



Unterschätzte Spurenelemente?

Gehaltsdaten für Chrom, Mangan, Molybdän und Selen in Lebensmitteln der BfR-MEAL-Studie

Mandy Stadion, Sophia Bergelt, Tanja Berg, Anna-Lena Klook, Oliver Lindtner, Irmela Sarvan

Literatur

1. EFSA Panel on Dietetic Products, Nutrition, Allergies: Scientific opinion on dietary reference values for chromium. *EFSA Journal* 2014; 12: 3845.
2. Deutsche Gesellschaft für Ernährung e. v. (DGE): Referenzwerte Kupfer, Mangan, Chrom, Molybdän. Bonn. www.dge.de/wissenschaft/referenzwerte/kupfer-mangan-chrom-molybdaen/ (last accessed on 22 July 2024).
3. Domke HVA, Großklaus R, Niemann B, et al.: Verwendung von Mineralstoffen in Lebensmitteln. Teil II. BfR Wissenschaft.
4. EFSA Panel on Dietetic Products, Nutrition, Allergies: Scientific opinion on dietary reference values for selenium. *EFSA Journal* 2014; 12: 3846.
5. Deutsche Gesellschaft für Ernährung e. V. (DGE): Referenzwerte Selen. Bonn. www.dge.de/wissenschaft/referenzwerte/selen/ (last accessed on 22 July 2024).
6. Sarvan I, Bürgelt M, Lindtner O, Greiner M: Expositionsschätzung von Stoffen in Lebensmitteln. *Bundesgesundheitsbl* 2017; 60: 689–96.
7. EFSA/FAO/WHO, European Food Safety Authority, Food Agriculture Organization of the United Nations, World Health Organization: Towards a harmonised Total Diet Study approach: a guidance document. *EFSA Journal* 2011; 9: 2450.
8. Heuer T, Krems C, Moon K, Brombach C, Hoffmann I: Food consumption of adults in Germany: results of the German National Nutrition Survey II based on diet history interviews. *Br J Nutr* 2015; 113: 1603–14.
9. Banasiak U, Heseker H, Sieke C, Sommerfeld C, Vohmann C: Abschätzung der Aufnahme von Pflanzenschutzmittel-Rückständen in der Nahrung mit neuen Verzehrmengen für Kinder. *Bundesgesundheitsblatt-Gesundheitsforschung-Gesundheitsschutz* 2005; 1: 84–98.
10. Hackethal C, Kirsch F, Schwerbel K, et al.: Filling data gaps to refine exposure assessment by consideration of specific consumer behavior. *Deutsche Lebensmittel-Rundschau* 2023; 119.
11. Stadion M, Hackethal C, Blume K, et al.: The first German total diet study (BfR MEAL Study) confirms highest levels of dioxins and dioxin-like polychlorinated biphenyls in foods of animal origin. *Food Chemistry: X* 2022; 16: 100459.
12. Schendel S, Berg T, Scherfling M, et al.: Results of the BfR MEAL study: Highest levels of retinol found in animal livers and of β-carotene in yellow-orange and green leafy vegetables. *Food Chemistry: X* 2022; 16: 100458.
13. Schwerbel K, Tüngerthal M, Nagl B, et al.: Results of the BfR MEAL Study: The food type has a stronger impact on calcium, potassium and phosphorus levels than factors such as seasonality, regionality and type of production. *Food Chemistry: X* 2022; 13: 100221.
14. Fechner C, Hackethal C, Höpfner T, et al.: Results of the BfR MEAL Study: In Germany, mercury is mostly contained in fish and seafood while cadmium, lead, and nickel are present in a broad spectrum of foods. *Food Chemistry: X* 2022; 14: 100326.
15. Bundesinstitut für Risikobewertung (BfR): Public Use File. Berlin. www.bfr-meal-studie.de/de/public-use-file.html (last accessed on 22 July 2024).
16. Kolbaum AE, Sarvan I, Bakhya N, et al.: Long-term dietary exposure to copper in the population in Germany – results from the BfR MEAL study. *Food Chem Toxicol* 2023; 176: 113759.
17. Sarvan I, Kolbaum AE, Pabel U, Bührke T, Greiner M, Lindtner O: Exposure assessment of methylmercury in samples of the BfR MEAL Study. *Food Chem Toxicol* 2021; 149: 112005.
18. Hackethal C, Pabel U, Jung C, Schwerdtle T, Lindtner O: Chronic dietary exposure to total arsenic, inorganic arsenic and water-soluble organic arsenic species based on results of the first German total diet study. *Sci Total Environ* 2023; 859: 160261.
19. Noël L, Chekri R, Millour S, et al.: Li, Cr, Mn, Co, Ni, Cu, Zn, Se and Mo levels in foodstuffs from the Second French TDS. *Food Chemistry* 2012; 132: 1502–13.
20. Anke M, Glei M, Groppel B, Rother C, Gonzales D: Mengen-, Spuren- und Ultraspurelemente in der Nahrungskette. *Nova Acta Leopoldina NF* 1998; 79: 157–90.
21. Bundesinstitut für Risikobewertung (BfR): Nährstoffe und Co: Chrom. Berlin. www.mikroco-wissen.de/de/chrom-310963.html (last accessed on 22 July 2024).
22. EFSA Panel on Nutrition, Novel Foods and Food Allergens (NDA): Scientific opinion on the tolerable upper intake level for manganese. *EFSA Journal* 2023; 21: e8413.
23. Sachse B, Kolbaum AE, Ziegenhagen R, et al.: Dietary manganese exposure in the adult population in Germany – What does it mean in relation to health risks? *Mol Nutr Food Res* 2019; 63: 1900065.
24. Bundesinstitut für Risikobewertung (BfR): Nährstoffe und Co: Mangan. Berlin. www.mikroco-wissen.de/de/mangan-310857.html (last accessed on 22 July 2024).
25. EFSA Panel on Dietetic Products, Nutrition, Allergies: Scientific opinion on dietary reference values for molybdenum. *EFSA Journal* 2013; 11: 3333.
26. Holzinger S, Anke M, Röhrlig B, Gonzalez D: Molybdenum intake of adults in Germany and Mexico. *Analyst* 1998; 123: 447–50.
27. Scientific Committee on Food (SCF): Opinion of the Scientific Committee on Food on the tolerable upper intake level of molybdenum. 2000, p. 15pp.
28. Bundesinstitut für Risikobewertung (BfR): Nährstoffe und Co: Molybdän. Berlin. www.mikroco-wissen.de/de/molybdaen-310964.html (last accessed on 22 July 2024).
29. Wang J, Chatzidimitriou E, Wood L, et al.: Effect of wheat species (*Triticum aestivum* vs *T. spelta*), farming system (organic vs conventional) and flour type (whole-grain vs white) on composition of wheat flour – Results of



a retail survey in the UK and Germany – 2. Antioxidant activity, and phenolic and mineral content. *Food chemistry*: X 2020; 6: 100091.

30. Vrček IV, Čepo DV, Rašić D, et al.: A comparison of the nutritional value and food safety of organically and conventionally produced wheat flours. *Food chemistry* 2014; 143: 522-9.
31. Anke M, Drobner C, Röhrig B, Schäfer U, Müller R: The selenium content of the flora and plant and animal food-stuffs in Germany. *Ernährungsforschung* 2002; 47: 67-79.
32. Bundesinstitut für Risikobewertung (BfR): Nährstoffe und Co: Selen. Berlin. www.mikroco-wissen.de/de/selen-310961.html (last accessed on 22 July 2024).
33. EFSA Panel on Nutrition, Novel Foods and Food Allergens: Scientific opinion on the tolerable upper intake level for selenium. *EFSA Journal* 2023; 21: e07704.
34. Kolbaum AE, Jaeger A, Ptak S, Sarvan I, Greiner M, Lindtner O: Collection of occurrence data in foods – the value of the BfR MEAL study in addition to the national monitoring for dietary exposure assessment. *Food Chemistry*: X 2022; 13: 100240.