pro and Pro/Leu, $P < 0.05$ for Leu/Leu (Student's *t* test).

[§] Significantly different from baseline; $P = 0.00$ for Pro/Pro, $P < 0.00001$ for Pro/Leu, $P < 0.001$ for Leu/Leu (Student's *t* test).

^{||} Significantly different from baseline; $P < 0.005$ (Student's *t* test).

[¶] Significantly different from Pro/Pro; $P < 0.05$ (Kruskal-Wallis test).

Selênio

Conclusão

- A deficiência de Se foi significativa nas mulheres com obesidade mórbida
- A castanha do Brasil melhorou de forma eficiente o status de Se e a atividade da GPx independente do genótipo
- Mulheres com o alelo variante parecem ter uma resposta alterada à suplementação
- Os níveis mais elevados de danos ao DNA observados nos indivíduos Leu/ Leu após a suplementação pode não ser interessante.



Effects of Brazil nut consumption on selenium status and cognitive performance in older adults with mild cognitive impairment: a randomized controlled pilot trial

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Alexandre Leopold Busse · Regina Miksian Magaldi · Wilson Jacob-Filho ·
Silvia Maria Franciscato Cozzolino

Eur J Nutr

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Table 4 Cognitive evaluation in the treated and the control groups at baseline and after 6 months

	Treatment			Control			Between-group comparison	
	Pre (SD)	Post (SD)	Change (95 % CI)	Pre (SD)	Post (SD)	Change (95 % CI)	<i>p</i> value	Effect size ^b
CERAD total score ^a	59.2 (8.1)	60.3 (10.3)	1.1 (−4.0; 6.2)	66.71 (8.2)	63.57 (8.0)	−3.1 (−5.9; −0.3)	0.138	0.76
Verbal fluency ^a	12.8 (3.3)	14.1 (3.9)	1.3 (0.6; 2.6)	16.29 (3.7)	14.14 (3.9)	−2.1 (−4.3; 0.2)	0.007	1.33
Boston naming test ^a	11.7 (2.3)	11.9 (1.2)	0.2 (−1.5; 1.5)	11.2 (2.5)	11.9 (1.7)	0.7 (−0.3; 1.7)	0.511	−0.33
Constructional praxis ^a	7.7 (2.3)	9.2 (2.2)	1.5 (0.0; 3.1)	8.7 (2.6)	8.3 (2.4)	−0.4 (−1.6; 0.7)	0.031	1.01
Word list learning test ^a	15.3 (3.5)	14.2 (4.4)	−1.1 (−4.6; 2.4)	15.4 (3.2)	14.9 (3.8)	−0.6 (−3.8; 2.6)	0.792	−0.13
Word list recall ^a	3.7 (2.2)	3.6 (2.1)	−0.1 (−1.2; 1.0)	5.4 (1.6)	5.1 (1.3)	−0.3 (−1.7; 1.1)	0.818	0.12

SD standard deviation, *95 % CI* 95 % confidence interval, *CERAD* Consortium to Establish a Registry for Alzheimer's Disease

^a *t* test

^b Cohen's *d*

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Table 5 Correlation analyses between changes in the CERAD total score and changes in selenium status, GPx activity, ORAC, and MDA

	Correlations (<i>r</i>)					
	CERAD total score	Selenium erythrocyte ^a	Selenium plasma ^a	GPx activity ^b	ORAC ^a	MDA ^a
CERAD total score ^a		0.55*	0.51*	0.29	0.10	0.50
Selenium erythrocyte ^a	0.55*		0.97**	0.51*	0.07	0.21
Selenium plasma ^a	0.51*	0.97**		0.44	0.83	0.28
GPx activity	0.29	0.51*	0.44		0.16	0.43
ORAC ^a	0.10	0.07	−0.05	0.16		−0.37
MDA ^a	0.50	0.21	0.28	0.43	−0.37	

CERAD Consortium to Establish a Registry for Alzheimer's Disease, *GPx* glutathione peroxidase, *ORAC* oxygen radical absorbance capacity, *MDA* malondialdehyde

* $p < 0.05$, ** $p < 0.001$

^a Pearson's correlation coefficient

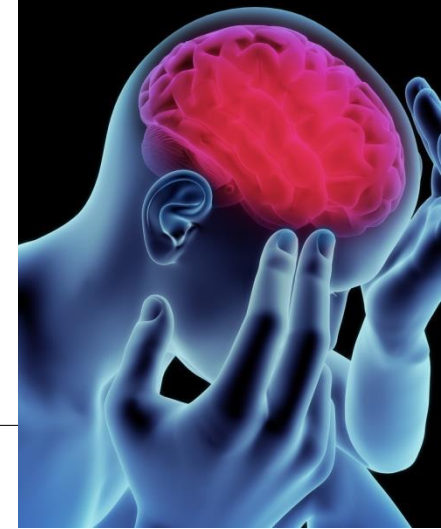
^b Spearman's correlation

Selenium status in elderly: Relation to cognitive decline

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ARTICLE INFO

Keywords:

Cognitive decline
Alzheimer's disease
Mild cognitive impairment
Oxidative stress
Selenium

ABSTRACT

Studies show that decreased antioxidant system is related to cognitive decline. Thus we aimed to measure selenium (Se) status in Alzheimer's disease (AD) and mild cognitive impairment (MCI) elderly and compared them with a control group (CG). 27 AD, 17 MCI and 28 control elderly were evaluated. Se concentration was determined in plasma and erythrocyte by using hydride generation atomic absorption spectroscopy. Erythrocyte Se concentration in AD group was lower than CG ($43.73 \pm 23.02 \mu\text{g/L}$ and $79.15 \pm 46.37 \mu\text{g/L}$; $p=0.001$), but not statistically different from MCI group ($63.97 \pm 18.26 \mu\text{g/L}$; $p=0.156$). AD group exhibited the lowest plasma Se level ($34.49 \pm 19.94 \mu\text{g/L}$) when compared to MCI ($61.36 \pm 16.08 \mu\text{g/L}$; $p=0.000$) and to CG ($50.99 \pm 21.06 \mu\text{g/L}$; $p=0.010$). It is observed that erythrocyte Se decreases as cognition function does. Since erythrocyte reflects longer-term nutritional status, the data point to the importance of the relation between Se exposure and cognitive function. Our findings suggest that the deficiency of Se may contribute to cognitive decline among aging people.

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Table 1

Intake of energy, macronutrients and Se by participants according to group.

	Groups		
	Control (mean \pm SD)	MCI (mean \pm SD)	AD (mean \pm SD)
Energy (kcal/d)	1781.43 \pm 441.71	1474.42 \pm 490.28	1466.02 \pm 422.43
Protein (%)	18.29 \pm 3.98	20.67 \pm 6.43 ^a	14.88 \pm 2.82 ^b
Carbohydrates (%)	54.49 \pm 7.69	55.07 \pm 12.95	61.72 \pm 6.30 ^b
Lipids (%)	27.22 \pm 7.79	26.83 \pm 7.62	23.41 \pm 5.23 ^b
Se (mcg/d)	48.91 \pm 15.5	34.43 \pm 9.87 ^{a,b}	40.99 \pm 11.23 ^b

^a Different from AD group ($p < 0.005$).^b Different from control group.

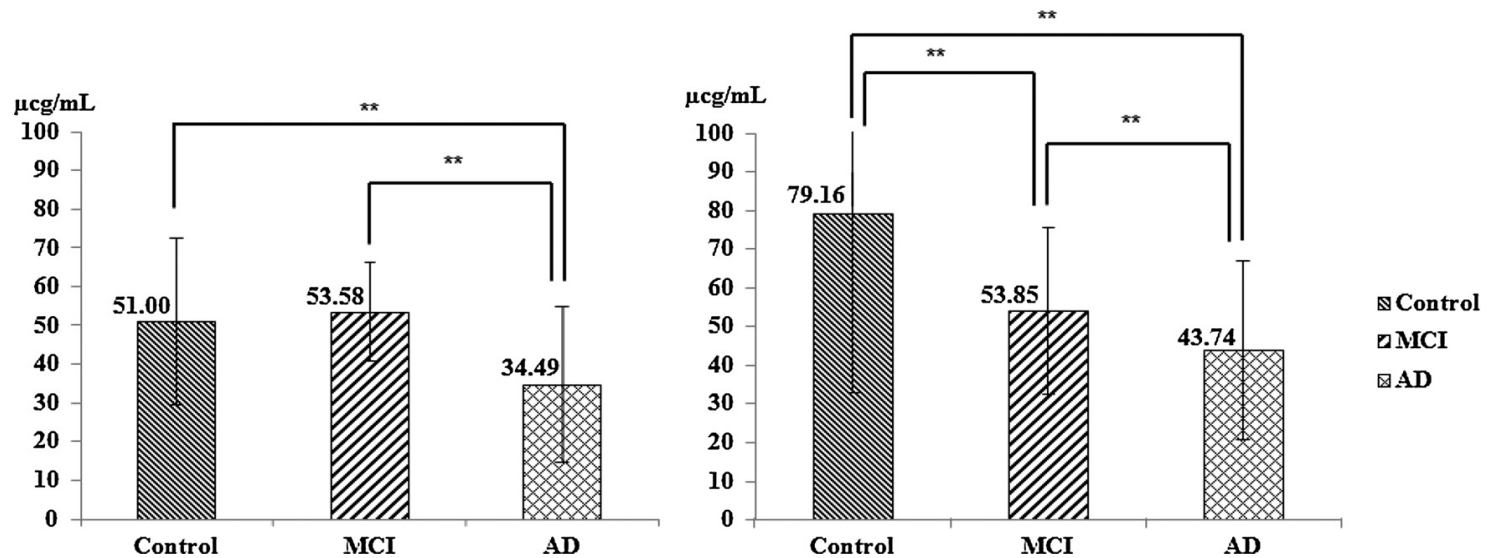


Fig. 1. Se levels in control, MCI and AD groups. (A) Plasma; (B) erythrocyte. ** $p < 0.001$.

Fontes de Variabilidade e de Incertezas

Variabilidade

- Interindividual

Diferenças de:

- Adaptação
- Funcionalidade
- Polimorfismos
- *Programming*
- Idade
- Sexo
- Maturação fisiológica

Incertezas

- Fatores desconhecidos ou imprecisos
- Dieta
- Exposição
- Dose
- Biodisponibilidade
- Medidas avaliadas (metodologia utilizada)
- Extrapolações



Conclusões

- ❑ As pesquisas devem continuar avaliando os mecanismos de ação de cada micronutriente em particular
- ❑ Necessidade de biomarcadores mais sensíveis para identificação de deficiência e excessos
- ❑ Necessidade de tabelas de composição de alimentos regionais, periodicamente revisadas
- ❑ Necessidade de estudos sobre compostos bioativos presentes nos alimentos ou suplementos, avaliando principalmente doses para obtenção de efeito na redução risco de doenças