This study investigates dietary fortification of heifer feeds with cholecalciferol and ergocalciferol sources and effects on beef total vitamin D activity, vitamer, respective 25-hydroxymetabolite contents, and meat quality. Thirty heifers were allocated to one of three dietary treatments [(1) basal diet + 4000 IU of vitamin D3 (Vit D3); (2) basal diet + 4000 IU of vitamin D2 (Vit D2); and (3) basal diet + 4000 IU of vitamin D2-enriched mushrooms (Mushroom D2)] for a 30 day pre-slaughter period. Supplementation of heifer diets with Vit D3 yielded higher (p < 0.001) Longissimus thoracis (LT) total vitamin D activity (by 38–56%; p < 0.05) and serum 25-OH-D concentration (by 20–36%; p < 0.05), compared to that from Vit D2 and Mushroom D2 supplemented animals. Irrespective of vitamin D source, carcass characteristics, sensory and meat quality parameter were unaffected (p > 0.05) by the dietary treatments. In conclusion, vitamin D3 biofortification of cattle diets is the most efficacious way to enhance total beef vitamin D activity.
Stability of vitamin D₃ and vitamin D₂ in oil, fish and mushrooms after household cooking

Information on the retention of vitamin D in food following household cooking is scarce. So far the retention of its metabolites vitamin D₃, vitamin D₂, and 25-hydroxyvitamin D₃ has shown that the type of food and the cooking method are the essential determinants, and there is no significant difference between the metabolites. We investigated the retention of vitamin D₃ and vitamin D₂ in sunflower oil, vitamin D₃ in rainbow trout, and vitamin D₂ in button mushrooms. The investigated cooking methods were boiling at different pH, steam cooking, microwave cooking, pan-frying, and oven baking. There was no difference between the retention of vitamin D₃ and vitamin D₂ added to sunflower oil, which ranged from 70 to 99%. In rainbow trout, the retention of vitamin D₃ at 85–114% was not significantly different from 100%, except for pan-frying at 85%. However, the retention of vitamin D₂ in mushrooms at 62–88% was significantly different from 100% (p ≤ 0.05).
Effect of low energy diet for eight weeks to adults with overweight or obesity on folate, retinol, vitamin B₁₂, D and E status and the degree of inflammation: a post hoc analysis of a randomized intervention trial

Background: Obesity is associated with vitamin insufficiency and low grade inflammation. The purpose of this study was to investigate the effect of weight loss on folate, retinol, vitamin B₁₂, D and E status and the degree of inflammation.

Methods: Out of 110, 85 individuals (75% women) aged 39 ± 11 years with a mean ± SD BMI of 33 ± 4 kg/m², completed an eight-week low energy diet (LED). Serum concentration of folate, retinol, vitamin B₁₂, D and E and C-reactive protein and homocysteine (Hcy) were measured at baseline and at end of the LED. Results: At baseline, 8% of the participants were deficient in folate, 13% in vitamin B₁₂, 2% in retinol, 28% in vitamin D (72% were insufficient in vitamin D), and none were deficient in vitamin E. At baseline, BMI was inversely associated with retinol (P < 0.05) as was total and abdominal fat percentage with folate (P < 0.05); further BMI and measures of adiposity were positively associated with CRP (P < 0.01) and Hcy (P < 0.05). Homocysteine was inversely associated with all vitamins but retinol (P < 0.001). After the LED, the participants lost a mean [95% confidence intervals] of 12.3 [- 13.1,-11.6] kg. The serum concentration of folate, vitamin B₁₂ and D were increased (P < 0.001) after the LED whereas the concentration of retinol and vitamin E were reduced (P < 0.001). Conclusion: Eight-weeks LED resulted in 13% weight loss and an increase in the serum concentrations of folate, vitamin B₁₂ and D. Baseline adiposity was inversely associated with folate and retinol, and positively associated with markers of inflammation. Trial registration: Ethical Committee of Copenhagen as no. H-4-2013-135, NCT01561131.
The use of synthetic and natural vitamin D sources in pig diets to improve meat quality and vitamin D content

This study investigated the effects of synthetic and natural sources of vitamin D biofortification in pig diets on pork vitamin D activity and pork quality. One hundred and twenty pigs (60 male, 60 female) were assigned to one of four dietary treatments for a 55d feeding period. The dietary treatments were (1) 50μg vitamin D₃/kg of feed; (2) 50μg of 25-hydroxvitamin D₃/kg of feed; (3) 50μg vitamin D₂/kg of feed; (4) 50μg vitamin D₂-enriched mushrooms/kg of feed (Mushroom D₂). The pigs offered the 25-OH-D₃ diet exhibited the highest (P<0.001) serum total 25-hydroxyvitamin D concentration and subsequently exhibited the highest (P<0.05) Longissimus thoracis (LT) total vitamin D activity. Mushroom D2 and 25-OH-D3 supplementation increased pork antioxidant status. The vitamin D₂-enriched mushrooms improved (P<0.05) pig performance, carcass weight and LT colour. In conclusion, 25-OH-D₃ is the most successful source for increasing pork vitamin D activity, while Mushroom D2 may be a new avenue to improve animal performance and pork quality.

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Web of Science (2016): Indexed yes
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Web of Science (2015): Indexed yes
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Scopus rating (2014): SJR 1.488 SNIP 1.878 CiteScore 2.94
Web of Science (2014): Indexed yes
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Scopus rating (2013): SJR 1.506 SNIP 1.848 CiteScore 2.9
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Vitamin D vitamers affect vitamin D status differently in young healthy males

Dietary intake of vitamin D includes vitamin D3 (vitD3), 25-hydroxyvitamin D3 (25OH-D3), and vitamin D2 (vitD2). However, the bioactivity of the different species has not been scientifically established. The hypothesis in this study was that vitD3, 25OH-D3, and vitD2 have an equal effect on 25-hydroxyvitamin D in serum (vitamin D status). To test our hypothesis, we performed a randomized, crossover study. Twelve young males consumed 10 µg/day vitD3 during a four-week run-in period, followed by 3 × 6 weeks of 10 µg/day vitD3, 10 µg/day 25OH-D3, and 10 µg/day vitD2. The content of vitD3, vitD2, 25OH-D3, and 25-hydroxyvitamin D2 (25OH-D2) in serum was quantified by liquid chromatography-tandem mass spectrometry (LC-MS/MS). The hypothesis that the three sources of vitamin D affect vitamin D status equally was rejected. Based on the assumption that 1 µg vitD3/day will show an increase in vitamin D status of 1.96 nmol/L, the results showed that 23 µg vitD2 and 6.8 µg 25OH-D3 was similar to 10 µg vitD3. These results demonstrate that further investigations are necessary to determine how to quantify the total vitamin D activity based on chemical quantification of the individual vitamin D metabolites to replace the total vitamin D activity assessed in biological rat models.

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Organisations: National Food Institute, Research Group for Bioactives – Analysis and Application, Department of Applied Mathematics and Computer Science, Division of Risk Assessment and Nutrition, Research Group for Risk-Benefit, University of Copenhagen
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Number of pages: 12
Physiological limit of the daily endogenous cholecalciferol synthesis from UV light in cattle
The link between UV light (sunlight) and endogenous cholecalciferol (vitamin D3) synthesis in the skin of humans has been known for more than a 100 years, since doctors for the first time successfully used UV light to cure rickets in children. Years later, it was shown that UV light also had a significant effect on the cholecalciferol status in the body of cattle. The cholecalciferol status in the body is measured as the plasma concentration of 25-hydroxycholecalciferol, which in cattle and humans is the major circulating metabolite of cholecalciferol. Very little is, however, known about the quantitative efficiency of UV light as a source of cholecalciferol in cattle nutrition and physiology. Hence, the aim of this study was to determine the efficiency of using UV light for increasing the plasma 25-hydroxycholecalciferol concentration in cholecalciferol-deprived cattle. Twelve cows deprived of cholecalciferol for 6 months were divided into three treatment groups and exposed to UV light for 30, 90 or 120 min/day during 28 days. UV-light wavelengths ranged from 280 to 415 nm and 30-min exposure to the UV light was equivalent to 60-min average summer-sunlight exposure at 56 °N. Blood samples were collected every 3–4 days and analysed for 25-hydroxycholecalciferol and cholecalciferol. Results showed that increasing the exposure time from 90–120 min/day did not change the slope of the daily increase in plasma 25-hydroxycholecalciferol. Hence, it appears that cholecalciferol-deprived dairy cattle are able to increase their plasma 25-hydroxycholecalciferol concentration by a maximum of 1 ng/ml/day from UV-light exposure.
Vitamin D and 25-hydroxyvitamin D (25(OH)D) are stored in adipose tissue, but the clinical relevance is uncertain. To evaluate changes in serum 25(OH)D and adipose tissue vitamin D levels, after stopping vitamin D supplementation. A prospective, double-blind cohort follow-up study. Clinical Research Unit at The University Hospital of North Norway.

**Vitamin D Status and Muscle Function Among Adolescent and Young Swimmers**

Impaired muscle function has been coupled to vitamin D insufficiency in young women and in elderly men and women. Those living at Northern latitudes are at risk of vitamin D insufficiency due to low sun exposure which may be more pronounced among elite swimmers because of their indoor training schedules. We aimed to examine vitamin D status among young elite swimmers and evaluate the association between vitamin D status and muscle strength. Twenty-nine swimmers, 12 female and 17 male (16-24 years) residing at latitude 55-56°N were studied in March and April. Blood samples were analysed for serum 25-hydroxyvitamin D (s-25(OH)D) and hand-grip strength was measured as marker of muscle strength. Subjects’ vitamin D and calcium intake were assessed by food frequency questionnaire and sun exposure and training status by questionnaires. Mean (±SD) s-25(OH)D was 52.6 ± 18.3 nmol/L among all swimmers. In 45% of the swimmers s-25(OH)D was below 50 nmol/L. Female swimmers had higher s-25(OH)D concentration than male swimmers (61.7 ± 17.5 nmol/L vs. 46.2 ± 16.5 nmol/L, p = 0.026). Among male swimmers, those with sufficient vitamin D status had higher hand grip strength than those with insufficient vitamin D status (50.6 ± 6.4 kg vs. 41.1 ± 7.8 kg, p = 0.02). Among Danish elite swimmers 45% had an insufficient vitamin D status during the spring; the prevalence being higher among male swimmers. Muscle strength was significantly higher in male swimmers with sufficient vitamin D status.

**General information**

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Authors: Geiker, N. R. W. (Ekstern), Larsen, R. (Ekstern), Hansen, M. (Ekstern), Jørgensen, N. R. (Ekstern), Jakobsen, J. (Intern), Hansen, B. B. (Ekstern), Kristensen, L. M. (Ekstern), Bügel, S. (Ekstern)

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Subjects were included after participation in a 3-5 year prevention of type 2 diabetes study, and were administered 20,000 IU of vitamin D or placebo / week. During the 12-month follow-up period, blood samples were drawn at the beginning and after one, three, six, nine, and 12 months. Fat biopsies were taken at the start and end. Changes in 25(OH)D level in serum, and 25(OH)D and vitamin D levels in adipose tissue. 41 out of 42 subjects who had been given vitamin D, and 33 out of 34 subjects who were given the placebo completed the study. At the inclusion mean serum 25(OH)D levels were 122 and 71 nmol/L in vitamin D and placebo groups, respectively. Serum 25(OH)D remained significantly higher in the vitamin D group compared to the placebo group throughout, and was 84.5 and 73.1 nmol/L, respectively after 12 months. In the vitamin D group, adipose tissue vitamin D levels decreased by 52% over 12 months. 25(OH)D and vitamin D stored in adipose tissue after 3-5 years with vitamin D supplementation may have a clinically relevant effect on serum 25(OH)D levels the following year.

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BFI (2016): BFI-level 1
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Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): CiteScore 4.4
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): CiteScore 4.88
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
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ISI indexed (2011): ISI indexed yes
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BFI (2009): BFI-level 2
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Web of Science (2007): Indexed yes
Web of Science (2006): Indexed yes
Web of Science (2005): Indexed yes
Analysis of vitamin K-1 in fruits and vegetables using accelerated solvent extraction and liquid chromatography tandem mass spectrometry with atmospheric pressure chemical ionization

The objective of this study was to develop a rapid, sensitive, and specific analytical method to study vitamin K-1 in fruits and vegetables. Accelerated solvent extraction and solid phase extraction was used for sample preparation. Quantification was done by liquid chromatography tandem mass spectrometry with atmospheric pressure chemical ionization in selected reaction monitoring mode with deuterium-labeled vitamin K1 as an internal standard. The precision was estimated as the pooled estimate of three replicates performed on three different days for spinach, peas, apples, banana, and beetroot. The repeatability was 5.2% and the internal reproducibility was 6.2%. Recovery was in the range 90-120%. No significant difference was observed between the results obtained by the present method and by a method using the same principle as the CEN-standard i.e. liquid-liquid extraction and post-column zinc reduction with fluorescence detection. Limit of quantification was estimated to 0.05 µg/100 g fresh weight. (C) 2015 Elsevier Ltd. All rights reserved.

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Scopus rating (2015): SJR 1.597 SNIP 1.962 CiteScore 4.31
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.595 SNIP 2.027 CiteScore 3.92
Web of Science (2014): Indexed yes
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Scopus rating (2013): SJR 1.548 SNIP 2.069 CiteScore 3.87
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.805 SNIP 2.357 CiteScore 3.98
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.909 SNIP 2.395 CiteScore 4.17
Effects of vitamin D2-fortified bread v. supplementation with vitamin D2 or D3 on serum 25-hydroxyvitamin D metabolites: an 8-week randomised-controlled trial in young adult Finnish women

There is a need for food-based solutions for preventing vitamin D deficiency. Vitamin D3 (D3) is mainly used in fortified food products, although the production of vitamin D2 (D2) is more cost-effective, and thus may hold opportunities. We investigated the bioavailability of D2 from UV-irradiated yeast present in bread in an 8-week randomised-controlled trial in healthy 20–37-year-old women (n 33) in Helsinki (60°N) during winter (February–April) 2014. Four study groups were given different study products (placebo pill and regular bread=0 µg D2 or D3/d; D2 supplement and regular bread=25 µg D2/d; D3 supplement and regular bread=25 µg D3/d; and placebo pill and D2-biofortified bread=25 µg D2/d). Serum 25-hydroxyvitamin D2 (S-25(OH)D2) and serum 25-hydroxyvitamin D3 (S-25(OH)D3) concentrations were measured at baseline, midpoint and end point. The mean baseline total serum 25-hydroxyvitamin D (S-25(OH)D=S-25(OH)D2+S-25(OH)D3) concentration was 65·1 nmol/l. In repeated-measures ANCOVA (adjusted for baseline S-25(OH)D as total/D2/D3), D2-bread did not affect total S-25(OH)D (P=0·707) or S-25(OH)D3 (P=0·490), but increased S-25(OH)D2 compared with placebo (P)

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Authors: Itkonen, S. T. (Ekstern), Skaffari, E. (Ekstern), Saaristo, P. (Ekstern), Saarnio, E. M. (Ekstern), Erkkola, M. (Ekstern), Jakobsen, J. (Intern), Cashman, K. D. (Ekstern), Lamberg-Allardt, C. (Ekstern)
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Impact on Vitamin D2, Vitamin D4 and Agaritine in Agaricus bisporus Mushrooms after Artificial and Natural Solar UV Light Exposure

Commercial mushroom production can expose mushrooms post-harvest to UV light for purposes of vitamin D2 enrichment by converting the naturally occurring provitamin D2 (ergosterol). The objectives of the present study were to artificially simulate solar UV-B doses occurring naturally in Central Europe and to investigate vitamin D2 and vitamin D4 production in sliced Agaricus bisporus (button mushrooms) and to analyse and compare the agaritine content of naturally and artificially UV-irradiated mushrooms. Agaritine was measured for safety aspects even though there is no rationale for a link between UV light exposure and agaritine content. The artificial UV-B dose of 0.53 J/cm² raised the vitamin D2 content to significantly (P < 0.001) higher levels of 67.1 ± 9.9 μg/g dry weight (DW) than sun exposure (3.9 ± 0.8 μg/g dry DW). We observed a positive correlation between vitamin D4 and vitamin D2 production (r² = 0.96, P < 0.001) after artificial UV irradiation, with vitamin D4 levels ranging from 0 to 20.9 μg/g DW. The agaritine content varied widely but remained within normal ranges in all samples. Irrespective of the irradiation source, agaritine dropped dramatically in conjunction with all UV-B doses both artificial and natural solar, probably due to its known instability. The biological action of vitamin D from UV-exposed mushrooms reflects the activity of these two major vitamin D analogues (D2, D4). Vitamin D4 should be analysed and agaritine disregarded in future studies of UV-exposed mushrooms.

Assessment of total vitamin D intake from foods and dietary supplements (DSs) may be incomplete if 25-hydroxyvitamin D [25(OH)D] intake is not included. However, 25(OH)D data for such intake assessments are lacking, no food or DS reference materials (RMs) are available, and comparison of laboratory performance has been needed. The primary goal of this study was to evaluate whether vitamin D3 and 25(OH)D3 concentrations in food and DS materials could be measured with acceptable reproducibility. Five experienced laboratories from the United States and other countries participated, all using liquid chromatography tandem-mass spectrometry but no common analytical protocol; however, various methods were used for determining vitamin D3 in the DS. Five animal-based materials (including three commercially available RMs) and one DS were analyzed. Reproducibility results for the materials were acceptable. Thus, it is possible to obtain consistent results among experienced laboratories for vitamin D3 and 25(OH)D3 in foods and a DS.

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Web of Science (2015): Indexed yes
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Scopus rating (2014): SJR 1.278 SNIP 1.421 CiteScore 3.25
Web of Science (2014): Indexed yes
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Scopus rating (2013): SJR 1.423 SNIP 1.479 CiteScore 3.44
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Scopus rating (2012): SJR 1.43 SNIP 1.471 CiteScore 3.2
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
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Scopus rating (2011): SJR 1.384 SNIP 1.446 CiteScore 3.1
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.408 SNIP 1.392
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.317 SNIP 1.303
Web of Science (2009): Indexed yes
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Scopus rating (2008): SJR 1.361 SNIP 1.324
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.249 SNIP 1.439
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.358 SNIP 1.418
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.286 SNIP 1.521
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.316 SNIP 1.496
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.158 SNIP 1.479
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 1.236 SNIP 1.537
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 1.066 SNIP 1.255
Web of Science (2001): Indexed yes
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Investigation of the effect of UV-LED exposure conditions on the production of vitamin D in pig skin

The dietary intake of vitamin D is currently below the recommended intake of 10-20 µg vitamin D/day. Foods with increased content of vitamin D or new products with enhanced vitamin D are warranted. Light-emitting diodes (LEDs) are a potential new resource in food production lines. In the present study the exposure conditions with ultraviolet (UV) LEDs were systematically investigated in the wavelength range 280-340 nm for achieving optimal vitamin D bio-fortification in pig skin. A wavelength of 296 nm was found to be optimal for vitamin D3 production. The maximum dose of 20 kJ/m2 produced 3.5-4 µg vitamin D3/cm2 pig skin. Vitamin D3 produced was independent on the combination of time and intensity of the LED source. The increased UV exposure by UV-LEDs may be readily implemented in existing food production facilities, without major modifications to the process or processing equipment, for bio-fortifying food products containing pork skin.
Phylloquinone content from wild green vegetables may contribute substantially to dietary intake

Background: Traditional Nordic eatable wild plants are now sold in local stores and available to everyone. Wild vegetables may contain large amounts of vitamin K1. Due to the concomitant therapeutic use of anticoagulants among the populations, it is important to gain knowledge about the content of vitamin K1 in these products, as well as their contribution to the diet. The objective of this study was to measure the vitamin K1 content in four wild eatable plants and to estimate how much these wild vegetables contribute to the daily dietary vitamin K1 intake. Results: The wild vegetables had a high phylloquinone content of 400-600 μg vitamin K1/100 g fresh weight. The average daily intake when consuming the average Danish diet is low (64 ±20 μg/d or 72±23 μg/10 MJ/d), however, inclusion of wild vegetables as in the New Nordic Diet increases the vitamin K1 intake to 233±51 μg/d or 260±50 μg/10 MJ/d. Conclusion: Inclusion of more wild vegetables may substantially increase the intake of vitamin K, which could pose a risk for people treated with vitamin K antagonists (VKAs), but may be beneficial for the remaining population.

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Authors: Bügel, S. G. (Ekstern), Spagner, C. (Ekstern), Poulsen, S. K. (Ekstern), Jakobsen, J. (Intern), Astrup, A. (Ekstern)
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Vitamin D3 and 25-hydroxyvitamin D3 in pork and their relationship to vitamin D status in pigs

The content of vitamin D in pork produced in conventional systems depends on the vitamin D concentration in the pig feed. Both vitamin D3 and 25-hydroxyvitamin D3 (25(OH)D3) are essential sources of dietary vitamin D; however, bioavailability assessed by serum 25(OH)D3 concentration is reported to be different between the two sources. Furthermore, the relationship between serum 25(OH)D3 level and the tissue content of vitamin D3 and 25(OH)D3 is unknown. The objective of this study was to investigate the potential of increasing the content of vitamin D in different pig tissues by increasing the levels of vitamin D3 and 25(OH)D3 in the pig feed for 49 d before slaughter. Concurrently, the 25(OH)D3 level in serum was investigated as a biomarker to assess the content of vitamin D3 and 25(OH)D3 in pig tissues. Adipose tissue, white and red muscle, the liver and serum were sampled from pigs fed feed containing either vitamin D3 or 25(OH)D3 at 5, 20, 35 or 50 µg/kg feed for 7 weeks before slaughter. The tissue 25(OH)D3 level was significantly higher in the pigs fed 25(OH)D3 compared with those fed vitamin D3, while the tissue vitamin D3 level was higher in the pigs fed vitamin D3 compared with those fed 25(OH)D3. The content of 25(OH)D3 in the different tissues fully correlated with the serum 25(OH)D3 level, whereas the correlation between the tissue content of vitamin D3 and serum 25(OH)D3 was dependent on the source of the ingested vitamin D3.
Vitamin D-enhanced eggs are protective of wintertime serum 25-hydroxyvitamin D in a randomized controlled trial of adults

Despite numerous animal studies that have illustrated the impact of additional vitamin D in the diet of hens on the resulting egg vitamin D content, the effect of the consumption of such eggs on vitamin D status of healthy individuals has not, to our knowledge, been tested. We performed a randomized controlled trial (RCT) to investigate the effect of the consumption of Vitamin D-enhanced eggs (produced by feeding hens at the maximum concentration of vitamin D3 or serum 25-hydroxyvitamin D [25(OH)D3] lawfully allowed in feed) on winter serum 25(OH)D in healthy adults. We conducted an 8-wk winter RCT in adults aged 45-70 y (n = 55) who were stratified into 3 groups and were requested to consume ≤2 eggs/wk (control group, in which status was expected to decline), 7 vitamin D3-enhanced eggs/wk, or seven 25(OH)D3-enhanced eggs/wk. Serum 25(OH)D was the primary outcome. Although there was no significant difference (P > 0.1; ANOVA) in the mean preintervention serum 25(OH)D in the 3 groups, it was ~7-8 nmol/L lower in the control group than in the 2 groups who consumed vitamin D-enhanced eggs. With the use of an ANCOVA, in which baseline 25(OH)D was accounted for, vitamin D3-egg and 25(OH)D3-egg groups were shown to have had significantly higher (P ≤ 0.005) postintervention serum 25(OH)D than in the control group. With the use of a within-group analysis, it was shown that, although serum 25(OH)D in the control group significantly decreased over winter (mean ± SD: -6.4 ± 6.7 nmol/L; P = 0.001), there was no change in the 2 groups who consumed vitamin D-enhanced eggs (P > 0.1 for both). Weekly consumption of 7 vitamin D-enhanced eggs has an important impact on winter vitamin D status in adults.
Vitamin D in salmonids – wild and farmed, from head to tail – impact on dietary intake?

General information
State: Published
Organisations: National Food Institute, Research Group for Bioactives – Analysis and Application, Daithi O'Murchu Marine Research Station
Authors: Jakobsen, J. (Intern), Knuthsen, P. (Intern), Smith, C. (Extern)
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Main Research Area: Technical/natural sciences
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Vitamin D in salmonids - wild and farmed

Publication: Research - peer-review › Conference abstract for conference – Annual report year: 2017

Vitaminer i 100 år

General information
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Authors: Jakobsen, J. (Intern), Knuthsen, P. (Intern)
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Main Research Area: Technical/natural sciences

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Electronic versions:
2016_Vitaminer_i_100_r.pdf
Source: PublicationPreSubmission
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Association of body fat and vitamin D status and the effect of body fat on the response to vitamin D supplementation in Pakistani immigrants in Denmark

Vitamin D deficiency and obesity are both prevalent conditions in the northern countries, especially among immigrants. The aims were to assess the possible relationship between body fat and vitamin D status, and to investigate the effect of body fat on the response to oral vitamin D supplementation in Pakistani immigrants in Denmark. Data were obtained from a 1-year double-blind randomised controlled trial with oral vitamin D supplementation. A total of 122 women and men received either vitamin D3 supplementation (10 or 20 μg/day) or placebo. No association was found between body fat percentage and vitamin D status in a multiple linear regression model (P<0.001). No effect of body fat was seen on the vitamin D status response following the intervention with vitamin D. In conclusion, there was no baseline association between body fat percentage and vitamin D status, and body fat percentage had no effect on the response to vitamin D supplementation.

General information
State: Published
Organisations: National Food Institute, Division of Nutrition, Division of Food Chemistry, Technical University of Denmark, University of Copenhagen, Slagelse Hospital
Authors: Grønborg, I. M. (Intern), Lundby, M. (Ekstern), Mølgaard, C. (Ekstern), Jakobsen, J. (Intern), Ovesen, L. (Ekstern), Andersen, R. (Intern)
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BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.8 SJR 1.347 SNIP 1.179
Dose-Response Effect of Sunlight on Vitamin D2 Production in Agaricus bisporus Mushrooms

The dose response effect of UV-B irradiation from sunlight on vitamin D2 content of sliced Agaricus bisporus (white button mushroom) during the process of sun-drying was investigated. Real-time UV-B and UV-A data were obtained using a high-performance spectroradiometer. During the first hour of sunlight exposure, the vitamin D2 content of the mushrooms increased in a linear manner, with concentrations increasing from 0.1 μg/g up to 3.9 ± 0.8 μg/g dry weight (DW). At the
subsequent two measurements one and 3 h later, respectively, a plateau was reached. Two hours of additional exposure triggered a significant decline in vitamin D2 content. After just 15 min of sun exposure and an UV-B dose of 0.13 J/cm², the vitamin D2 content increased significantly to 2.2 ± 0.5 μg/g DW (P <0.0001), which is equivalent to 17.6 μg (704 IU) vitamin D2 per 100 g of fresh mushrooms and comparable to levels found in fatty fish like the Atlantic salmon.

General information
State: Published
Organisations: National Food Institute, University Medical Center Freiburg
Authors: Urbain, P. (Ekstern), Jakobsen, J. (Intern)
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Main Research Area: Technical/natural sciences

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Scopus rating (2016): CiteScore 3.45 SJR 1.291 SNIP 1.344
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.236 SNIP 1.253 CiteScore 3.23
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.278 SNIP 1.421 CiteScore 3.25
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.423 SNIP 1.479 CiteScore 3.44
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.43 SNIP 1.471 CiteScore 3.2
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.384 SNIP 1.446 CiteScore 3.1
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.408 SNIP 1.392
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.317 SNIP 1.303
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.361 SNIP 1.324
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.249 SNIP 1.439
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.358 SNIP 1.418
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.286 SNIP 1.521
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 1.316 SNIP 1.496
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 1.158 SNIP 1.479
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 1.236 SNIP 1.537
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 1.066 SNIP 1.255
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 1.091 SNIP 1.312
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 0.859 SNIP 1.256
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Agaricus bisporus, UV-B, dose–response, ergocalciferol, mushroom, sunlight, vitamin D
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Evaluation of the Danish cultivated sugarkelp as possible future source of ingredients such as minerals and pigments

General information
State: Published
Organisations: National Food Institute, Research Group for Bioactives – Analysis and Application, Department of Environmental Engineering, Residual Resource Engineering, Research Group for Nano-Bio Science
Authors: Holdt, S. L. (Intern), Silva Marinho, G. (Intern), Sloth, J. J. (Intern), Safafar, H. (Intern), Jakobsen, J. (Intern), Angelidaki, I. (Intern)
Number of pages: 1
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Electronic versions:
F5_DTU_Sustain_2015.pdf
Publication: Research - peer-review › Conference abstract in proceedings – Annual report year: 2015

Nutrient composition of important fish species in Bangladesh and potential contribution to recommended nutrient intakes
Fish, in Bangladesh where malnutrition remains a significant development challenge, is an irreplaceable animal-source food in the diet of millions. However, existing data on the nutrient composition of fish do not reflect the large diversity available and have focused on only a few select nutrients. The purpose of this study was to fill the gaps in existing data on the nutrient profiles of common fish in Bangladesh by analysing the proximate, vitamin, mineral and fatty acid composition of 55 fish, shrimp and prawn species from inland capture, aquaculture and marine capture fisheries. When comparing species, the composition of nutrients of public health significance was diverse. Iron ranged from 0.34 to 19mg/100g, zinc from 0.6 to 4.7mg/100g, calcium from 8.6 to 1900mg/100g, vitamin A from 0 to 2503μg/100g and vitamin B12 from 0.50 to 14μg/100g. Several species were rich in essential fatty acids, particularly docosohexaenoic acid in capture fisheries species (86–310mg/100g). The potential contribution of each species to recommended nutrient intakes (RNIs) for pregnant and lactating women (PLW) and infants was calculated. Seven species for PLW and six species for infants, all from inland capture, and all typically consumed whole with head and bones, could potentially contribute ≥25% of RNIs for three or more of these nutrients, simultaneously, from a standard portion. This illustrates the diversity in nutrient content of fish species and in particular the rich nutrient composition of small indigenous species, which should guide policy and programmes to improve food and nutrition security in Bangladesh.

General information
Artificial ultraviolet B light exposure increases vitamin D levels in cow plasma and milk

The number of dairy cows without access to pasture or sunlight is increasing; therefore, the content of vitamin D in dairy products is decreasing. Ultimately, declining vitamin D levels in dairy products will mean that dairy products are a negligible source of natural vitamin D for humans. We tested the ability of a specially designed UVB lamp to enhance the vitamin D-3 content in milk from dairy cows housed indoors. This study included 16 cows divided into 4 groups. Each group was exposed daily to artificial UVB light simulating 1, 2, 3, or 4 h of summer sun at 56 degrees N for 24 d, and the group with simulated exposure to 2 h of summer sun daily continued to be monitored for 73 d. We found a significant increase in 25-hydroxyvitamin D-3 (25OHD(3)) levels in plasma as well as vitamin D-3 and 25OHD(3) levels in milk after daily exposure for 24 d in all treatment groups. Extending daily exposure to artificial UVB light to 73 d did not lead to an increase of vitamin D-3 or 25OHD(3) level in the milk. In conclusion, the change in production facilities for dairy cows providing cows with no access to pasture and sunlight causes a decrease of vitamin D levels in dairy products. This decrease may be prevented by exposing cows to artificial UVB light in the stable.
Tissue content of vitamin D₃ and 25-hydroxy vitamin D₃ in minipigs after cutaneous synthesis, supplementation and deprivation of vitamin D₃

Information regarding the endogenous storages of vitamin D₃ after cutaneous vitamin D synthesis compared to oral vitamin D₃ supplementation is sparse. Furthermore it is not known whether vitamin D₃ can be stored for later use during periods of shortages of vitamin D₃. To investigate the endogenous storages of vitamin D₃ two studies were carried out in Göttingen minipigs. In study 1 one group of minipigs (n=2) was daily exposed to UV light corresponding to 10–20min of midday sun and another group (n=2) of pigs were fed up to 60μg vitamin D₃/day corresponding to 3.7–4.4μg/kg body weight. Study 1 demonstrated that daily UV-exposure of minipigs stimulated the cutaneous synthesis of vitamin D₃ and resulted in increasing serum vitamin D₃ and 25-hydroxy vitamin D₃, but also carcasses containing vitamin D₃ and 25-hydroxy vitamin D₃. The vitamin D₃ content in adipose tissue from the UV-exposed minipigs was 150–260ng/g and the content was 90–150ng/g in the orally supplemented minipigs. In study 2, minipigs were UV-exposed daily for 49 days. Subsequently, one group (n=2) was fed a vitamin D-free diet and another group (n=2) was dosed daily with 13C-labeled vitamin D₃. The concentrations of vitamin D₃ and 25-hydroxy vitamin D₃ in serum and skin- and subcutaneous adipose tissue biopsies were repeatedly monitored. Vitamin D₃ and 25-hydroxy vitamin D₃ were eliminated from the skin and the adipose tissue after UV-exposure was ceased. Supplementation of 13C-vitamin D₃ did not seem to affect the decline in the endogenous vitamin D₃ in the adipose tissue formed during UV-exposure.
UVB-lys i stalden øger mælkens indhold af D-vitamin

General information
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Organisations: National Food Institute, Research Group for Bioactives – Analysis and Application
Authors: Jakobsen, J. (Intern)
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Main Research Area: Technical/natural sciences

Publication information
Journal: Ny Kvægforskning
Volume: 13
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Bibliographical note
Ny Kvægforskning nr. 5, November 2015

Vitamin D₃ increases in abdominal subcutaneous fat tissue after supplementation with vitamin D₃
Objective: The objective was to assess the amount of vitamin D-3 stored in adipose tissue after long-term supplementation with high dose vitamin D-3. Design: A cross-sectional study on 29 subjects with impaired glucose tolerance who had participated in a randomized controlled trial with vitamin D-3 20 000 IU (500 μg) per week vs placebo for 3-5 years. Methods: Abdominal subcutaneous fat tissue was obtained by needle biopsy for the measurements of vitamin D-3 and 25-hydroxyvitamin D-3 (25(OH)D-3). Body fat was measured with dual-energy X-ray absorptiometry, and serum 25(OH)D-3 level was quantified. Results: In the subjects given vitamin D-3, the median concentrations of serum 25(OH)D-3, fat vitamin D-3, and fat 25(OH)D-3 were 99 nmol/l, 209 ng/g, and 3.8 ng/g, respectively; and correspondingly in the placebo group 62 nmol/l, 32 ng/g, and 2.5 ng/g. If assuming an equal amount of vitamin D-3 stored in all adipose tissue in the body, the median body store was 6.6 mg vitamin D-3 and 0.12 mg 25(OH)D-3 in those given vitamin D-3. Conclusions: Subcutaneous adipose tissue may store large amounts of vitamin D-3. The clinical importance of this storage needs to be determined.

General information
State: Published
Organisations: National Food Institute, Division of Food Chemistry, University of Tromsø, University Hospital of North Norway
Authors: Didriksen, A. (Ekstern), Burild, A. (Intern), Jakobsen, J. (Intern), Fuskevag, O. M. (Ekstern), Jorde, R. (Ekstern)
Number of pages: 7
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Scopus rating (2016): CiteScore 4.11 SJR 1.674 SNIP 1.474
BFI (2015): BFI-level 1

Vitamins A (retinol) and E (α-tocopherol) are dietary vitamins, essential for, e.g., growth and development, reproduction, and immune function. Persistent organic pollutants (POPs) have been found to be related to vitamin A and E metabolism. However, few investigations have been published on this health issue in polar bears (Ursus maritimus). The aim of this study was thus to provide reference values for concentrations of vitamin A in liver, kidney cortex, and whole blood and vitamin E in kidney cortex and whole blood from 166 East Greenland polar bears, as well as to assess the relationship between POPs and vitamin concentrations. In addition, vitamin concentrations were analyzed for temporal trends (1994–2008). Results showed vitamin A in liver to be higher in adult bears and the concentrations of vitamin E in kidney and blood to likewise be generally higher in adult bears. In addition, all analyzed contaminant groups were correlated with at least one of the vitamin parameters, predominantly in a negative way. Finally, vitamin A liver concentrations as well as concentration of vitamin E in kidney and blood showed a temporal increase. Together, these results add to the weight of evidence that POPs could be disrupting polar bear vitamin status. However, while the observed temporal increases in vitamin concentrations were likely POP related, the question remains as to whether they stem from influence of
contaminants only or also, e.g., changes in prey species. Further studies are needed to tease apart the causes underlying these changes in vitamin concentrations.
Altered vitamin D status in liver tissue and blood plasma from Greenland sledge dogs (Canis familiaris) dietary exposed to organohalogen contaminated minke whale (Balaenoptera acuterostrata) blubber

This study compared vitamin D3 (vitD3) and 25-OH vitamin D3 (25OHD3) status in Greenland sledge dogs (Canis familiaris) given either minke whale (Balaenoptera acuterostrata) blubber high in organohalogen contaminants (OHCs) or clean porcine (Suis scrofa) fat for up to 636 days. A group of six exposed and six control sister bitches (maternal generation) and their three exposed and four control pups, respectively, were daily fed 112g whale blubber (193µg ∑PCB/day) or porcine fat (0.17µg ∑PCB/day). Mean level of ∑PCB in adipose tissue of exposed bitches and their pups was 3106 and 2670ng/g lw, respectively, which was significantly higher than the mean concentration of 53ng/g lw for all controls (p

General information
State: Published
Organisations: National Food Institute, Division of Food Chemistry, Aarhus University, Norwegian University of Science and Technology, Carleton University
Authors: Sonne, C. (Ekstern), Kirkegaard, M. (Ekstern), Jakobsen, J. (Intern), Jenssen, B. M. (Forskerdatabase), Letcher, R. J. (Ekstern), Dietz, R. (Ekstern)
Number of pages: 6
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Main Research Area: Technical/natural sciences

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BFI (2017): BFI-level 2
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.99 SJR 1.205 SNIP 1.484
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.208 SNIP 1.419 CiteScore 3.46
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.114 SNIP 1.418 CiteScore 2.96
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.135 SNIP 1.316 CiteScore 2.8
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.063 SNIP 1.377 CiteScore 2.6
Quantification of physiological levels of vitamin D₃ and 25-hydroxyvitamin D₃ in porcine fat and liver in subgram sample sizes

Most methods for the quantification of physiological levels of vitamin D₃ and 25-hydroxyvitamin D₃ are developed for food analysis where the sample size is not usually a critical parameter. In contrast, in life science studies sample sizes are often limited. A very sensitive liquid chromatography with tandem mass spectrometry method was developed to quantify vitamin D₃ and 25-hydroxyvitamin D₃ simultaneously in porcine tissues. A sample of 0.2–1 g was saponified followed by liquid–liquid extraction and normal-phase solid-phase extraction. The analytes were derivatized with 4-phenyl-1,2,4-triazoline-3,5-dione to improve the ionization efficiency by electrospray ionization. The method was validated in porcine liver and adipose tissue, and the accuracy was determined to be 72–97% for vitamin D₃ and 91–124% for 25-hydroxyvitamin D₃. The limit of quantification was
Simultaneous quantification of vitamin D₃, 25-hydroxyvitamin D-3 and 24,25-dihydroxyvitamin D₃ in human serum by LC-MS/MS

Introduction. Serum 25-hydroxy-vitamin D is the established biomarker of vitamin D status although serum concentrations of vitamin D and 24,25-dihydroxyvitamin D may also be of interest to understand the in vivo kinetics of serum 25-hydroxyvitamin D. Method. An LC-MS/MS method was developed and validated to quantify vitamin D-3, 25-hydroxyvitamin D-3 and 24,25-dihydroxyvitamin D-3 in serum. After protein precipitation of the serum it was loaded on a HybridSPE column to separate vitamin D metabolites from phospholipids. Vitamin D-3, 25-hydroxyvitamin D-3 and 24,25-dihydroxyvitamin D-3 in the eluate were derivatized by 4-phenyl-1,2,4-triazoline-3,5-dione to improve sensitivity in the following LC-MS/MS analysis. Results. Using only 100 L serum the limit of quantification was
MEDICINE, TANDEM MASS-SPECTROMETRY, LIQUID-CHROMATOGRAPHY, D METABOLITES, CIRCULATING VITAMIN-D-3, SUPPLEMENTATION, Liquid chromatography, vitamin D, mass spectroscopy
Stability of vitamin D in foodstuffs during cooking

We investigated the retention of vitamin D3 and 25-hydroxyvitamin D3 in eggs, vitamin D3 in margarine, and vitamin D3 and vitamin D2 in bread. Our set-up illustrated the cooking methods usually performed in households i.e. boiling, frying in pan and oven, and baking. All experiments were performed three times independently of one another. The retention of vitamin D compounds in eggs and margarine during heat treatment in an oven for 40min at normal cooking temperature showed retention at 39–45%, while frying resulted in retention at 82–84%. Boiled eggs were found to have a similar level of retention (86–88%). For bread baked, as recommended in the recipe, the retention of vitamin D3 in rye bread at 69% was lower than the retention in wheat bread at 85%. A similar observation was made for vitamin D2, although the retention was slightly higher, 73% and 89%. No difference between retention of vitamin D3 and 25-hydroxyvitamin D3 in eggs was shown. Cooking may cause detrimental loss of vitamin D, but it depends on the actual foodstuffs and the heating process. Further research is needed to optimise cooking procedures to enhance retention of vitamin D. Vitamin D retention should be taken into account in future calculations of dietary intake of vitamin D.

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Authors: Jakobsen, J. (Intern), Knuthsen, P. (Intern)
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Main Research Area: Technical/natural sciences

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Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 4.85 SJR 1.706 SNIP 2.091
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.597 SNIP 1.962 CiteScore 4.31
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.595 SNIP 2.027 CiteScore 3.92
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.548 SNIP 2.069 CiteScore 3.87
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.805 SNIP 2.357 CiteScore 3.98
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.909 SNIP 2.395 CiteScore 4.17
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.965 SNIP 2.261
Vitamin D Binding Protein Genotype Is Associated with Serum 25-Hydroxyvitamin D and PTH Concentrations, as Well as Bone Health in Children and Adolescents in Finland

Vitamin D binding protein (DBP)/group-specific component (Gc), correlates positively with serum vitamin D metabolites, and phenotype influences serum 25-hydroxyvitamin D (S-25(OH)D) concentration. The protein isoform has been associated with decreased bone mineral density (BMD) and increased fracture risk. We examined the role of GC genotypes in S-25(OH)D status and BMD in 231 Finnish children and adolescents aged 7-19 yr. BMD was measured with DXA from lumbar spine (LS), total hip, and whole body, and for 175 subjects, radial volumetric BMD was measured with pQCT. Background characteristic and total dietary intakes of vitamin D and calcium were collected. The concentrations of 25(OH)D, parathyroid hormone (PTH), calcium and other markers of calcium homeostasis were determined from blood and urine. Genotyping was based on single-nucleotide polymorphism (rs4588) in the GC gene. The genotype distribution was: GC 1/1 68%, GC 1/2 26% and GC 2/2 6%. A significant difference emerged in 25(OH)D and PTH concentrations between the genotypes, (p = 0.001 and 0.028 respectively, ANCOVA). There was also a linear trend in: Gc 2/2 had the lowest 25(OH) D and PTH concentrations (p = 0.025 and 0.012, respectively). Total hip bone mineral content was associated with GC genotype (BMC) (p = 0.05, ANCOVA) in boys. In regression analysis, after adjusting for relevant covariates, GC genotype was associated with LS BMC and strength and strain index (SSI) Z-score in both genders, and LS BMD in boys. In conclusion, the present study demonstrates the association between GC genotypes and S-25(OH)D and PTH concentrations. The results show the influence of DBP genetic variation on bone mass accrual in adolescence.

General information
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Organisations: National Food Institute, Division of Food Chemistry, University of Helsinki, Helsinki University Central Hospital, University College Cork
Authors: Pekkinen, M. (Ekstern), Saarnio, E. (Ekstern), Viljakainen, H. T. (Ekstern), Kokkonen, E. (Ekstern), Jakobsen, J. (Intern), Cashman, K. (Ekstern), Makitie, O. (Ekstern), Lamberg-Allardt, C. (Ekstern)
Number of pages: 10
Publication date: 2014
Main Research Area: Technical/natural sciences
Vitamin D₃ in Pigs: Distribution, Storage and Turnover under Various Input Conditions

Vitamin D₃ is important for the mineralization of the skeleton to prevent the deficiency diseases rickets and osteoporosis, and to maintain a healthy skeleton throughout life.

Vitamin D₃ is synthesized in the skin after exposure to the sun. Due to the low angle of the sun during wintertime at high latitudes, no or only a negligible amount of vitamin D₃ is synthesized and the body needs to rely on its storages of vitamin D₃ or dietary vitamin D₃ in the form of vitamin D₃ and 25-hydroxyvitamin D₃. The information of the size of the storages of vitamin D₃ in humans is sparse, but very low levels of vitamin D₃ is found in tissues from animals fed physiologically relevant doses of vitamin D₃. The natural synthesis of vitamin D₃ might, however, influence on the storages of vitamin D₃.

The different inherent properties of the two forms of vitamin D₃ might also affect the tissue distribution of vitamin D₃ and 25-hydroxyvitamin D₃ and how the distribution associates with serum 25-hydroxyvitamin D₃.

To study the association between vitamin D₃ and 25-hydroxyvitamin D₃ in serum and tissue, two analytical methods were developed and validated. The difference in tissue distribution of vitamin D₃ and 25-hydroxyvitamin D₃ after supplementation of vitamin D₃ and 25-hydroxyvitamin D₃ was investigated in slaughter pigs. Tissue 25-hydroxyvitamin D₃ was significantly higher in pigs fed 25-hydroxyvitamin D₃ compared to vitamin D₃, but vitamin D₃ in tissue was higher in the pigs fed vitamin D₃. The content of 25-hydroxyvitamin D₃ in the different tissues correlated with the serum 25-hydroxyvitamin D₃ level, but the correlation between the tissue content of vitamin D₃ and the serum 25-hydroxyvitamin D₃ concentration was dependent on the form of the ingested vitamin D₃.

Göttingen minipigs were used to investigate the endogenous storages of vitamin D₃ after UV-exposure to stimulate synthesis of vitamin D₃ and after oral supplementation of vitamin D₃. Furthermore, the minipigs were used to study the turnover of synthesized vitamin D₃ in skin and adipose tissue during vitamin D₃ shortages. Daily UV-exposure of minipigs stimulated the cutaneous synthesis of vitamin D₃. The results showed an increase in serum vitamin D₃ and 25-hydroxyvitamin D₃, but also tissues and organs contained vitamin D₃ and 25-hydroxyvitamin D₃. The vitamin D₃ content in adipose tissue from the UV-exposed minipigs was 150-260 ng/g while the content was 90-150 ng/g in the orally supplemented minipigs. Vitamin D₃ and 25-hydroxyvitamin D₃ declined from the skin and the adipose tissue after the UV-exposure had ceased.

A comprehensive pharmacokinetic-model was established to describe the relation between vitamin D₃ in tissue and vitamin D₃ and 25-hydroxyvitamin D₃ in serum by taking both synthesized and orally supplemented vitamin D₃ into account.
glycosylated form (17ng/g dry weight).

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Authors: Jäpelt, R. B. (Intern), Silvestro, D. (Ekstern), Smedsgaard, J. (Intern), Jensen, P. E. (Ekstern), Jakobsen, J. (Intern)
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BFI (2008): BFI-level 2
Scopus rating (2008): SJR 1.488 SNIP 1.703
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 1.467 SNIP 2.095
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Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.017 SNIP 1.543
Randomized controlled trial of the effects of vitamin D–fortified milk and bread on serum 25-hydroxyvitamin D concentrations in families in Denmark during winter: the VitmaD study

Background: Vitamin D intakes are lower than dietary recommendations in most populations, and thus, a low vitamin D status is widespread, especially during winter.

Objective: We investigated the effects of increasing vitamin D intake to the recommended amount by fortification of milk and bread on serum 25-hydroxyvitamin D [25(OH)D] concentrations in families during winter in Denmark.

Design: The study was a randomized controlled trial in 782 children and adults (4–60 y old) recruited as 201 families. Families were randomly assigned to vitamin D–fortified or nonfortified milk and bread for 6 mo starting in September. The milk and bread replaced the participants’ usual consumptions of products.

Results: Median (IQR) vitamin D intakes (habitual diet plus fortified products) were 9.4 μg/d (6.5, 12.3 μg/d) and 2.2 μg/d (1.5, 3.0 μg/d) in fortification and control groups, respectively. Geometric mean (IQR) serum 25(OH)D concentrations decreased from 73.1 nmol/L (61.9, 88.5 nmol/L) to 67.6 nmol/L (56.2, 79.4 nmol/L) in the fortification group and from 71.1 nmol/L (61.2, 85.9 nmol/L) to 41.7 nmol/L (29.5, 58.9 nmol/L) in the control group (both P < 0.001). The final 25(OH)D concentration was significantly higher in the fortification group than in the control group (P < 0.001). By the end of the study, <1% of subjects in the fortification group and 25% of subjects in the control group had 25(OH)D concentrations <30 nmol/L and 16% and 65% of subjects, respectively, had 25(OH)D concentrations <50 nmol/L.

Conclusion: Vitamin D fortification of milk and bread reduces the decrease in serum 25(OH)D concentrations during winter and ensures 25(OH)D concentrations >50 nmol/L in children and adults in Denmark. This trial was registered at clinicaltrials.gov as NCT01184716.

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Organisations: National Food Institute, Division of Nutrition, Division of Food Chemistry, Department of Applied Mathematics and Computer Science, Statistics and Data Analysis
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Scopus rating (2011): SJR 3.519 SNIP 2.473 CiteScore 6.23
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Scopus rating (2007): SJR 3.343 SNIP 2.503
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Seasonal changes in vitamin D status among Danish adolescent girls and elderly women: the influence of sun exposure and vitamin D intake.

Background/objectives: To determine seasonal variation in vitamin D status in healthy Caucasian adolescent girls and elderly community-dwelling women living in Denmark, and to quantify the impact of sun exposure and intake on the seasonal changes in vitamin D status. Subjects/methods: A 1-year longitudinal observational study of 54 girls (11-13 years) and 52 women (70-75 years). The participants were examined three times (winter-summer-winter). Serum 25-hydroxyvitamin D (S-25OHD) concentration and vitamin D intake were measured at each visit. Sun exposure was measured during summer. Results: S-25OHD concentrations (winter, summer, winter) were median (25, 75 percentiles) 23.4 (16.5, 36.4), 60.3 (42.7, 67.7), 29.5 (22.2, 40.4) and 47.2 (27.3, 61.1), 67.3 (35.1, 79.2), 50.5 (32.7, 65.5) nmol/l for girls and women, respectively. The usual sun habits were determinant (P=0.002) for change in vitamin D status from winter to summer. Vitamin D intake from supplements (P

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Authors: Andersen, R. (Intern), Brot, C. (Ekstern), Jakobsen, J. (Intern), Mejborn, H. (Intern), Mølgaard, C. (Ekstern), Skovgaard, L. T. (Ekstern), Trolle, E. (Intern), Tetens, I. (Intern), Ovesen, L. (Forskerdatabase)
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Vitamin D in plants: a review of occurrence, analysis, and biosynthesis.

The major function of vitamin D in vertebrates is maintenance of calcium homeostasis, but vitamin D insufficiency has also been linked to an increased risk of hypertension, autoimmune diseases, diabetes, and cancer. Therefore, there is a growing awareness about vitamin D as a requirement for optimal health. Vitamin D3 is synthesized in the skin by a photochemical conversion of provitamin D3, but the necessary rays are only emitted all year round in places that lie below a 35° latitude. Unfortunately, very few food sources naturally contain vitamin D and the general population as a results fail to meet the requirements. Fish have the highest natural content of vitamin D expected to derive from an accumulation in the food chain originating from microalgae. Microalgae contain both vitamin D3 and provitamin D3, which suggests that vitamin D3 exist in the plant kingdom and vitamin D3 has also been identified in several plant species as a surprise to many. The term vitamin D also includes vitamin D2 that is produced in fungi and yeasts by UVB-exposure of provitamin D2. Small amounts can be found in plants contaminated with fungi and traditionally only vitamin D2 has been considered present in plants. This review summarizes the current knowledge on sterol biosynthesis leading to provitamin D. It also addresses the occurrence of vitamin D and its hydroxylated metabolites in higher plants and in algae and discusses limitations and advantages of analytical methods used in studies of vitamin D and related compounds including recent advances in analytical technologies. Finally, perspectives for a future production of vitamin D biofortified fruits, vegetables, and fish will be presented.
Determinants of vitamin D status in a general population of Danish adults

Background and aims: Danish legislation regarding food fortification has been very restrictive and vitamin D deficiency is thought to be common in Denmark due to inadequate dietary intakes and the fact that in Denmark (latitude 56°N) vitamin D is only synthesized in the skin after exposure to solar radiation during summertime (April–September). The purpose of this study was to evaluate the vitamin D status of a general adult population in Denmark and, in addition, associations between vitamin D status and distinct lifestyle factors were studied.

Methods: A random sample of 6784 persons from a general population aged 30–60 years participated in a health examination in 1999–2001. Serum samples from all participants were stored and levels of 25-hydroxyvitamin D (25(OH)D) were measured by HPLC in 2009. The method was compared to another HPLC method. Information on dietary intake of vitamin D and other lifestyle factors were obtained by questionnaires. A total of 6146 persons defined as ethnic Danes and with successful measurements of 25(OH)D were included in the analyses.

Results: The overall prevalence of vitamin D deficiency (25(OH)D
Estimation of the dietary requirement for vitamin D: impact of season

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Organisations: National Food Institute, Division of Food Chemistry, University College Cork, University of Helsinki, University of Copenhagen
Authors: Seamans, K. M. (Ekstern), Kiely, M. (Ekstern), Jakobsen, J. (Intern), Lamberg-Allardt, C. (Ekstern), Mølgaard, C. (Ekstern), Cashman, K. D. (Ekstern)
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Since collection of 24 h urine samples is very time consuming and difficult to obtain, epidemiological studies typically only obtain spot urine samples. The aim of the present study was to evaluate whether flavonoids and enterolactone in overnight urine could substitute flavonoids and enterolactone in 24 h urine as an alternative and more feasible biomarker...
of fruit, vegetable and beverage intake. A total of 191 individuals in the Inter99 cohort in Denmark completed the validation study. Concentrations of nine urinary flavonoid aglycones (quercetin, isorhamnetin, tamarixetin, kaempferol, hesperetin, naringenin, eriodictyol, phloretin and apigenin) and enterolactone were determined in overnight and 24 h urine samples, and their validity as biomarkers of fruit, vegetable and beverage intake was evaluated in relation to two independent reference methods (Inter99 FFQ data and plasma carotenoids) by using the method of triads. The intakes of fruit, juice, vegetables and tea reported in the FFQ were reflected by the flavonoid biomarker both in overnight and 24 h urine samples. Validity coefficients for the flavonoid biomarker in overnight urine ranged from 0.39 to 0.49, while the corresponding validity coefficients for the biomarker in 24 h urine ranged from 0.43 to 0.66. Although the validity coefficients were lower for overnight urine than for the 24 h urine flavonoid biomarker, they were still of acceptable magnitude. In conclusion, the results indicate that flavonoids and enterolactone in overnight urine samples may be used as a more feasible biomarker than 24 h urine for the assessment and validation of fruit, juice, vegetable and tea intakes in epidemiological studies. Copyright © The Authors 2012.

**General information**

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Organisations: National Food Institute, Division of Food Chemistry, Norwegian Institute of Public Health, Novo Nordisk A/S, Copenhagen University Hospital
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Scopus rating (2009): SJR 0.62 SNIP 0.581
Increase of vitamin D2 by UV-B exposure during the growth phase of white button mushroom (Agaricus bisporus).

Background: Mushrooms are the only non-animal food source of vitamin D. Wild mushrooms have naturally high vitamin D2 content, and cultivated mushrooms produce vitamin D2 from ergosterol when exposed to supplementary UV-B during the post-harvest phase. Objectives: This study investigated the effects of providing supplementary UV-B during the growth phase on vitamin D2 formation and the interactions with growth of mushrooms, as compared to supplementary UV-B during the post-harvest phase or exposure to sunlight for both cultivated and wild mushrooms. Methods: Experiments were carried out with exposure to supplementary UV-B just prior to harvest in the range of 0-2,400 mJ cm⁻². Mushrooms grew for 2 days with or without repeated UV-B exposure each day. Vitamin D2 and growth rate were determined. Some mushrooms were post-harvest treated by exposure at 200 mJ cm⁻² supplementary UV-B or natural sunlight, prior to vitamin D2 determination. Results: The content of vitamin D2 was 0.2-164 µg 100 g⁻¹ fresh weight (FW), and there was a linear relationship between UV-dose up to 1,000 mJ cm⁻² and vitamin D2 content. The fast growth rate of the mushrooms diluted the vitamin D2 from 24 to 3 µg vitamin D2 100 g⁻¹ within 2 days of exposure at 200 mJ cm⁻². Following repeated UV-B exposure, vitamin D2 increased to 33 µg vitamin D2 100 g⁻¹. Growth was unaffected by UV-B. Post-harvest exposure to supplementary UV-B resulted in a higher vitamin D2 content of 32 µg 100 g⁻¹ compared to the 24 µg 100 g⁻¹ obtained from exposure to UV-B during the growth phase. In contrast, wild and cultivated mushrooms with and without exposure to sunlight had vitamin D2 content in the range of 0.2-1.5 µg vitamin D2 100 g⁻¹. Conclusions: This study showed that mushrooms with a well-defined content of vitamin D2 can be obtained by exposure to supplementary UV-B just prior to harvest.
Vitamin D

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Authors: Jakobsen, J. (Intern), Jäpelt, R. B. (Intern)
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**Vitamin D3 in plants: effect of UVB exposure**

**General information**
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Authors: Jäpelt, R. B. (Intern), Silvestro, D. (Ekstern), Smedsgaard, J. (Intern), Jensen, P. (Ekstern), Jakobsen, J. (Intern)
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**Abstract**

**Vitamin Supplement - Editorial**

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Scopus rating (2014): SJR 1.01 SNIP 0.965 CiteScore 2.37
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Scopus rating (2013): SJR 0.708 SNIP 0.792 CiteScore 1.82
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Vitamins: Vital Compounds Of Life

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Distribution of vitamins A (retinol) and E (alpha-tocopherol) in polar bear kidney: Implications for biomarker studies

Vitamins A and E content of inner organs, among these the kidneys, are increasingly being used as an indicator of adverse effects caused to the organism by e.g. environmental contaminants. In general, only a renal sub sample is used for analyses, and it is thus essential to know which part of the organ to sample in order to get a representative value for this important biomarker. The aim here was to assess the distribution of vitamins A (retinol) and E (α-tocopherol) within the polar bear multirenunculate kidney (i.e. polar vs. medial position) and also within the cortex vs. medulla of each separate renunci. The results showed no significant difference between the medial and polar renunci with regards to either retinol (p=0.44) or α-tocopherol (p=0.75). There were, however, significant differences between cortex and medulla for both vitamins (retinol, p=0.0003; α-tocopherol, p

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Organisations: Division of Food Chemistry, National Food Institute, Aarhus University
Authors: Bechshøft, T. (Ekstern), Jakobsen, J. (Intern), Sonne, C. (Ekstern), Dietz, R. (Ekstern)
Pages: 3508-3511
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Main Research Area: Technical/natural sciences
Estimation of the dietary requirement for vitamin D in healthy adolescent white girls.

Background: Knowledge gaps have contributed to considerable variation (between 0 and 15 μg/d) in international dietary recommendations for vitamin D in adolescents. Objective: We aimed to establish the distribution of dietary vitamin D required to maintain serum 25-hydroxyvitamin D (25(OH)D) concentrations above several proposed cutoffs (25, 37.5, 40, and 50 nmol/L) during wintertime in adolescent white girls. Design: Data (baseline and 6 mo) from 2 randomized, placebo-controlled, double-blind, 12-mo intervention studies in Danish (55°N) and Finnish (60°N) girls (n = 144; mean age: 11.3 y; mean vitamin D intake: 3.7 μg/d) at vitamin D3 supplementation amounts of 0, 5, and 10 μg/d were used. Serum 25(OH)D was measured with an HPLC assay in a centralized laboratory. Results: Clear dose-related increments (P < 0.0001) in serum 25(OH)D with increasing supplemental vitamin D3 were observed. The slope of the relation between vitamin D intake and serum 25(OH)D at the end of winter was 2.43 nmol L⁻¹ μg intake⁻¹, and no difference in the slopes between Finnish and Danish girls was observed. The vitamin D intakes that maintained serum 25(OH)D concentrations at >25, >37.5, and >50 nmol/L in 97.5% of the sample were 8.3, 13.5, and 18.6 μg/d, respectively, whereas an intake of 6.3 μg/d maintained a serum 25(OH)D concentration >40 nmol/L in 50% of the sample. Conclusion: The vitamin D intakes required to ensure that adequate vitamin D status (defined variably as serum 25(OH)D >25 and >50 nmol/L) is maintained during winter in the vast majority (>97.5%) of adolescent girls (mean age: 11.3 y) at northern latitudes (>55°N) are 8.3 and 18.6 μg/d, respectively. This trial was registered at clinicaltrials.gov as NCT00267540. ©American Society for Nutrition. All rights reserved.
LC–MS/MS with atmospheric pressure chemical ionisation to study the effect of UV treatment on the formation of vitamin D3 and sterols in plants

Some plant species are known to cause calcium intoxification in grazing animals. This has been attributed to the presence of vitamin D3-like activity. However, research into the presence of vitamin D3 in plants has been limited. One reason for this may be limitations in the analytical methods available for unambiguous detection and quantification of vitamin D3. This paper presents a new method for determining vitamin D3 and its sterol precursors. The method is based on saponification and extraction followed by solid phase clean-up of the compounds from plant leaves and detection by APCI-MS. Recoveries ranged from 101% to 114% and precision from 3% to 12%. Detection limits were 2–8ng/g fresh weight for the substances tested. In a pilot study we found that Solanum glaucohyllum Desf. and Solanum lycopersicum L. produced vitamin D3 after UV-treatment. The preliminary results presented suggest that vitamin D3 formation in plants is dependent on light exposure.

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New food with natural content of vitamin D

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Main Research Area: Technical/natural sciences
Electronic versions:
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Source: orbit
Source-ID: 316211
Publication: Research - peer-review › Conference abstract in proceedings – Annual report year: 2011

Seasonal Variation of Provitamin D2 and Vitamin D2 In Perennial Ryegrass (Lolium perenne L.)
Ergosterol (provitamin D(2)) is converted to vitamin D(2) in grass by exposure to UV light. Six varieties of perennial ryegrass (Lolium perenne L.) were harvested four times during the season, and the contents of vitamin D(2) and ergosterol were analyzed by a sensitive and selective liquid chromatography tandem mass spectrometry method. Weather factors were recorded, and a principal component analysis was performed to study which factors were important for the formation of vitamin D(2). The results suggest that a combination of weather factors is involved and that the contents of ergosterol and vitamin D(2) change more than a factor of 10 during the season. These results demonstrate that grass potentially can be a significant source of vitamin D for grazing animals and animals fed on silage and hay.

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute, DLF-TRIFOLIUM A/S
Authors: Jäpelt, R. B. (Intern), Didion, T. (Ekstern), Smedsgaard, J. (Intern), Jakobsen, J. (Intern)
Pages: 10907-10912
Publication date: 2011
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Agricultural and Food Chemistry
Volume: 59
Issue number: 20
ISSN (Print): 0021-8561
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.45 SJR 1.291 SNIP 1.344
Web of Science (2016): Indexed yes
Vitamin D in plants: Occurrence, analysis and biosynthesis

General information
An overall perspective on vitamins

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Jakobsen, J. (Intern)
Publication date: 2010
Event: Abstract from First International Vitamin Conference, Copenhagen,.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 264933
Publication: Research - peer-review › Conference abstract for conference – Annual report year: 2010

Does vitamin D supplementation of healthy Danish Caucasian girls affect bone turnover and bone mineralization?

Introduction: A high peak bone mass may be essential for reducing the risk of osteoporosis later in life and a sufficient vitamin D level during puberty may be necessary for optimal bone accretion and obtaining a high peak bone mass. Dietary intake and synthesis during winter of vitamin D might be limited but the effect of vitamin D supplementation in adolescence on bone mass is not well established. Objective: To investigate the effect of supplementation with 5 and 10 μg/day vitamin D-3 for 12 months in 11- to 12-year-old girls on bone mass and bone turnover as well as the possible influence of VDR and ER genotype on the effect of the supplementation. Methods: The girls (n = 221) were randomized to receive either 5 μg or 10 μg vitamin D-3 supplementation per day or placebo for 12 months. Whole body and lumbar spine bone mass measured by DXA and pubertal status were determined at baseline and after 12 months whereas physical activity and dietary intake of calcium and vitamin D were assessed at baseline. Serum (S) 25-hydroxyvitamin D (25OHD), S-osteocalcin, S-parathyroid hormone, S-calcium, S-inorganic phosphate, urinary (U) pyridinoline (Pyr) and deoxypyridinoline (Dpyr) were measured at baseline and after 6 and 12 months. Results: The S-25OHD concentration increased (p <0.001) relative to the baseline values in the groups receiving either 5 μg/day (mean +/- SD; 11.0 +/- 10.3 nmol/l, baseline 41.9 +/- 17.6 nmol/l) or 10 μg/day (13.3 +/- 11.8 nmol/l, baseline 44.4 +/- 16.6 nmol/l) vitamin D-3 for 12 months compared to placebo (-3.1 +/- 9.8 nmol/l, baseline 43.4 +/- 17.1 nmol/l). There was no effect of vitamin D-supplementation on biomarkers for bone turnover or on whole body or spine bone mineral augmentation. However, vitamin D supplementation increased whole body bone mineral density (BMD) (p = 0.007) and bone mineral content (BMC) (p = 0.048) in the FF VDR genotype but not in the Ff or ff VDR genotypes. Conclusion: Supplementation with vitamin D (5 or 10 μg/day) over 12 months increased the S-25OHD concentration but there was no effect on indices of bone health in the entire group of girls. However, there was an effect on BMD for a subgroup with the FF VDR genotype indicating an influence of genotype.

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Molgaard, C. (Ekstern), Larnkjaer, A. (Ekstern), Cashman, K. (Ekstern), Lamberg-Allardt, C. (Ekstern), Jakobsen, J. (Intern), Michaelsen, K. (Ekstern)
Pages: 432-439
Publication date: 2010
Main Research Area: Technical/natural sciences
Publication information
Journal: Bone
Volume: 46
Issue number: 2
ISSN (Print): 8756-3282
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 1.612 SNIP 1.427 CiteScore 4.09
BFI (2015): BFI-level 1
The aim of this study was to examine the plasma, liver, and kidney status of vitamin A (retinol) and vitamin E (-tocopherol) in two groups of Greenland sled dogs (Canis familiaris), with a total number of 16 bitches and 8 pups. The dogs were fed either minke whale (Balaenoptera acutrostrata) blubber (exposed dogs) or uncontaminated (control group) porcine fat for up to 12 to 21 mo of age. The daily intake of 50-200 g whale blubber (mean: 112 g) constituted between 10.4 and 11.7 μg/kg body weight Σ organohalogen contaminants (OHC) (or between 4.6 and 6.1 μg/kg body weight Σ polychlorinated biphenyls [PCB]). Retinol was approximately 18% and -tocopherol 22% higher in the diet of the exposed dogs compared to controls. In adipose tissue, mean of Σ OHC was 92 ng/g lipid weight (lw) and 5005 ng/g lw for all control (n = 12) and exposed dogs (n = 10), respectively. Hepatic retinol correlated negatively with Σ-dichlorodiphenyldichloroethane (Σ DDT) and Σ-polybrominated diphenyl ethers (Σ PBDE) for all exposed animals. A negative correlation between kidney -tocopherol and Σ PCB concentrations was observed, whereas two positive significant correlations were observed between kidney retinol and Σ-chlordane-related compounds (Σ CHL) and dieldrin concentrations. Hepatic -tocopherol concentrations were significantly lower in exposed compared to controls, most likely due to a combination by OHC exposure and high dietary intake of unsaturated fatty acids. These results suggest that dietary exposure from OHC may, even at low concentrations, possibly affect retinol and -tocopherol status in Arctic top predators.

General information
State: Published
The effect of farmed trout on cardiovascular risk markers in healthy men

Increased intake of marine long-chain n-3 PUFA (n-3 LCPUFA) may decrease the risk of CVD and reduce mortality by lowering serum TAG and blood pressure (BP). Furthermore, n-3 LCPUFA may affect novel CVD risk markers related to inflammation and vascular function. The objective of the present study was to examine the effect of farmed trout on novel and traditional CVD risk markers in healthy men, and to evaluate whether this was affected by the aquacultural feed regime. We performed a parallel, 8-week intervention study in which sixty-eight healthy male volunteers were randomised to consume either a daily meal with 150 g farmed trout raised on either marine or vegetable-based feed, or a reference meal containing 150 g chicken. Twenty-four hour BP, pulse wave velocity, augmentation index, fatty acid composition of erythrocyte (RBC), and concentrations of TAG, HDL-cholesterol, LDL-cholesterol, glucose, insulin, C-reactive protein (CRP) and other markers of inflammation were measured at weeks 0 and 8. RBC content of total n-3 LCPUFA, both EPA and DHA, was significantly higher among men consuming trout raised on marine feed compared with men consuming the vegetable-fed trout or chicken. The three intervention groups did not differ significantly with respect to any of the other outcome variables, although there were trends towards associations between the changes in RBC n-3 LCPUFA and those in BP and CRP. In the present study, we conclude that we could not confirm the fish oil-induced reduction in CVD risk markers after daily consumption of trout with high or low n-3 LCPUFA content. However, trout raised on vegetable-based feed had less pronounced impact on RBC n-3 LCPUFA status.

General information
State: Published
Organisations: Division of Seafood Research, National Food Institute, Division of Food Chemistry, National Institute of Aquatic Resources, University of Copenhagen, Aalborg University Hospital, BioMar A/S
Authors: Hallund, J. (Ekstern), Madsen, B. O. (Ekstern), Bügel, S. H. (Ekstern), Jacobsen, C. (Intern), Jakobsen, J. (Intern), Krarup, H. (Ekstern), Holm, J. (Ekstern), Nielsen, H. H. (Intern), Lauritzen, L. (Ekstern)
Pages: 1528-1536
Publication date: 2010
Main Research Area: Technical/natural sciences

Publication information
Journal: British Journal of Nutrition
Volume: 104
ISSN (Print): 0007-1145
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.46 SJR 1.983 SNIP 1.533
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.583 SNIP 1.446 CiteScore 3.52
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.468 SNIP 1.278 CiteScore 3.18
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 2.72 SNIP 2.521 CiteScore 3.61
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 2.263 SNIP 2.484 CiteScore 3.12
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 2.079 SNIP 1.661 CiteScore 3.13
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Increased micronuclei and bulky DNA adducts in cord blood after maternal exposures to traffic-related air pollution

Exposure to traffic-related air pollution in urban environment is common and has been associated with adverse human health effects. In utero exposures that result in DNA damage may affect health later in life. Early effects of maternal and in utero exposures to traffic-related air pollution were assessed through the use of validated biomarkers in blood cells from mother-newborn pairs. A cross-sectional biomonitoring study with healthy pregnant women living in the Greater Copenhagen area, Denmark, was conducted. Bulky DNA adducts and micronuclei (MN) were measured in blood from 75
women and 69 umbilical cords, concurrently collected at the time of planned Caesarean section. Modeled residential traffic density, a proxy measure of traffic-related air pollution exposures, was validated by indoor levels of nitrogen dioxide and polycyclic aromatic hydrocarbons in 42 non-smoking homes. DNA adduct levels were similar and positively correlated in maternal and cord blood (1.40 vs. 1.37 n/10(8) nucleotides; r = 0.99; p < 0.01). Maternal MN frequencies were significantly associated with age (p < 0.01), and higher than those of the newborns (7.0 vs. 3.2 MN per 1000 binucleated cells). Adduct levels were highest among mother-newborn pairs who lived near medium-traffic-density (> 400-2500 vehicle km/24 h; p <0.01) places. MN frequencies among newborns from women who lived at high-traffic-density homes (> 2500 vehicle km/24 h) were significantly increased (p = 0.02). This trend remained after adjusting for potential confounders and effect modifiers. For the first time increased bulky DNA adducts and MN in cord blood after maternal exposures to traffic-related air pollution are found, demonstrating that these transplacental environmental exposures induce DNA damage in newborns. Given that increased DNA damage early in life indicate an increased risk for adverse health effects later in life, these findings justify intervention of pregnant women.
Intake of household salt in a Danish population

Objective: To quantify the intake of household salt and its contribution to the total salt intake in a Danish population.

Methods: Eighty-seven healthy individuals (37 men and 50 women), aged 20-55 years, recruited from the area of Copenhagen, completed the study. Total salt intake was estimated from the mean urinary excretion of sodium in four 24-h collections. Household salt, added to the food by the volunteers, was assessed using a lithium-marker technique. Results: Total salt intake was 10.6 +/- 3.3 g day(-1) (mean +/- s.d.) in men and 7.1 +/- 2.3 g day(-1) in women. Median intake of household salt was 1.0 g day(-1) in men and 0.5 g day(-1) in women, corresponding to 10.2 and 8.7% of total salt intake in men and women, respectively. A significant difference between sexes was found regarding total salt intake (P < 0.05).
Vitamin D, folate levels and DNA repair activity - preliminary results of measurements in subsets of maternal and umbilical cord blood samples

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Pedersen, M. (Ekstern), Jakobsen, J. (Intern), Neilsen, S. M. (Ekstern), Møller, P. (Ekstern), Knudsen, L. E. (Ekstern)
Pages: 105-105
Publication date: 2009
Main Research Area: Technical/natural sciences

Publication information
Journal: Mutagenesis
Volume: 24
Issue number: 1
ISSN (Print): 0267-8357
Ratings:
BFI (2018): BFI-level 2

Original language: English
household salt intake, salt intake, urinary sodium, lithium-marker technique

DOIs:
10.1038/ejcn.2008.18
Source: orbit
Source-ID: 233162
Publication: Research - peer-review - Journal article - Annual report year: 2009
Vitamin D metabolites in bovine milk and butter

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute, Division of Nutrition
Authors: Jakobsen, J. (Intern), Saxholt, E. (Intern)
Publication date: 2009
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Food Composition and Analysis
ISSN (Print): 0889-1575
Ratings:
BFI (2018): BFI-level 1
Vitamin D status assessed by a validated HPLC method: within and between variation in subjects supplemented with vitamin D3

Objective. The aim of this study was to develop and validate a high-pressure liquid chromatography (HPLC) method for assessing vitamin D status as 25-hydroxyvitamin D2 (S-25OHD2) and 25-hydroxyvitamin D3 (S-25OHD3) in serum.

Material and methods. We assessed the within- and between-subject variation of vitamin D status in serum samples from four different dietary intervention studies in which subjects (n=92) were supplemented with different doses of vitamin D3 (5-12 g/day) and for different durations (4-20 months). Results. The HPLC method was applicable for 4.0-200 nmol S-
25OHD/L, while the within-day and between-days variations were 3.8 % and 5.7 %, respectively. There was a concentration-dependent difference between results obtained by a commercial radioimmunoassay and results from the HPLC method of -5 to 20 nmol 25OHD/L in the range 10-100 nmol 25OHD/L. The between-subject variation estimated in each of the four human intervention studies did not differ significantly (p=0.55). Hence, the pooled standard deviation was 15.3 nmol 25OHD3/L. In the studies with 6-8 samplings during 7-20 months of supplementation, the within-subject variation was 3.9-7.2 nmol 25OHD3/L, while vitamin D status was in the range 47-120 nmol/L. Conclusions. The validated HPLC method was applied in samples from human intervention studies in which subjects were supplemented with vitamin D3. The estimated standard deviation between and within subjects is useful in the forthcoming decision on setting limits for optimal vitamin D status.

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute, Division of Nutrition
Authors: Jakobsen, J. (Intern), Bysted, A. (Intern), Andersen, R. (Intern), Bennett, T. (Ekstern), Brot, C. (Ekstern), Bugel, S. (Ekstern), Cashman, K. D. (Ekstern), Denk, E. (Ekstern), Harrington, M. (Ekstern), Teucher, B. (Ekstern), Walczyk, T. (Ekstern), Ovesen, L. (Ekstern)
Pages: 190-197
Publication date: 2009
Main Research Area: Technical/natural sciences

Publication information
Journal: Scandinavian Journal of Clinical & Laboratory Investigation
Volume: 69
Issue number: 2
ISSN (Print): 0036-5513
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.584 SNIP 0.69 CiteScore 1.4
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.729 SNIP 0.741 CiteScore 1.79
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.746 SNIP 0.897 CiteScore 1.9
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.632 SNIP 0.676 CiteScore 1.84
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.482 SNIP 0.67 CiteScore 1.43
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.545 SNIP 0.769 CiteScore 1.54
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.54 SNIP 0.703
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.453 SNIP 0.607
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.487 SNIP 0.588
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.49 SNIP 0.598
Bioactivity of vitamin D sources

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Jakobsen, J. (Intern), Bysted, A. (Intern), Bügel, S. (Ekstern), Hels, O. (Intern), Jensen, H. (Ekstern), Maribo, H. (Ekstern), Sommer, H. M. (Intern)
Publication date: 2008
Event: Poster session presented at 9th Nordic Nutrition Conference, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 235297
Publication: Research - poster – Annual report year: 2008

Does the nutrition profile of vitamins, fatty acids and microelements counteract the negative impact from organohalogen pollutants on bone mineral density in Greenland sledge dogs (Canis familiaris)?
There is a great need for understanding the impact from dietary OHCs (organohalogen compounds) on bone mineral composition - and thereby osteoporosis - in especially arctic wildlife such as polar bears (Ursus maritimus) as well as humans. For that purpose, we measured BMD (bone mineral density) by DXA scanning (g/cm^(-2)) in 15 age and weight normalized sledge dog (Canis familiaris) bitches and their 26 pups divided into a control group (n = 26) given 50-200 g/day clean pork (Sus scrofa) fat and a treated group (n = 15) given 50-200 g/day OHC polluted minke whale (Balaenoptera acutorostrata) blubber as main lipid sources. The results showed that BMD increased significantly with age (linear regression: p 0.0001, r^2=0.83, n=41) while no sex difference was found in the F-generation (two-way ANOVA: all p>0.3). No differences in BMDfemur or BMDvertebrae between exposed and control individuals in the bitch generation were found (linear mixed effect model: both p > 0.38). Likewise, no difference between exposed and control subadults and juveniles in the F-generation was found (two-way ANOVA: all p>0.33). Correlation analyses between BMDfemur, BMDvertebrae and groups of OHCs, respectively, did not show any statistically significant relationships nor a clear or decreasing trend (Pearson's: p: 0.07-0.78; r: -0.2-0.59; n: 10-18). As the groups were similar regarding genetics, age and sex are the only factors that can explain this observation. Either the pollutants did not have an impact on BMD using the present time frame and OHC concentrations (threshold levels not reached), or the difference in food composition (mainly vitamins and n3 fatty acids) conceal the potential OHC impact on BMD. Such information is important when evaluating the positive and negative health consequences from eating polluted marine species. (C) 2008 Elsevier Ltd. All rights reserved.

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Sonne, C. (Ekstern), Riget, F. F. (Ekstern), Jensen, J. B. (Ekstern), Hyldstrup, L. (Ekstern), Teilmann, J. (Ekstern), Dietz, R. (Ekstern), Kirkegaard, M. (Ekstern), Andersen, S. (Ekstern), Letcher, R. J. (Ekstern), Jakobsen, J. (Intern)
Pages: 811-820
Publication date: 2008
Main Research Area: Technical/natural sciences

Publication information
Journal: Environment International
Effect of vitamin D supplementation on bone and vitamin D status among Pakistani immigrants in Denmark: a randomised double-blinded placebo-controlled intervention study

Severe vitamin D deficiency is common among Muslim immigrants. The dose necessary to correct the deficiency and its consequence for bone health are not known for immigrants. The aim was to assess the effect of relatively low dosages of supplemental vitamin D on vitamin D and bone status in Pakistani immigrants. This 1-year-long randomised double-blinded placebo-controlled intervention with vitamin D-3 (10 and 20 μg/d) included girls (10.1 - 14.7 years), women (18.1 - 52.7 years) and men (17.9-63.5 years) of Pakistani origin living in Denmark. The main endpoints were serum 25-hydroxyvitamin D (S-25OHD), parathyroid hormone, bone turnover markers and bone mass. The study showed that supplementation with 10 and 20 μg vitamin D-3 per d increased S-25OHD concentrations similarly in vitamin D-deficient Pakistani women (4-fold), and that 10 μg increased S-25OHD concentrations 2-fold and 20 μg 3-fold in Pakistani men. S-25OHD concentrations increased at 6 months and were stable thereafter. Baseline S-25OHD concentrations tended to be lower in girls and women than in men; females achieved about 46 nmol/l and men 55 nmol/l after supplementation. Serum intact parathyroid hormone concentrations decreased at 6 months, but there was no significant effect of the intervention on bone turnover markers and dual-energy X-ray absorptiometry measurements of the whole body and lumbar spine.

General information
State: Published
Organisations: Division of Nutrition, National Food Institute, Division of Food Chemistry
Authors: Andersen, R. (Intern), Mølgaard, C. (Ekstern), Skovgaard, L. T. (Ekstern), Brot, C. (Ekstern), Cashman, K. D. (Ekstern), Jakobsen, J. (Intern), Lamberg-Allardt, C. (Ekstern), Ovesen, L. (Ekstern)
Pages: 197-207
Publication date: 2008
Main Research Area: Technical/natural sciences

Publication information
Journal: British Journal of Nutrition
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ISSN (Print): 0007-1145
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BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.46 SJR 1.983 SNIP 1.533
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.583 SNIP 1.446 CiteScore 3.52
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.468 SNIP 1.278 CiteScore 3.18
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 2.72 SNIP 2.521 CiteScore 3.61
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 2.263 SNIP 2.484 CiteScore 3.12
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 2.079 SNIP 1.661 CiteScore 3.13
ISI indexed (2011): ISI indexed yes
Optimisation of the determination of thiamin, 2-(1-hydroxyethyl)thiamin, and riboflavin in food samples by use of HPLC

The aim of this study was first to optimise and validate a method using an enzyme-mixture to liberate protein- and phosphate-bound thiamin and riboflavin in food by the use of ultrasonication and HPLC, and second to include the quantitation of the vitamin B-1 active compound 2-(1-hydroxyethyl)thiamin (HET). The enzyme-mixture consisted of (x-amylase, proteinase, and phosphatase. The use of ultrasonication in the enzyme treatment enabled the results for vitamin B-1 and B-2 to be obtained in 1 day. In consequence of an incomplete release of phosphate-bound thiamin of some of the batches of enzymes used, thiamin was quantitated as the sum of thiaminmonophosphate and thiamin. The vitamin B, active compound, HET was detected and quantitated separately. The standard deviations for the method were 3.7%, 4.7%, and 13.3% for thiamin, riboflavin, and HET, respectively. The relative bioactivity of HET is similar to the bioactivity of thiamin. In the samples of animal origin the content of HET represented 7-24% of the content of thiamin, while in dried yeast the content of HET was 37% of the content of thiamin. Quantitation of vitamin B-1 in food by a post-column derivatisation is recommended to include separate quantitation of thiamin and HET.

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Jakobsen, J. (Intern)
Pages: 1209-1217
Publication date: 2008
Main Research Area: Technical/natural sciences

Publication information
Journal: Food Chemistry
Volume: 106
Issue number: 3
HPLC, vitamins, food composition, HET, riboflavin, thiamin, ultrasonication
Pakistani Immigrant Children and Adults in Denmark Have Severely Low Vitamin D Status

Objective: To determine vitamin D and bone status in adolescent girls, pre-menopausal women and men of Pakistani origin, to single out determinants of vitamin D status and to determine the association between vitamin D status, bone metabolism and bone status. Subjects/Methods: Cross-sectional study, Copenhagen (55 degrees N), January- November. Serum 25-hydroxyvitamin D (S-25OHD), serum intact parathyroid hormone (S-iPTH), bone turnover markers and whole body and lumbar spine bone mineral density were measured. Sun, smoking and clothing habits, age, body mass index (BMI), and vitamin D and calcium from food and from supplements were recorded. Thirty-seven girls (median age, range: 12.2 years, 10.1 - 14.7), 115 women (36.2 years, 18.1 - 52.7) and 95 men (38.3 years, 17.9 - 63.5) of Pakistani origin (immigrants or descendants with Pakistani parents) took part in the study. Results: Median concentration of S-25OHD was 10.9, 12.0 and 20.7 nmol/l for girls, women and men, respectively. Forty-seven per cent of the girls, 37% of the women and 24% of the men had elevated S-iPTH, and there was a negative relationship between S-iPTH and S-25OHD. Use of vitamin D-containing supplements had a positive association with S-25OHD for men (P = 0.04) and women (P = 0.0008). Twenty-one per cent of the women and 34% of the men had osteopenia. Neither S-25OHD nor S-iPTH was associated with lumbar spine or whole body bone mineral content. Conclusions: Severely low vitamin D status and elevated S-iPTH is common among Pakistani immigrants in Denmark. The low vitamin D status is not associated with bone markers or bone mass among relatively young Pakistanis.

General information
State: Published
Organisations: Division of Nutrition, National Food Institute, Division of Food Chemistry
Authors: Andersen, R. (Intern), Mølgaard, C. (Ekstern), Skovgaard, L. T. (Ekstern), Brot, C. (Ekstern), Cashman, K. D. (Ekstern), Jakobsen, J. (Intern), Lamberg-Allardt, C. (Ekstern), Ovesen, L. (Ekstern)
Pages: 625-634
Publication date: 2008
Main Research Area: Technical/natural sciences

Publication information
Journal: European Journal of Clinical Nutrition
Volume: 62
Issue number: 5
ISSN (Print): 0954-3007
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.8 SJR 1.347 SNIP 1.179
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.586 SNIP 1.192 CiteScore 2.86
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.516 SNIP 1.183 CiteScore 2.78
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.422 SNIP 1.329 CiteScore 3.15
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.413 SNIP 1.22 CiteScore 3
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Potency of vitamin D sources

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute, Division of Microbiology and Risk Assessment
Authors: Jakobsen, J. (Intern), Bügel, S. (Ekstern), Hels, O. (Ekstern), Jensen, H. (Ekstern), Maribo, H. (Ekstern), Sommer, H. M. (Intern)
Publication date: 2008
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 233250
Publication: Research - peer-review › Journal article – Annual report year: 2008

Relative validity of a food frequency questionnaire used in the Inter99 study

General information
State: Published
Organisations: National Food Institute, Division of Food Chemistry
Authors: Toft, U. (Ekstern), Kristoffersen, L. (Intern), Ladelund, S. (Ekstern), Bysted, A. (Intern), Jakobsen, J. (Intern), Lau, C. (Ekstern), Jørgensen, T. (Ekstern), Borch-Johnsen, K. (Ekstern), Ovesen, L. (Ekstern)
Publication: Research › Conference abstract for conference – Annual report year: 2008
Sodium and bone health: The impact of moderately high and low salt intakes on calcium metabolism in postmenopausal women

High salt intake is a well-recognized risk factor for osteoporosis because it induces calciuria, but the effects of salt on calcium metabolism and the potential impact on bone health in postmenopausal women have not been fully characterized. This study investigated adaptive mechanisms in response to changes in salt and calcium intake in postmenopausal women. Eleven women completed a randomized cross-over trial consisting of four successive 5-wk periods of controlled dietary intervention, each separated by a minimum 4-wk washout. Moderately low and high calcium (518 versus 1284 mg) and salt (3.9 Versus 11.2 g) diets, reflecting lower and upper intakes in post menopausal women consuming a Western-style diet, were provided. Stable isotope labeling techniques were used to measure calcium absorption and excretion, compartmental modeling was undertaken to estimate bone calcium balance, and biomarkers of bone formation and resorption were measured in blood and urine. Moderately high salt intake (11.2 g/d) elicited a significant increase in urinary calcium excretion (p = 0.0008) and significantly affected bone calcium balance with the high calcium diet (p = 0.024). Efficiency of calcium absorption was higher after a period of moderately low calcium intake (p < 0.05) but was unaffected by salt intake. Salt was responsible for a significant change in bone calcium balance, from positive to negative, when consumed as part of a high calcium diet, but with a low calcium intake, the bone calcium balance was negative on both high and low salt diets.
Specific data for vitamin D in milk

**General information**
State: Published
Organisations: Division of Food Chemistry, National Food Institute, Division of Nutrition
Authors: Jakobsen, J. (Intern), Saxholt, E. (Intern)
Publication date: 2008
Event: Poster session presented at 9th Nordic Nutrition Conference, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 235284
Publication: Research › Poster – Annual report year: 2008

Vitamin B1 – not only thiamine and its phosphates

**General information**
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Jakobsen, J. (Intern), Rasmussen, T. (Ekstern), Strandler, H. S. (Ekstern)
Publication date: 2008
Event: Poster session presented at AOAC Annual meeting, Dallas, US.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 235292
Publication: Research › Poster – Annual report year: 2008

Vitamin B1 – quantification of thiamine and 2-(1-hydroxyethyl)thiamine a necessity

**General information**
25-Hydroxyvitamin D-3 affects vitamin D status similar to vitamin D-3 in pigs - but the meat produced has a lower content of vitamin D

In food databases, the specific contents of vitamin D-3 and 25-hydroxyvitamin D-3 in food have been implemented in the last 10 years. No consensus has yet been established on the relative activity between the components. Therefore, the objective of the present study was to assess the relative activity of 25-hydroxyvitamin D-3 compared to vitamin D-3. The design was a parallel study in pigs (n 24), which from an age of 12 weeks until slaughter 11 weeks later were fed approximately 55 μg vitamin D/d, as vitamin D-3, in a mixture of vitamin D-3 and 25-hydroxyvitamin D-3, or 25-hydroxyvitamin D-3. The end-points measured were plasma 25-hydroxyvitamin D-3, and in the liver and loin the content of vitamin D-3 and 25-hydroxyvitamin D-3 Vitamin D-3 and 25-hydroxyvitamin D3 in the feed did not affect 25-hydroxyvitamin D-3 in the plasma, liver or loin differently, while a significant effect was shown on vitamin D-3 in the liver and loin (P

General information

State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Jakobsen, J. (Intern), Rasmussen, T. (Ekstern), Strandler, H. S. (Ekstern)
Publication date: 2008
Event: Poster session presented at 9th Nordic Nutrition Conference, Copenhagen, Denmark.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 235293
Publication: Research › Poster – Annual report year: 2008
Afprøvning af to D3-vitaminkilder: 25-hydroxy D3-vitamin som alternativ til den traditionelt anvendte D3-vitamin kilde

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Maribo, H. (Ekstern), Nielsen, D. H. (Ekstern), Jakobsen, J. (Intern)
Publication date: 2007

Publication information
Source/Publisher: http://www.infosvin.dk
Main Research Area: Technical/natural sciences
Links:

An investigation of a possible nutritional interaction between vitamin D and K status in Danish girls

General information
State: Published
Bioactivity of vitamin D sources

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute, Division of Nutrition, Division of Microbiology and Risk Assessment
Authors: Jakobsen, J. (Intern), Bysted, A. (Intern), Bügel, S. (Ekstern), Hels, O. (Intern), Jensen, H. (Ekstern), Maribo, H. (Ekstern), Sommer, H. M. (Intern)
Publication date: 2007
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 238925
Publication: Research › Poster – Annual report year: 2007

Bioactivity of vitamin D sources

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute, Division of Nutrition, Division of Microbiology and Risk Assessment
Authors: Jakobsen, J. (Intern), Bysted, A. (Intern), Bügel, S. (Ekstern), Hels, O. (Intern), Jensen, H. (Ekstern), Maribo, H. (Ekstern), Sommer, H. M. (Intern)
Publication date: 2007
Event: Poster session presented at 7th International Food Data Conference, Sao Paolo, Brazil.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 238926
Publication: Research › Poster – Annual report year: 2007

Bioavailability and bioactivity of vitamin D3 active compounds – Which potency should be used for 25-hydroxyvitamin D3?

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Jakobsen, J. (Intern)
Number of pages: 332
Pages: 133-142
Publication date: 2007

Host publication information
Title of host publication: Nutritional Aspects of Osteoporosis 2006 : International Congress Series 1297
Publisher: Elsevier
ISBN (Print): 978-0444528872
Main Research Area: Technical/natural sciences
Conference: 6th international Symposium on Nutritional Aspects of Osteoporosis, Lausanne, Switzerland, 04/05/2006 - 04/05/2006
Source: orbit
Source-ID: 238920
Publication: Research › Article in proceedings – Annual report year: 2007

Bioavailability and bioactivity of vitamin D sources – pigs used as models for humans

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Jakobsen, J. (Intern), Bysted, A. (Intern), Maribo, H. (Ekstern)
Publication date: 2007

Publication information
Original language: English
Main Research Area: Technical/natural sciences
Dietary supplementation with an extract of lycopene-rich tomatoes does not reduce atherosclerosis in Watanabe Heritable Hyperlipidemic rabbits

Tomatoes are rich in lycopene and other carotenoids which have shown beneficial effects on CVD in epidemiological and intervention studies. In the present study the effect of an extract of lycopene-rich tomatoes, Lyc-O-Mato (R) on atherosclerosis was studied in Watanabe Heritable Hyperlipidemic rabbits. The rabbits were fed a control diet, a control diet supplemented with the tomato extract or a control diet supplemented with a mixture of plant oils for 16 weeks. Lycopene was detected only in plasma of rabbits receiving tomato extract. The tomato extract had no effect on cholesterol and triacylglycerol levels measured in total plasma, lipoprotein fractions and on aortic atherosclerosis evaluated biochemically and by microscopy. Oxidation of lipids in unfractionated plasma also was unaffected by the intake of tomato extract. In conclusion, the tomato extract increased plasma levels of lycopene in rabbits, but had no effect on hypercholesterolaemia, oxidation of plasma lipids or aortic atherosclerosis.

General information
State: Published
Organisations: Division of Toxicology and Risk Assessment, National Food Institute, Division of Food Chemistry
Pages: 6-10
Publication date: 2007
Main Research Area: Technical/natural sciences

Publication information
Journal: British Journal of Nutrition
Volume: 97
Issue number: 1
ISSN (Print): 0007-1145
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.46 SJR 1.983 SNIP 1.533
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.583 SNIP 1.446 CiteScore 3.52
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.468 SNIP 1.278 CiteScore 3.18
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 2.72 SNIP 2.521 CiteScore 3.61
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 2.263 SNIP 2.484 CiteScore 3.12
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 2.079 SNIP 1.661 CiteScore 3.13
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.248 SNIP 1.277
Effect of phylloquinone supplementation on biochemical markers of vitamin K status and bone turnover in postmenopausal women

While current intakes of phylloquinone (vitamin K-1) in many populations are believed to be sufficient to maintain normal blood coagulation, these may be insufficient to cover the requirements for optimal bone metabolism. Therefore, the objective of the present study was to investigate the effect of increasing phylloquinone intakes above the usual dietary intake for 6 weeks on biochemical markers of vitamin K status and bone turnover in postmenopausal women. Thirty-one postmenopausal women completed this 3 X 6-week randomised cross-over study, in which volunteers were supplemented with 0 (placebo), 200, and 500 μg phylloquinone/d. In addition, the volunteers were given 10 μg vitamin D-3/d throughout the study period. With increasing phylloquinone intake, the concentration of serum gamma-carboxylated and under-gamma-carboxylated osteocalcin was significantly increased and decreased, respectively, in a dose-dependent manner (P <0.001). Mean serum phylloquinone concentration was significantly (P <0.001) higher with daily supplementation with 500 μg phylloquinone/d compared with that during either of the placebo or 200 μg phylloquinone/d supplementation periods, which did not differ (P=0.15). Serum total osteocalcin was significantly (P <0.001) increased in response to daily supplementation with 500 (but not 200) μg g phylloquinone compared with placebo. Serum bone-specific alkaline phosphatase as well as the urinary markers of bone resorption (N-telopeptide cross-links of collagen, pyridinoline and deoxypyridinoline) and urinary gamma-carboxyglutarnate were unaffected by phylloquinone supplementation. In conclusion, while daily supplementation with 200 and 500 μg g phylloquinone/d for 6 weeks increased vitamin K status in postmenopausal women, it had no effect on bone turnover.

General information
State: Published
Organisations: Division of Nutrition, National Food Institute, Division of Food Chemistry, Royal Veterinary and Agricultural University
Authors: Bugel, S. (Ekstern), Sorensen, A. D. (Ekstern), Hels, O. (Intern), Kristensen, M. (Ekstern), Vermeer, C. (Ekstern), Jakobsen, J. (Intern), Flynn, A. (Ekstern), Molgaard, C. (Ekstern), Cashman, K. D. (Ekstern)
Pages: 373-380
Publication date: 2007
Main Research Area: Technical/natural sciences

Publication information
Journal: British Journal of Nutrition
Volume: 97
Issue number: 2
ISSN (Print): 0007-1145
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.46 SJR 1.983 SNIP 1.533
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.583 SNIP 1.446 CiteScore 3.52
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.468 SNIP 1.278 CiteScore 3.18
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 2.72 SNIP 2.521 CiteScore 3.61
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 2.263 SNIP 2.484 CiteScore 3.12
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 2.079 SNIP 1.661 CiteScore 3.13
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 1.248 SNIP 1.277
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.62 SNIP 0.581
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 0.956 SNIP 1.199
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.941 SNIP 1.192
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 0.71 SNIP 0.924
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 0.513 SNIP 1.152
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.627 SNIP 1.109
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 0.738 SNIP 1.53
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 0.959 SNIP 1.804
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 0.821 SNIP 1.519
Freshwater fish as a dietary source of vitamin A in Cambodia

Vitamin A deficiency is a public health problem among children and women. Common Cambodian fish species were sampled and screened for vitamin A content. Contents of vitamin A-active compounds (all-trans retinol, all-trans dehydroretinol, 13-cis retinol, 13-cis dehydroretinol and P-carotene) were determined by high-performance liquid chromatography in samples of raw, whole fish from 29 fish species and in raw, edible parts from 24 species. Replicate samples were analysed in seven selected species. Two species, Parachela siamensis and Rasbora tomieri had very high vitamin A contents >1500 RAE/100 g raw, whole fish, and six species (Barbodes altus, Barbodes gonionatus, Dermogenys pusilla, Puntioplites protozysron and Thynnichthys thynnoides) had high contents of 500-1500 RAE/100 g raw, whole fish. Two species, Puntioplites protozysron and Thynnichthys thynnoides had high vitamin A contents in raw, edible parts, after employing traditional cleaning practices. (RAE: The amount of vitamin A active compounds in food is expressed as retinol activity equivalents (RAE), defined as the bioefficacy relative to all-trans-retinol [West, C. E., & Eilander, A. (2002). Consequences of revised estimates of carotenoid bioefficacy for the control of vitamin A deficiency in developing countries. Journal of Nutrition, 132, 2920S-2926S]. Dehydroretinoids (vitamin A(2)) are not converted to all-trans-retinol but have similar metabolic functions. In this paper, RAE refers to the functional bioefficacy as defined by Brouwer et al. [Brouwer, I. A., Dusseldorp, M. V., West, C. E., & Steegers-Theunissen, R. P. M. (2001). Bioavailability and bioefficacy of folate and folic acid in man. Nutrition Research Review, 14, 267-293]).

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Roos, N. (Ekstern), Chamnan, C. (Ekstern), Loeung, D. (Ekstern), Jakobsen, J. (Intern), Thilsted, S. H. (Ekstern)
Pages: 1104-1111
Publication date: 2007
Main Research Area: Technical/natural sciences

Publication information
Journal: Food Chemistry
Volume: 103
Issue number: 4
ISSN (Print): 0308-8146
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 4.85 SJR 1.706 SNIP 2.091
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 1.597 SNIP 1.962 CiteScore 4.31
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 1.595 SNIP 2.027 CiteScore 3.92
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 1.548 SNIP 2.069 CiteScore 3.87
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
Potency of vitamin D sources

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute, Division of Microbiology and Risk Assessment, Division of Toxicology and Risk Assessment
Authors: Jakobsen, J. (Intern), Bysted, A. (Intern), Sommer, H. M. (Intern), Bugel, S. (Ekstern), Jensen, H. M. (Intern), Maribo, H. (Ekstern)
Pages: 210-211
Publication date: 2007
Main Research Area: Technical/natural sciences

Publication information
Journal: Annals of Nutrition and Metabolism
Volume: 51
Issue number: Suppl. 1
Seasonal changes in vitamin D status and bone turnover in healthy Irish postmenopausal women

Objectives: To examine the effect of season on biochemical markers of bone turnover in 51-to 75-year-old Irish women and to investigate whether such changes are related to vitamin D status. Design: Longitudinal observational study. Setting: Cork, Ireland (52 degrees N). Subjects: 76 apparently healthy, free-living postmenopausal women (aged 51-75 years), not taking any medication and free from any condition likely to affect vitamin D status or calcium/bone metabolism. Results:
Serum 25-hydroxyvitamin D [S-25(OH)D] showed a clear seasonal variation with significantly higher (p <0.001) values during late summer than late winter. Both urinary pyridinoline (Ur-Pyr) (p <0.01) and deoxypyridinoline (Ur-Dpyr) (p <0.001), but not serum parathyroid hormone or osteocalcin, showed a marked seasonal variation with lowest values during late-summer. Stratifying women into those with S-25(OH)D levels >= or <50 nmol/L (vitamin D adequate and inadequate, respectively) during late-winter, showed that Ur-Pyr and Ur-Dpyr in both groups were significantly (p <0.05) lower during late summer, and the magnitude of the reduction from winter to summer was similar in both groups.

Conclusion: Seasonal changes in bone resorption markers appeared to be linked to seasonal changes in vitamin D status. Further research is needed to investigate the impact of these changes on risk of bone loss and fracture.
Serum percentage undercarboxylated osteocalcin, a sensitive measure of vitamin K status, and its relationship to bone health indices in Danish girls

Recent cross-sectional data suggest that better vitamin K status in young girls (aged 3-16 years) is associated with decreased bone turnover, even though it is not associated with bone mineral content (BMC). The objective of the present study was to investigate the relationship between serum percentage of undercarboxylated osteocalcin (%ucOC), as an index of vitamin K status, and BMC and biochemical indices of bone turnover in peri-pubertal Danish girls. This peri-pubertal stage is a dynamic period of bone development, and as such, may represent an important window of opportunity for vitamin K status to modulate childhood bone health. Serum %ucOC and serum 25-hydroxyvitamin D (25 (OH) D) were measured at baseline in a study of 223 healthy girls aged 11-12 years. Urinary pyridinium crosslinks of collagen and serum total osteocalcin as markers of bone resorption and formation, respectively, as well as BMC (total body and lumbar spine) were also measured. Serum %ucOC (median 21.9 %) was not associated with markers of bone resorption or with total osteocalcin. Serum %ucOC was inversely correlated with serum 25 (OH) D (r - 0.143; P
Vitamin B1 – quantification of thiamine and 2-(1-hydroxyethyl)thiamine a necessity

**General information**
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Jakobsen, J. (Intern), Rasmussen, T. (Ekstern), Strandler, H. S. (Ekstern)
Publication date: 2007
Event: Poster session presented at 7th International Food Data Conference, Sao Paolo, Brazil.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 214358
Publication: Research › Poster – Annual report year: 2007

Vitamin D metabolites in milk products

**General information**
State: Published
Organisations: Division of Food Chemistry, National Food Institute, Division of Nutrition
Authors: Jakobsen, J. (Intern), Saxholt, E. (Intern)
Publication date: 2007

**Publication information**
Original language: English
Vitamin D status and effect of vitamin D supplementation among Pakistani immigrants in Denmark

General information
State: Published
Organisations: Division of Nutrition, National Food Institute, Division of Food Chemistry
Authors: Andersen, R. (Intern), Mølgaard, C. (Ekstern), Skovgaard, L. T. (Ekstern), Brot, C. (Ekstern), Cashman, K. D. (Ekstern), Jakobsen, J. (Intern), Lamberg-Allardt, C. (Ekstern), Ovesen, L. (Ekstern)
Publication date: 2007
Event: Abstract from Danish Nutrition Society Annual Meeting, Odense, Denmark, .
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 246055
Publication: Research › Conference abstract for conference – Annual report year: 2007

A positive dose-response effect of vitamin D supplementation on site-specific bone mineral augmentation in adolescent girls: A double-blinded randomized placebo-controlled 1-year intervention
The effect of vitamin D supplementation on bone mineral augmentation in 212 adolescent girls with adequate calcium intake was studied in a randomized placebo-controlled setting. Bone mineral augmentation determined by DXA increased with supplementation both in the femur and the lumbar vertebrae in a dose-responsive manner. Supplementation decreased the urinary excretion of resorption markers, but had no impact on formation markers.

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Pages: 836-844
Publication date: 2006
Main Research Area: Technical/natural sciences
Publication information
Journal: Journal of Bone and Mineral Research
Volume: 21
Issue number: 6
ISSN (Print): 0884-0431
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 2
Scopus rating (2016): SJR 2.712 SNIP 2.008 CiteScore 5.48
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.819 SNIP 1.941 CiteScore 5.82
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 3.507 SNIP 2.363 CiteScore 6.49
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 3.345 SNIP 2.243 CiteScore 6.75
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 3.056 SNIP 2.059 CiteScore 6.23
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 3.434 SNIP 2.168 CiteScore 6.24
ISI indexed (2011): ISI indexed yes
A seasonal variation of calcitropic hormones, bone turnover and bone mineral density in early and mid-puberty girls - A cross-sectional study

The importance of the seasonal variation of calcitropic hormones to growing skeleton has not been established. We studied whether there exists a seasonal variation in calcitropic hormones, bone mineral density (BMD) and bone remodelling markers in early puberty girls. One hundred and ninety-six girls, mean age 11.4 (sd 0.4) years, in Tanner stage 2 (early puberty) and 3 (mid-puberty) were studied during September to March. The BMD was measured from the lumbar vertebrae and the left femur by dual-energy X-ray absorptiometry. Their serum 25-hydroxyvitamin D (S-25-OHD), serum intact parathyroid hormone (S-iPTH), serum osteocalcin, urinary pyridinoline and urinary deoxypyridinoline were analysed from fasting samples. The concentration of S-25-OHD and serum osteocalcin differed among months (P < 0.01), reflecting a seasonal variation. The parathyroid hormone correlated negatively with S-25-OHD (r = -0.325, P < 0.001). Moreover, the BMD in the femur (P = 0.047) and to a lesser extent in vertebrae (P = 0.057) differed between months in early puberty girls but this was not seen in mid-puberty. Seasonal variation in S-25-OHD and bone remodelling markers accompanied by negative correlation between S-25-OHD and S-iPTH was seen in this cross-sectional study of adolescent girls. In addition, the seasonal rhythm contributed 7.0-7.6% difference in the BMD of lumbar vertebrae and left femur in early puberty girls. This variation should be avoided since it could hamper peak bone mass attainment.

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Viljakainen, H. (Ekstern), Palssa, A. (Ekstern), Karkkainen, M. (Ekstern), Jakobsen, J. (Intern), Cashman, K. (Ekstern), Mølgaard, C. (Ekstern), Lamberg-Allardt, C. (Ekstern)
Pages: 124-130
Publication date: 2006
Main Research Area: Technical/natural sciences

Publication information
Journal: British Journal of Nutrition
Volume: 96
Issue number: 1
ISSN (Print): 0007-1145
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
adolescent girls, bone remodelling markers, seasonal variation, 25-hydroxyvitamin D, bone mineral density, cross-sectional study
Bread fortified with cholecalciferol increases the serum 25-hydroxyvitamin D concentration in women as effectively as a cholecalciferol supplement

Fortification of foods is a feasible way of preventing low vitamin D status. Bread could be a suitable vehicle for fortification because it is a common part of diets worldwide. The bioavailability of cholecalciferol from bread is not known. We studied cholecalciferol stability, the concentration of the added cholecalciferol, the dispersion of cholecalciferol in bread, and the bioavailability of cholecalciferol from fortified bread. Three batches of fortified low-fiber wheat and high-fiber rye breads were baked; from each batch, 3 samples of dough and bread were analyzed for their cholecalciferol content. In a single-blind bioavailability study, 41 healthy women, 25–45 y old, with mean serum 25-hydroxyvitamin D concentration 29 nmol/L (range 12–45 nmol/L), were randomly assigned to 4 study groups. Each group consumed fortified wheat bread, fortified rye bread, regular wheat bread (control), or regular wheat bread and a cholecalciferol supplement (vitamin D control) daily for 3 wk. The daily dose of vitamin D was 10 μg in all groups except the control group. The vitamin dispersed evenly in the breads and was stable. Both fortified breads increased serum 25-hydroxyvitamin D concentration as effectively as the cholecalciferol supplement. Supplementation or fortification did not affect serum intact parathyroid hormone concentration or urinary calcium excretion. In conclusion, fortified bread is a safe and feasible way to improve vitamin D nutrition.

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Natri, A. M. (Ekstern), Salo, P. (Ekstern), Vikstedt, T. (Ekstern), Palssa, A. (Ekstern), Huttunen, M. (Ekstern), Karkkainen, M. U. M. (Ekstern), Salovaara, H. (Ekstern), Piironen, V. (Ekstern), Jakobsen, J. (Intern), Lamberg-Allardt, C. J. (Ekstern)
Pages: 123-127
Publication date: 2006
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Nutrition
Volume: 136
Issue number: 1
ISSN (Print): 0022-3166
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 3.93 SJR 1.956 SNIP 1.335
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): SJR 2.271 SNIP 1.505 CiteScore 4.08
BFI (2014): BFI-level 2
Scopus rating (2014): SJR 2.089 SNIP 1.596 CiteScore 4.13
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): SJR 2.172 SNIP 1.614 CiteScore 4.6
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): SJR 1.919 SNIP 1.671 CiteScore 4.45
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): SJR 1.838 SNIP 1.603 CiteScore 4.32
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 1.7 SNIP 1.575
BFI (2009): BFI-level 2
Scopus rating (2009): SJR 1.559 SNIP 1.545
Evaluation of Ca-41 as a new approach to assess changes in bone metabolism: effect of a three month calcium supplementation in post-menopausal women

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Publication date: 2006
Event: Poster session presented at 6th international Symposium on Nutritional Aspects of Osteoporosis, Lausanne, Switzerland.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 238820
Publication: Research - peer-review › Journal article – Annual report year: 2006

How much vitamin D-3 do the elderly need?
Background: Vitamin D insufficiency poses a problem in many parts of the world, the elderly being an especially vulnerable group. This insufficiency results from an inadequate amount of sunshine and a low dietary intake of vitamin D. Typically, insufficiency is accompanied with high intact parathyroid hormone, (S-iPTH) concentrations. Aims of the Study: We studied how serum 25-hydroxy vitamin D (S-25-OHD) concentrations respond to different doses of vitamin D3 supplementation. Secondly to determine the smallest efficient dose to maintain serum 25-OHD concentration above the insufficiency level. We also studied which dose would be efficient in decreasing S-iPTH concentration in these subjects.
Subjects and Methods: Forty-nine 65- to 85-year-old women participated. The women were randomly assigned into one of four groups receiving 0 (placebo), 5, 10 or 20 μg of vitamin D3 daily for 12 weeks. Fasting morning blood was drawn at the beginning of the study, and thereafter every second week. Calciotropic variables were assessed from serum and urine samples. Results: The S-25-OHD concentration increased significantly (p <0.001) in all supplemented groups [5 μg: by 10.9 (8.5) nmol/L, 10 μg: by 14.4 (6.9) nmol/L, 20 μg: by 23.7 (11.9) nmol/L], whereas it decreased in the placebo group by 8.3 (13.2) nmol/L. Equilibrium in S-25-OHD concentration was reached in all groups after 6 weeks of supplementation at 57.7 (8.9) nmol/L, 59.9 (8.9) nmol/L and 70.9 (8.9) nmol/L in the groups with increasing vitamin D supplementation. The dose-response to supplementation decreased with increasing vitamin D status at baseline, r = -0.513, p = 0.002. S-iPTH tended to decrease in those with highest dose response to supplementation. Conclusions: A clear dose response was noted in S-25-OHD to different doses of vitamin D3. The recommended dietary intake of 15 μg is adequate to maintain the S-25-OHD concentration around 40-55 nmol/L during winter, but if the optimal S-25-OHD is higher than that even higher vitamin D intakes are needed. Interestingly, subjects with lower vitamin D status at baseline responded more efficiently to supplementation than those with more adequate status.
Vitamin D and estrogen receptor-alpha genotype and indices of bone mass and bone turnover in Danish girls

Peak bone mass is a major determinant of osteoporosis risk in later life. It is under strong genetic control; however, little is known about the identity of the genes involved. In the present study, we investigated the relationship between polymorphisms in the genes encoding the vitamin D receptor (VDR) (FokI, TaqI) and estrogen receptor-alpha (ER alpha) (PvuII, XbaI), and bone mineral density (BMD), bone mineral content (BMC), and markers of bone turnover in 224 Danish girls aged 11-12 years. BMD and BMC were measured by dual-energy X-ray absorptiometry. Serum osteocalcin, 25(OH)D, and parathyroid hormone (PTH) were measured by ELISA assays and urinary pyridinium cross-links by HPLC. Physical activity, dietary calcium, and Tanner stage were assessed by questionnaire. In general, there were no significant differences in anthropometrical variables, physical activity, dietary calcium, serum 25(OH)D, or PTH among genotype groups. BMD or BMC of lumbar spine or whole body (adjusted for body and bone size and pubertal status) were not associated with VDR or ER alpha genotypes or the combination of these genotypes. This lack of association remained even after adjustment for dietary and environmental factors. VDR genotypes had no effect on bone turnover markers. XX and PP ER alpha genotypes were associated (P <0.05) with reduced levels of urinary pyridinium cross-links, whereas serum osteocalcin was similar among genotypes. These findings suggest that the rate of bone resorption was influenced by ER alpha genotypes, even though these biochemical differences were not evident in bone mass indices.

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Cusack, S. (Ekstern), Mølgaard, C. (Ekstern), Michaelsen, K. F. (Ekstern), Jakobsen, J. (Intern), Lamberg-Allardt, C. J. E. (Ekstern), Cashman, K. D. (Ekstern)
Pages: 329-336
Publication date: 2006
Main Research Area: Technical/natural sciences

Publication information
Journal: Journal of Bone and Mineral Metabolism
Volume: 24
Issue number: 4
ISSN (Print): 0914-8779
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.855 SNIP 1.086 CiteScore 2.27
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.802 SNIP 1.068 CiteScore 2.12
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.941 SNIP 0.995 CiteScore 2.44
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.846 SNIP 1.195 CiteScore 2.51
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.882 SNIP 1.081 CiteScore 2.46
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 1.33 SNIP 1.166 CiteScore 2.56
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.977 SNIP 1.061
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.824 SNIP 0.892
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.889 SNIP 1.302
Scopus rating (2007): SJR 0.87 SNIP 0.839
Scopus rating (2006): SJR 0.681 SNIP 0.855
Web of Science (2006): Indexed yes
Vitamin D intake and status in Irish elderly women and adolescent girls

Aim To assess vitamin D status during summer and winter in Irish girls and elderly women, and to estimate vitamin D intake in these two age-groups. Methods Ambulatory free-living, elderly Irish women (aged 70-76 years; n = 43) and girls (aged 11-13 years; n = 17) were recruited. Fasting serums were collected during August/ September 2002 and February/March 2003 and analysed for 25 (OH) D by HPLC. Results Mean daily intakes of vitamin D were 4.6 μg and 2.1 μg in elderly women and girls, respectively. Serum 25 (OH) D was significantly lower (P
Vitamin D status of 51-75-year-old Irish women: its determinants and impact on biochemical indices of bone turnover

Objectives: To assess the vitamin D status of Irish postmenopausal women during wintertime, and to examine its relationship with serum parathyroid hormone (PTH) and biochemical markers of bone turnover. In addition, the determinants of wintertime serum 25-hydroxyvitamin D (25OH-D) levels in these women were investigated.

Design: A cross-sectional observational study.

Setting: Cork City, Ireland (52 degrees N).

Subjects: Ninety-five apparently healthy, free-living postmenopausal women (aged 51-75 years), not taking any medication and free from any condition likely to affect vitamin D status or calcium/bone metabolism.

Results: Forty-eight per cent and 7% of women had serum 25OH-D levels <50 nmol l(-1) and <25 nmol l(-1), respectively. 25OH-D levels in these women were positively associated with dietary calcium intake (P=0.0002) and use of vitamin D-containing supplements (P=0.031), and negatively associated with cigarette smoking (P=0.027) and body mass index (BMI) (P=0.030). Low serum 25OH-D levels (<50 nmol l(-1)) were associated (P <0.01) with elevated serum PTH levels. There were no significant differences in urinary pyridinium crosslinks or serumosteocalcin, biochemical indices of bone turnover, between subjects with serum 25OH-D levels above or below 50 nmol l(-1).

Conclusion: A high proportion of Irish postmenopausal women had low vitamin D status (<50 nmol l(-1)) during late wintertime, which appeared to lead to elevated levels of serum PTH but not of bone turnover markers.

Use of regular low-dose supplemental vitamin D, meeting daily calcium recommendations, cessation of smoking and maintaining BMI in the normal range are important factors that could help maintain adequate vitamin D levels during wintertime in these women.

General Information

State: Published
Organisations: Division of Food Chemistry, National Food Institute
Pages: 225-233
Publication date: 2006
Main Research Area: Technical/natural sciences

Publication Information
Journal: Public Health Nutrition
Volume: 9
Issue number: 2
ISSN (Print): 1368-9800
Ratings:
- BFI (2018): BFI-level 1
- Web of Science (2018): Indexed yes
- BFI (2017): BFI-level 1
- Web of Science (2017): Indexed Yes
- BFI (2016): BFI-level 1
- Scopus rating (2016): CiteScore 2.04 SJR 1.03 SNIP 0.876
- Web of Science (2016): Indexed yes
- BFI (2015): BFI-level 1
- Scopus rating (2015): SJR 0.973 SNIP 0.834 CiteScore 1.82
- Web of Science (2015): Indexed yes
- BFI (2014): BFI-level 1
- Scopus rating (2014): SJR 1.087 SNIP 1.116 CiteScore 2.15
- BFI (2013): BFI-level 1
- Scopus rating (2013): SJR 1.104 SNIP 1.196 CiteScore 2.22
- ISI indexed (2013): ISI indexed yes
- Web of Science (2013): Indexed yes
- BFI (2012): BFI-level 1
- Scopus rating (2012): SJR 1.234 SNIP 1.191 CiteScore 2.22
- ISI indexed (2012): ISI indexed yes
How to validate vitamin D status?

General information
State: Published
Organisations: National Food Institute, Division of Food Chemistry, Division of Nutrition
Authors: Jakobsen, J. (Intern), Andersen, R. (Intern), Bysted, A. (Intern), Rasmussen, L. B. (Intern)
Publication date: 2005

Host publication information
Title of host publication: TemaNord
Main Research Area: Technical/natural sciences
Conference: Nordic Biomarker Seminar, Copenhagen, Denmark, 01/01/2005
Source: orbit
Source-ID: 237749
Publication: Research › Article in proceedings – Annual report year: 2005

Mola - en fisk der kan det hele

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Roos, N. (Ekstern), Wahab, M. A. (Ekstern), Jakobsen, J. (Intern)
Pages: 3
Publication date: 2005
Teenage girls and elderly women living in northern Europe have low winter vitamin D status

Objective: To determine the vitamin D status (serum 25-hydroxyvitamin D: S-25OHD) in adolescent girls and elderly community-dwelling women living in four countries of northern Europe and to explain differences in S-25OHD concentrations between and within the countries. Design: A cross-sectional observational study conducted in a standardised way during February-March. S-25OHD was analysed by high-performance liquid chromatography. Vitamin D and calcium intake was calculated using a standardised food composition database. Setting: Denmark, Finland, Ireland, and Poland. Subjects: A total of 199 girls (mean (s.d.) age 12.6 (0.5) y) and 221 women (mean (s.d.) age 71.8 (1.4) y). Results: The median (inter quartiles) concentration of S-25OHD was 29.4 (20.3, 38.3) nmol/l for the girls and 40.7 (28.0, 54.2) nmol/l for the women. S-25OHD below 25 nmol/l was found in 37% of the girls and 17% of the women, and S-25OHD below 50 nmol/l was found in 92% of the girls and 37% of the women. Positive significant determinants for S-25OHD in girls were use of vitamin D supplements, and in women sun habits, dietary vitamin D intake, use of vitamin D and calcium supplements. Body mass index and smoking were negative determinants in women. For women predictors could explain the differences between countries (P-country=0.09, R-2=0.39), but for girls the difference remained significant even after including predictors (P-country=0.03, R-2=0.15). Conclusion: Vitamin D status is low in northern Europe during winter. More than one-third of the adolescent girls have vitamin D status below 25 nmol/l and almost all are below 50 nmol/l. Two-thirds of the elderly community-dwelling women have vitamin D status below 50 nmol/l. Use of vitamin D supplements is a significant positive determinant for S-25OHD for both girls and women (P=0.001). Sponsorship: The European Fifth Framework Programme (Contract No. QLK1-CT-2000-00623).
Vitamin and mineral intake of twelve male Kalenjin runners in Western Kenya

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Christensen, D. L. (Ekstern), Jakobsen, J. (Intern), Friis, H. (Ekstern)
Pages: 637-642
Publication date: 2005
Main Research Area: Technical/natural sciences

Publication information
Journal: East African Medical Journal
ISSN (Print): 0012-835X
A CROSS-SECTIONAL STUDY OF FINNISH 11-YEAR-OLD GIRLS THE RELATIONSHIP BETWEEN BONE MINERAL DENSITY AND SERUM 25-HYDROXYVITAMIN D

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Pages: S106-S106
Publication date: 2004
Main Research Area: Technical/natural sciences

Publication information
Journal: Calcified Tissue International
Volume: 74
Issue number: Suppl. 1
ISSN (Print): 0171-967X
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 1.207 SNIP 1.08 CiteScore 3.05
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.184 SNIP 1.182 CiteScore 3.13
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.164 SNIP 1.122 CiteScore 2.99
A new method for the determination of vitamin D-3 and 25-hydroxyvitamin D-3 in meat

The total vitamin D content in meat, i.e., vitamin D-3 and 25-hydroxyvitamin D-3, was determined by HPLC after alkaline hydrolysis, solid-phase extraction and semi-preparative HPLC. For detection, a DAD detector between 220 and 320 nm was used and quantification was performed at 265 nm. Vitamin D-2 was used as internal standard for vitamin D-3 as well as for 25-hydroxyvitamin D-3. Precision for vitamin D-3 was determined in lean meat and lard to 9.1% and 7.1%, respectively. The corresponding values for 25-hydroxyvitamin D-3 were 8.9% and 9.9%. Accuracy was determined in spiked samples, which showed a recovery of 94.7% and 99.0% for vitamin D-3 and 25-hydroxyvitamin D-3, respectively. The method is applicable for establishing data for food composition tables. (C) 2004 Elsevier Inc. All rights reserved.
Does vitamin D supplementation to healthy Danish Caucasian girls affect bone mineralization

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
How to validate vitamin D status?

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Jakobsen, J. (Intern)
Publication date: 2004

Hypovitaminosis D in Europe

General information
State: Published
Organisations: Division of Nutrition, National Food Institute, Division of Food Chemistry
Publication date: 2004
Event: Poster session presented at IOF World Congress, Brazil.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 238932
Publication: Research › Poster – Annual report year: 2004

Immigrants - vitamin D, bone accretion and lack of sun exposure

General information
State: Published
Organisations: Division of Nutrition, National Food Institute, Division of Food Chemistry
Authors: Andersen, R. (Intern), Mølgård, C. (Ekstern), Skovgaard, L. T. (Ekstern), Brot, C. (Ekstern), Cashman, K. D. (Ekstern), Jakobsen, J. (Intern), Lamberg-Allardt, C. (Ekstern), Ovesen, L. (Ekstern)
Publication date: 2004
Event: Abstract from Conference on Fortification of food in Europe.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 247719
Publication: Research › Conference abstract for conference – Annual report year: 2004

Seasonal variation of BMC in lumbar spine and hip in early-puberty girls

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Viljakainen, H. (Ekstern), Palssa, A. (Ekstern), Natri, A. (Ekstern), Jakobsen, J. (Intern), Cashman, K. D. (Ekstern), Lamberg-Allardt, C. (Ekstern)
Publication date: 2004
Event: Poster session presented at ASBMR annual meeting, Seattle, United States.
Main Research Area: Technical/natural sciences
Severe vitamin D deficiency among Pakistani living in Denmark

General information
State: Published
Organisations: Division of Nutrition, National Food Institute, Division of Food Chemistry
Authors: Andersen, R. (Intern), Brot, C. (Ekstern), Jakobsen, J. (Intern), Lamberg-Allardt, C. (Ekstern), Mølgaard, C. (Ekstern), Skovgaard, L. T. (Ekstern), Ovesen, L. (Ekstern)
Publication date: 2004
Event: Abstract from IOF World Congress on Osteoporosis, Rio de Janeiro, Brazil.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 246059
Publication: Research › Conference abstract for conference – Annual report year: 2004

The 6-a-day study: effects of fruit and vegetables on markers of oxidative stress and antioxidative defense in healthy nonsmokers

Background: Fruit and vegetables contain both nutritive and nonnutritive factors that might contribute to redox (antioxidant and prooxidant) actions. Objective: We investigated the relative influence of nutritive and nonnutritive factors in fruit and vegetables on oxidative damage and enzymatic defense. Design: A 25-d intervention study with complete control of dietary intake was performed in 43 healthy male and female nonsmokers who were randomly assigned to 1 of 3 groups. In addition to a basic diet devoid of fruit and vegetables, the fruit and vegetables (Fruveg) group received 600 g fruit and vegetables/d; the placebo group received a placebo pill, and the supplement group received a vitamin pill designed to contain vitamins and minerals corresponding to those in 600 g fruit and vegetables. Biomarkers of oxidative damage to protein and lipids and of antioxidant nutrients and defense enzymes were determined before and during intervention. Results: Plasma lipid oxidation lag times increased during intervention in the Fruveg and supplement groups, and the increase was significantly higher in the former. Plasma protein carbonyl formation at lysine residues also increased in both of these groups. Glutathione peroxidase activity increased in the Fruveg group only. Other markers of oxidative damage, oxidative capacity, or antioxidant defense were largely unaffected by the intervention. Conclusions: Fruit and vegetables increase erythrocyte glutathione peroxidase activity and resistance of plasma lipoproteins to oxidation more efficiently than do the vitamins and minerals that fruit and vegetables are known to contain. Plasma protein carbonyl formation at lysine residues increases because of the vitamins and minerals in fruit and vegetables.

General information
State: Published
Organisations: Division of Toxicology and Risk Assessment, National Food Institute, Division of Food Chemistry, Technical University of Denmark
Authors: Dragsted, L. O. (Ekstern), Pedersen, A. (Ekstern), Hermetter, A. (Ekstern), Basu, S. (Ekstern), Hansen, M. (Intern), Ravn-Haren, G. (Intern), Kall, M. (Ekstern), Breinholt, V. (Ekstern), Castenmiller, J. J. M. (Ekstern), Stagsted, J. (Ekstern), Jakobsen, J. (Intern), Skibsted, L. (Ekstern), Rasmussen, S. E. (Ekstern), Loft, S. (Ekstern), Sandstrom, B. (Ekstern)
Pages: 1060-1072
Publication date: 2004
Main Research Area: Technical/natural sciences

Publication information
Journal: American Journal of Clinical Nutrition
Volume: 79
Issue number: 6
ISSN (Print): 0002-9165
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 5.97 SJR 3.664 SNIP 2.355
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
The effect of a high-protein, high-sodium diet on calcium and bone metabolism in postmenopausal women and its interaction with vitamin D receptor genotype

The influence of a high-Na, high-protein (calciuric) diet on Ca and bone metabolism was investigated in postmenopausal women (aged 50-67 years) who were stratified by vitamin D receptor (VDR) genotype. In a crossover trial, twenty-four women were randomly assigned to a diet high in protein (90 g/d) and Na (180 mmol/d) or a diet adequate in protein (70 g/d) and low in Na (65 mmol/d) for 4 weeks, followed by crossover to the alternative dietary regimen for a further 4 weeks. Dietary Ca intake was maintained at usual intakes (about 20 mmol (800 mg)/d). Urinary Na, K, Ca, N and type I collagen cross-linked N-telopeptide (NTx; a marker of bone resorption), plasma parathyroid hormone (PTH), serum 25-hydroxycholecalciferol (25(OH)D-3), 1,25-dihydroxycholecalciferol (1,25(OH)(2)D-3), osteocalcin and bone-specific alkaline phosphatase (B-Alkphase) were measured in 24 h urine samples and fasting blood samples collected at the end...
of each dietary period. The calciuric diet significantly (P<0.05) increased mean urinary Na, N, K, Ca and NTx (by 19%) compared with the basal diet, but had no effect on circulating 25(OH)D-3, 1,25(OH)(2)D-3, PTH, osteocalcin or B-Alkphase in the total group (n 24). There were no differences in serum markers or urinary minerals between the basal and calciuric diet in either VDR genotype groups. While the calciuric diet significantly increased urinary NTx (by 25.6%, P<0.01) in the f + VDR group (n 10; carrying one or more (f) Fok I alleles), it had no effect in the f - VDR group (n 14; not carrying any Fok I alleles). It is concluded that the Na- and protein-induced urinary Ca loss is compensated for by increased bone resorption and that this response may be influenced by VDR genotype.
The effect of a high-protein, high-sodium diet on calcium and bone metabolism in postmenopausal women stratified by hormone replacement therapy use

The objective of this study was to investigate the influence of a high-sodium, high-protein diet on bone metabolism in postmenopausal women (aged 49 - 60 y) stratified by hormone replacement therapy (HRT) use. In a crossover trial, 18 women (n = 8 HRT users (+HRT) and n = 10 nonusers (-HRT)) were randomly assigned to a diet high in protein (90 g/day) and sodium (180 mmol/day) (calciuric diet) or a diet moderate in protein (70 g/day) and low in sodium (65 mmol/day) for 4 weeks followed by crossover to alternative dietary regimen for a further 4 weeks. The calciuric diet significantly (P...
Vitamin D intake and status of Pakistani immigrants in Denmark

General information
State: Published
Organisations: Division of Nutrition, National Food Institute, Division of Food Chemistry
Authors: Andersen, R. (Intern), Brot, C. (Ekstern), Christensen, T. (Intern), Hermansen, B. (Ekstern), Jakobsen, J. (Intern), Malgaard, C. (Ekstern), Møller, A. (Ekstern), Ygil, K. H. (Intern), Ovesen, L. (Ekstern)
Publication date: 2004
Main Research Area: Technical/natural sciences
Source: orbit
Vitamin D supplementation of adolescent girls during one year: effect on S-25-hydroxyvitamin D, S-parathyroid hormone and bone markers

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Viljakainen, H. T. (Ekstern), Natri, A. (Ekstern), Palssa, A. (Ekstern), Huttunen, M. M. (Ekstern), Jakobsen, J. (Intern), Cashman, K. D. (Ekstern), Mølgaard, C. (Ekstern), Lamberg-Allardt, C. (Ekstern)
Publication date: 2004
Event: Poster session presented at ASBMR annual meeting, Seattle, United States.
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 238929
Publication: Research › Poster – Annual report year: 2004

Food contents and biological activity of 25-hydroxyvitamin D: A vitamin D metabolite to be reckoned with?
Only a limited number of foods naturally contain vitamin D such as fish, meat and offal, and eggs, and milk and dairy products. However, all these foods in addition contain the metabolite 25-hydroxyvitamin D (25OHD). From the few systematic studies which have been performed the food contents of 25OHD in animal foods are usually low but vary. Contents are typically very low in milk and fish

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute, Technical University of Denmark
Authors: Ovesen, L. (Ekstern), Brot, C. (Ekstern), Jakobsen, J. (Intern)
Pages: 107-113
Publication date: 2003
Main Research Area: Technical/natural sciences

Publication information
Journal: Annals of Nutrition and Metabolism
Volume: 47
Issue number: 3-4
ISSN (Print): 0250-6807
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 1.209 SNIP 0.997 CiteScore 2.69
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.093 SNIP 1.03 CiteScore 2.55
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.284 SNIP 1.12 CiteScore 2.64
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.949 SNIP 1.014 CiteScore 2.46
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.841 SNIP 0.89 CiteScore 2.35
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.872 SNIP 0.951 CiteScore 2.38
Geographic differences in vitamin D status, with particular reference to European countries

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Ovesen, L. (Ekstern), Andersen, R. (Ekstern), Jakobsen, J. (Intern)
Pages: 813-821
Publication date: 2003
Main Research Area: Technical/natural sciences

Publication information
Journal: Proceedings of the Nutrition Society
Volume: 62
ISSN (Print): 0029-6651
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 3.99 SJR 1.511 SNIP 0.992
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 1.903 SNIP 1.527 CiteScore 4.78
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 1.952 SNIP 1.479 CiteScore 4.88
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 1.742 SNIP 1.362 CiteScore 4.63
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 1.331 SNIP 1.018 CiteScore 3.5
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.863 SNIP 0.806 CiteScore 2.33
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.941 SNIP 1.026
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 1.051 SNIP 1.114
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 1.615 SNIP 1.707
Scopus rating (2007): SJR 1.574 SNIP 1.303
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 1.293 SNIP 1.303
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 1.053 SNIP 1.112
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 0.902 SNIP 0.975
Scopus rating (2003): SJR 0.929 SNIP 1.097
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 0.991 SNIP 1.126
Scopus rating (2001): SJR 0.832 SNIP 0.858
Scopus rating (2000): SJR 0.579 SNIP 0.717
Scopus rating (1999): SJR 0.448 SNIP 0.676
Original language: English
Source: orbit
Source-ID: 238907
Publication: Research - peer-review › Journal article – Annual report year: 2003

The vitamin D status in two risk groups from four European countries

General information
State: Published
Organisations: Division of Nutrition, National Food Institute, Division of Food Chemistry
Publication date: 2003
Main Research Area: Technical/natural sciences
Source: orbit
Source-ID: 246063
Publication: Research › Conference abstract for conference – Annual report year: 2003

Vitamin D-3 and 25-hydroxyvitamin D-3 in raw and cooked pork cuts

The contents of vitamin D-3 and its metabolically active metabolite 25-hydroxyvitamin D-3 (25OHD(3)) were examined by HPLC in different parts of four common raw pork cuts (loin boneless, leg inside, thin belly, neck) and in cooked meat (loin boneless). In whole raw pork cuts, varying in fat content from 2.2 to 26.5 g/100 g, concentrations of vitamin D-3 from 0.05 to 0.21 mug/100 g were measured. Pork cuts also contained significant amounts of 25OHD(3), from 0.07 to 0.14 mug/100 g. Further, the study demonstrated that most of the vitamin D-3 and 25OHD(3) is located in the fatty tissues, and that rind, despite its limited fat content, has a high concentration of vitamin D-3 and 25OHD(3). Cooking increased vitamin D-3 and 25OHD(3) calculated per 100 g of tissue in all parts and in the whole cut (in whole cuts in raw and cooked meat, respectively: vitamin D-3: 0.15 (0.08-0.24) mug/100 g and 0.18 (0.11-0.28) mug/100 g; P = 0.33; 25OHD(3): 0.09 (0.06-0.18) mug/100 g and 0.13 (0.10-0.18) mug/100 g; P = 0.02); however, correcting for differences in dry matter content, ameliorated all significant differences. 25OHD(3) has a higher (from 1.5 to 5 times) biological activity than vitamin D-3. Meat 25OHD(3) contributes significantly to vitamin D activity. Food databases should include concentrations of both vitamin D and 25OHD(3). (C) 2003 Elsevier Ltd. All rights reserved.
High vitamin A content in some small indigenous fish species in Bangladesh: perspectives for food-based strategies to reduce vitamin A deficiency

Recognising the importance of fish in the Bangladeshi diet, the objective of the present study was to screen commonly consumed fish species for vitamin A content to evaluate the potential of fish as a vitamin A source in food-based strategies to combat vitamin A deficiency. Samples of 26 commonly consumed fish species and one crustacean were collected in Kishoreganj and Mymensingh, Bangladesh. To obtain edible parts, the fish were cleaned by Bangladeshi women according to traditional practices. Distribution of vitamin A in parts of the fish and the effect of the cleaning practices on the vitamin A content in edible parts were assessed. The content of vitamin A compounds was analysed by high-performance liquid chromatography. The vitamin A content in small fish ranged from 2680 retinol equivalents (RE) /100 g raw edible parts in mola (Amblypharyngodon mola) to 20 RE/100 g raw edible parts in chata (Colisa lalia; an alternative scientific name is Colisa lalius). The vitamin A content in cultured species, silver carp (Hypophthalmichthys molitrix), rui (Labeo rohita), mirgal (Cirrhinus mrigala) and tilapia (Oreochromis niloticus) was low.

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Roos, N. (Ekstern), Leth, T. (Intern), Jakobsen, J. (Intern)
Pages: 425-437
Publication date: 2002
Main Research Area: Technical/natural sciences

Publication information
Journal: International Journal of Food Sciences and Nutrition
Volume: 53
Issue number: 5
ISSN (Print): 0963-7486
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed Yes
BFI (2016): BFI-level 1
Scopus rating (2016): SJR 0.574 SNIP 0.66 CiteScore 1.61
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.53 SNIP 0.661 CiteScore 1.58
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.486 SNIP 0.696 CiteScore 1.41
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.495 SNIP 0.675 CiteScore 1.48
ISI indexed (2013): ISI indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.509 SNIP 0.744 CiteScore 1.26
ISI indexed (2012): ISI indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.521 SNIP 0.757 CiteScore 1.32
ISI indexed (2011): ISI indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.418 SNIP 0.433
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.497 SNIP 0.743
Dose-response effects of lycopene on selected drug-metabolizing and antioxidant enzymes in the rat

The administration of lycopene to female rats at doses ranging from 0.001 to 0.1 g/kg b.w, per day for 2 weeks was found to alter the drug-metabolizing capacity and antioxidant status of the exposed animals. An investigation of four cytochrome P450-dependent enzymes revealed that benzyloxyresorufin O-dealkylase activity in the liver was significantly induced in a dose-dependent fashion at all lycopene doses investigated. Likewise, ethoxyresorufin O-dealkylase activity was induced, although only at the two highest lycopene concentrations tested. An investigation of selected phase 2 detoxification enzymes provided evidence that lycopene was capable of inducing hepatic quinone reductase, approximately two-fold, at doses between 0.001 and 0.05 g/kg b.w, per day, whereas no effect was observed at the remaining doses tested.

Glutathione transferase, using the two substrates, 2,4-dichloronitrobenzene and 1-chloro-2,4-dinitrobenzene, was significantly induced at the 0.1 g/kg b.w. per day dose, whereas no effect was observed at the remaining lycopene doses. Analysis of the antioxidant status of the blood compartment revealed that three out of four antioxidant enzymes were affected by lycopene treatment. The activity of superoxide dismutase was thus significantly induced at lycopene doses of 0.005 and 0.05 g/kg b.w, whereas glutathione reductase and glutathione peroxidase was only induced at the 0.005 g/kg b.w. per day dose. For all antioxidant enzymes investigated, the activities seemed to return to the control level after exerting peak induction at doses between 0.005 and 0.05 g/kg b.w. per day. The explanation for this remains unknown.

The plasma concentration of lycopene at dietary levels of 0.001, 0.005, 0.05 and 0.1 g/kg b.w. per day was estimated to be 16, 32, 71 and 67 nM, which is barely within the lower range of the mean human plasma concentration of lycopene, which ranges from 70-1790 nM. Oxidative stress induced by the heterocyclic amine, 2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine (PhIP), and investigated by analyzing for malondialdehyde in plasma, was not found to be affected by prior lycopene exposure. The level of PhIP-DNA adducts in the liver or colon was likewise not affected by lycopene at any dose. Overall, the present study provides evidence that lycopene administered in the diet of young female rats exerts minor modifying effects toward antioxidant and drug-metabolizing enzymes involved in the protection against oxidative stress and cancer. The fact that these enzymatic activities are induced at all of these very low plasma levels, could be taken to suggest that modulation of antioxidant and drug-metabolizing enzymes map indeed be relevant to humans, which in general exhibit a plasma lycopene level several fold above the effective levels observed in this study. (C) 2000 Elsevier Science Ireland Ltd. All rights reserved.

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Breinholt, V. (Ekstern), Lauridsen, S. T. (Ekstern), Daneshvar, B. (Ekstern), Jakobsen, J. (Intern)
Pages: 201-210
Publication date: 2000
Main Research Area: Technical/natural sciences

Publication information
Journal: Cancer Letters
Volume: 154
Issue number: 2
ISSN (Print): 0304-3835
Ratings:
BFI (2018): BFI-level 1
The intake of carotenoids in Denmark

To estimate the intake of carotenoids in the Danish population Danish fruits and vegetables were screened with an HPLC method consisting of extraction with ethanol:tetrahydrofuran, separation by reversed phase HPLC with the mobile phase acetonitrile:methanol: dichloromethane, triethylamine, BHT and detection at 450 nm. Food intakes were estimated by the national dietary surveys (1995) from 7 days’ food registration (n = 1837 adults), which allows the whole diet to be described by the mean intake and intake distribution of 207 raw or semiprepared foods. By multiplication with the mean content in the foods the mean intake and intake distribution of the carotenoids were calculated. Carrots and tomatoes...
have both high contents of carotenoids (8,450 μg/100 g alpha- + beta-carotene and 4,790 μg/100 g lycopene, respectively) and high intakes (19 and 15 g/day, respectively) and were responsible for 47% and 32%, respectively, of the mean intake of carotenoids of 4.8 mg/day. A median value of 4.1 mg/day was found indicating skewed intake distributions. The difference between men and women was 0.4 mg/day (p < 0.0065). Only four carotenoids, alpha-carotene, beta-carotene, lutein and lycopene, contributed significantly to the intake. Women had a 6 g/day higher intake of carrots than men (p < 0.0001), which explains the 0.4 mg/day difference in the intake between men and women, and the 25th percentile was well over zero (5.0 g/day for men and 5.9 g/day for women) indicating that almost everybody consumed at least some carrots.

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Leth, T. (Intern), Jakobsen, J. (Intern), Andersen, N. L. (Ekstern)
Pages: 128-132
Publication date: 2000
Main Research Area: Technical/natural sciences

Publication information
Journal: European Journal of Lipid Science and Technology
Volume: 102
Issue number: 2
ISSN (Print): 1438-7697
Ratings:
BFI (2018): BFI-level 1
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 1
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 1
Scopus rating (2016): CiteScore 2.06 SJR 0.71 SNIP 1.024
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 1
Scopus rating (2015): SJR 0.642 SNIP 0.881 CiteScore 1.85
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 1
Scopus rating (2014): SJR 0.737 SNIP 1.051 CiteScore 1.98
BFI (2013): BFI-level 1
Scopus rating (2013): SJR 0.852 SNIP 1.124 CiteScore 2.16
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 1
Scopus rating (2012): SJR 0.873 SNIP 1.207 CiteScore 2.06
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 1
Scopus rating (2011): SJR 0.732 SNIP 0.945 CiteScore 1.75
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 1
Scopus rating (2010): SJR 0.791 SNIP 1.049
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 1
Scopus rating (2009): SJR 0.838 SNIP 1.077
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 1
Scopus rating (2008): SJR 0.606 SNIP 0.815
Web of Science (2008): Indexed yes
Scopus rating (2007): SJR 0.598 SNIP 0.801
Web of Science (2007): Indexed yes
Para-aminobenzoic acid used as a marker for completeness of 24 hour urine: Assessment of control limits for a specific HPLC method

Objective and design: The study comprised three protocols. Protocol 1 compared a HPLC method with the commonly employed colorimetric diazacoupling method. Protocol 2 examined, if the last dosage of p-aminobenzoic acid (PABA) could be advanced in the old to allow for a delayed age-dependent urinary excretion of PABA. Protocol 3 established limits far recovery of PLEA in 24 h urine applying the HPLC method Subjects and setting: A total of 151 healthy volunteers participated in the study of which 140 were accepted. In protocol 1: 37 subjects aged 20-78 y were included. All subjects took PABA as recommended (80 mg orally at 08.00, 12.00 and 18.00 h). Protocol 2: compared urinary PABA excretion in two groups of 80 y old subjects who had their last PABA dosage administered at 15.00 h (n = 16) and at 18.00 h (n = 31), respectively. Protocol 3: comprised 56 subjects aged 20-80 y. In the younger age group (20-59 y; n = 34) PABA was taken as recommended, whereas in the older age group (60-80 y; n = 22) the last PABA dosage was advanced three hours.

Results: Protocol 1: HPLC gave significantly lower PABA recovery results compared to colorimetry, the difference between methods being 23.9 +/- 5.5 mg/24 h (P <0.001). Protocol 2: higher PABA recoveries were demonstrated with the advanced dosage schedule compared to the recommended schedule (208 +/- 14 mg/24 h vs 181 +/- 22 mg/24 h; P <0.001). Protocol 3: PABA recovery with HPLC was 211 +/- 12 mg/24 h, and the lower limit comprising 95% of subjects was 187 mg/24 h. Similar PABA recoveries were demonstrated in the younger subjects and the older subjects (211 +/- 11 mg/24 h vs 211 +/- 13 mg/24 h; NS). Conclusion: An advanced dosage schedule for PABA in the aged is recommended. Because of lower recoveries with HPLC, the low limit For recovered PABA in a complete 24 h urine differs from the limit based on colorimetry. This study found a limit of 187 mg/24 h corresponding to the lower 95% confidence limit for a single subject.
The effect of microwave heating on vitamin B1 and E the linoleic and linolenic acid, and immunoglobulins in human milk

General information
State: Published
Organisations: Division of Food Chemistry, National Food Institute
Authors: Ovesen, L. (Ekstern), Jakobsen, J. (Intern), Leth, T. (Ekstern), Reinholdt, J. (Ekstern)
Novel microalgae based ingredients

National Food Institute
Period: 01/12/2017 → 30/11/2020
Number of participants: 5
Phd Student:
Ljubic, Anita (Intern)
Supervisor:
Bysted, Anette (Intern)
Holdt, Susan Løvstad (Intern)
Jakobsen, Jette (Intern)
Main Supervisor:
Jacobsen, Charlotte (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Institut stipendie (DTU)
Project: PhD

PigLED - Optimal lighting system for pigs
Light and vitamin D are essential for human and animal well-being. In this project, researchers using specially developed LED lighting will reduce the mortality in piglets, improve the welfare of sows during gestation, and thus improve the pig farmer’s economy.

The challenge of this project is to improve the statistics in pig production. Every year, approximately 9,000,000 piglets die during birth or before weaning - an alarmingly high figure, which is not compatible with sustainability or animal welfare. In addition, it costs about 1.8 billion Danish kroner in lost profits for the Danish pig producers.

Piglets need vitamin D. They are born with a low level of vitamin D and in the first three weeks the only receive the sow’s milk, which contains minimal amounts of vitamin D. Vitamin D is often referred to as the sunshine vitamin, since animals and humans produce vitamin D in the skin. We cannot bring sunlight into the pig sheds, but we can develop a light source, which contains the portion of the sunlight which produces vitamin D in the skin of pigs.

For more information see attached document in Danish

National Food Institute
Research Group for Bioactives – Analysis and Application
Department of Photonics Engineering
Diode Lasers and LED Systems
University of Copenhagen
Kongsdal Multisite A/S

Photocat A7S
Period: 01/01/2017 → 30/09/2020
Number of participants: 3
Acronym: PigLED
Project participant:
Bang-Berthelsen, Iben (Intern)
Petersen, Paul Michael (Intern)
Project Coordinator:
Jakobsen, Jette (Intern)
Documents:
PigLED tekst til DTU Hjemmeside

Quantification of folate metabolites in food and potential biofortification strategies for future food products

National Food Institute
Period: 01/11/2015 → 31/10/2018
Number of participants: 3
Phd Student:
Ložnjak, Petra (Intern)
Supervisor:
Bysted, Anette (Intern)
Main Supervisor:
Jakobsen, Jette (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Samfinansieret - Andet
Project: PhD

4th International Vitamin Conference
At the 3rd IVC in Washington DC 12-15 May a Steering and Scientific Committee were assessed to be responsible for the discussion and progression to conduct the 4th IVC in Copenhagen in May 2016. IVCs forms a forum for people who have a strong interest in one or more of the 13 vitamins. An IVC covers vitamins horizontally, and brings producers, nutritionist, analyst and regulators together. For all vitamins the task is to quantify the total content in our foods, identify the beneficial effect, and assess the optimal dietary intake to obtain a long and healthy life. A specialist in one of the vitamins may learn from a specialist in other vitamins. And producers, nutritionist, analyst, regulators, and policy makers will benefit to know the recent progress achieved by colleagues in other fields.

National Food Institute
Division of Food Chemistry
Period: 15/05/2014 → 31/12/2016
Number of participants: 10
Acronym: IVC2016
Project participant:
Bügel, Susanne (Ekstern)
Obeid, Rima (Ekstern)
Gregory, Jess (Ekstern)
Piironen, Vieno (Ekstern)
Booth, Sarah (Ekstern)
Campos-Gimenez, Esther (Ekstern)
Eggersdorfer, Manfred (Ekstern)
Olmedilla-Alonso, Begoña (Ekstern)
Arcot, Jayashree (Ekstern)
Project Manager, organisational:
Jakobsen, Jette (Intern)

Vitamin D biofortified food - development of products and quantification of content of vitamin D
National Food Institute
Period: 01/03/2014 → 04/03/2019
Number of participants: 3
Phd Student:
Barnkob, Line Lundbæk (Intern)
Supervisor:
Frandsen, Henrik Lauritz (Intern)
Main Supervisor:
Jakobsen, Jette (Intern)

Financing sources
Source: Internal funding (public)
Name of research programme: Samfinansieret - Andet
Project: PhD

ODIN-Biofortification and analysis of vitamin D
National Food Institute
**Danish Vitamin Network**

Danish Vitamin Network brings together junior and senior scientists in the field of vitamins in the Danish Universities and industry. An annual workshop is arranged to promote collaboration between the groups having a major interest in vitamins.

The network were original named LMC's Vitamin Network (01/01/09-01/01/12)

**D vitamin i planter**

This PhD study represents one of five PhD projects within the Mobility stipend entitled: An Integrated approach to risk-benefit assessment of the human health effects of food and food contaminants.

The aim of this project is to study the vitamin D metabolism if vitamin D is synthisized in the skin by UV B exposure and if fed by feeding vitamin D. The animal model is the mini-pigs.

For measurement specific LC-MS/MS methods will be developed and validated for vitamin D metabolites in plasma and in food i.e. organs, meat and fat.
Division of Toxicology and Risk Assessment
Period: 01/12/2010 → 30/11/2014
Number of participants: 4
Acronym: Vitamin D Metabolism
Contact person:
Burild, Anders (Intern)
Jakobsen, Jette (Intern)
Project participant:
Poulsen, Morten (Intern)
Frandsen, Henrik Lauritz (Intern)

Metabolisme af D-vitamin
National Food Institute
Period: 01/12/2010 → 03/12/2014
Number of participants: 6
Phd Student:
Burild, Anders (Intern)
Supervisor:
Frandsen, Henrik Lauritz (Intern)
Main Supervisor:
Jakobsen, Jette (Intern)
Examiner:
Ravn-Haren, Gitte (Intern)
Höller, Ulrich (Ekstern)
Rejnmark, Lars (Ekstern)

Financing sources
Source: Internal funding (public)
Name of research programme: Forskningsrådsfinansiering
Project: PhD

Risk-benefit analyser af funktionelle fødevarer – Fokus på D-vitamin
National Food Institute
Division of Food Chemistry
Division of Toxicology and Risk Assessment
Department of Energy Conversion and Storage
Mixed Conductors
Period: 01/12/2010 → 30/11/2014
Number of participants: 4
Project participant:
Burild, Anders (Intern)
Poulsen, Morten (Intern)
Frandsen, Henrik Lund (Intern)
Project Manager, organisational:
Jakobsen, Jette (Intern)

D Vitamin og prostata cancer risiko
National Food Institute
Period: 01/10/2010 → 29/04/2015
Number of participants: 9
Phd Student:
Kopp, Tine Iskov (Intern)
We are daily exposed to chemicals from our surroundings and an important source is food and drinking together with smoking, consumables and packaging or medicine. The exposure for many harmful compounds such as persistent organic pollutants and heavy metals is primary through the diet. The relationship between the exposure through the diet and the surroundings can be elucidated through biomonitoring. The health effects caused by the chemicals exposed for can be a result of complex interactions between genes and exposure, in cases concerning cancer, neurotoxicity, hormone disturbance and reproduction-damaging compounds. However, surveillance of essential and non-nutritive health promoting compounds is also important for an overall evaluation of the impact of the exposure of chemicals on the health. Biomonitoring of the content of polluting chemicals and essential and non-nutritive compounds in food at DTU FOOD is done through development and validation of chemical analytical methods for determination of a wide range of polluting compounds, macro-compounds, essential and non-nutritive trace elements using techniques based on the coupling between chromatography and mass spectrometry: HPLC-ICPMS (organic metallic compounds), HPLC-ESI-MSMS (non-volatile compounds), SS-MS (volatile compounds) and GC-HRMS (Dioxins; PCB and quality assurance/verification).

National Food Institute
Division of Food Chemistry
**Cultivation of mushrooms with natural content of vitamin D**

In this project the scientific basic for cultivation of fresh mushrooms with a natural high content of vitamin D by exposure of UVB-light will be developed. Exposure of UVB-light will increase vitamin D content to the same high content of vitamin D in cultivated mushrooms as in wild mushrooms.

**Division of Food Chemistry**

**National Food Institute**

**Aarhus University**

Period: 01/01/2009 → 31/12/2010

Number of participants: 1

Project Manager, organisational:

Jakobsen, Jette (Intern)

Project

**The first International vitamin conference - 19-21 May 2010 in Copenhagen**

Vitamins in foods and supplements - analytical possibilities versus nutritional need in human research, food databases, and labelling. The idea of setting up this conference is to establish a forum for scientists and regulators for whom the vitamins are of major concern. Although we can't give the impression that a new vitamin will be launched we will promise to make a great effort to reveal new information on the vitamins.

**Division of Food Chemistry**

**National Food Institute**

**Nestle**

**University of Copenhagen**

**New Zealand Laboratory Services**

**University of Florida**

**University of Helsinki**

**Spanish National Research Council**

Period: 01/01/2009 → 31/12/2010

Number of participants: 1

Project Manager, organisational:

Jakobsen, Jette (Intern)

Project

**Improvement of vitamin D content i food crops**

The hypothesis is that plant can be a vitamin D source for humans as well as for domestic animals. The ultimate aim of this project is to increase the synthesis and content of vitamin D in food crops through biofortification. To achieve this aim, we must obtain a better understanding of how vitamin D synthesis in plants takes place and how it is regulated. In the project we expect to analyze plant species with high amount of D2 and D3 and to screen several crop plants and their
ancestors for the presence and amount of provitamin D2 and D3, and to identify and clone plant enzymes and genes involved in vitamin D2 and vitamin D3 synthesis, and to determine the subcellular localization of vitamin D3 and its glucosides. A LC-MS/MS will be developed and validated before applied on samples to elucidate the synthesis, content of vitamin D in plant crops, and the effect of exposure of UVB-light on vegetables.

**Division of Food Chemistry**

National Food Institute  
Period: 01/09/2008 → 31/10/2011  
Number of participants: 1  
Project Manager, organisational:  
Jakobsen, Jette (Intern)

**Vitamin D in plants**

National Food Institute  
Period: 01/09/2008 → 29/02/2012  
Number of participants: 6  
Phd Student:  
Jäpelt, Rie Bak (Intern)  
Supervisor:  
Smedsgaard, Jørn (Intern)  
Main Supervisor:  
Jakobsen, Jette (Intern)  
Examiner:  
Munch Jacobsen, Charlotte (Ekstern)  
Bjorn, Lars Olof (Ekstern)  
Höller, Ulrich (Ekstern)

**Financing sources**

Source: Internal funding (public)  
Name of research programme: Institut stipendie (DTU) Samf.

**Dansk Vitamin Netværk**

National Food Institute  
Division of Food Chemistry  
Aarhus University  
University of Copenhagen  
Technical University of Denmark  
Period: 01/07/2008 → 31/12/2014  
Number of participants: 1  
Project Manager, organisational:  
Jakobsen, Jette (Intern)

**D Vitamin og mælk**

National Food Institute  
Division of Food Chemistry  
Aarhus University  
Period: 01/06/2008 → 31/05/2012  
Number of participants: 1  
Project Manager, academic:  
Jakobsen, Jette (Intern)
Maximizing of vitamin D content in milk from indoor raised dairy cows

In this project a novel light source will be developed, which will increase the synthesis of vitamin D in indoor raised dairy cows, and thereby the content of vitamin D in milk. The background is that usual vitamin D in milk from indoor raised cows is lower than from cows with access to grass, regardless of content of vitamin D in feed.

Division of Food Chemistry
National Food Institute
Aarhus University
Scan Research A/S
Period: 01/06/2008 → 31/05/2011
Number of participants: 1
Project Manager, organisational:
Jakobsen, Jette (Intern)

Content, bioavailability and health effects of trace elements and bioactive components in organic agricultural systems

The main objective is to study the impact of relevant organic agricultural practices on the ability of plants to assimilate trace elements from the soil and to synthesise bioactive secondary metabolites and antioxidant vitamins with health promoting effects. Moreover, in comparison with conventionally cultivated crops, the possible improved uptake rate of bioactive compounds in humans and animal models will be studied. The specific objectives are: 1. To screen the content of trace elements together with other relevant bioactive constituents in a wide selection of commonly consumed organic crops. 2. To characterise and optimise the content of trace elements and bioactive compounds in crop plants harvested from two well-defined organic cultivation systems that include combinations of plant species, soil type, crop rotations and fertilizers. 3. To assess the bioavailability of the bioactive compounds in human intervention studies employing prepared diets based on the crops produced within the systems. 4. To study the effects of foods on health and well being after long-term consumption using the rat as a model.

Division of Food Chemistry
National Food Institute
University of Copenhagen
Aarhus University
Period: 07/01/2007 → 31/12/2010
Number of participants: 7
Project participant:
Husted, Søren (Ekstern)
Larsen, Erik Huusfeldt (Intern)
Knuthsen, Pia (Intern)
Jakobsen, Jette (Intern)
Sloth, Jens Jørgen (Intern)
Kápolna, Emese (Intern)
Søltoft, Malene (Intern)

Intake of household salt in a Danish population

The aim of the present study is to assess the intake of household salt and the part of the total salt which is derived from household salt in a cross section of the Danish population. 100 men and women between 20 and 55 years of age are recruited by advertising in some work places and in some supermarkets in the Copenhagen area. The subjects use a salt cellar with a known amount of lithium-tagged salt for 10 consecutive days. Before the 10 days and for the last 3 days of the 10 days period 24-h urine samples are collected. Urine samples are analysed for sodium content, to determine total salt intake and lithium content, to determine intake of household salt.

Division of Nutrition
National Food Institute
Aalborg University Hospital
**Vitamin D activity of food and supplements**

The aim of the project is to assess the relative potency of each of the vitamin D active compounds in order to be able to calculate vitamin D activity through dietary intake, and to investigate the possibility of producing meat high in vitamin D. Firstly, the potency of 25-hydroxyvitamin D3 relative to vitamin D3 will be investigated. This will include nutritional studies connected to ongoing feeding trials in pigs, and the initiation of a human intervention study i.e. A feeding trial in slaughter pigs with vitamin D3 and 25-hydroxyvitamin D3. The end-points are vitamin D status assessed as 25-hydroxyvitamin D in serum and the content of vitamin D3 and 25-hydroxyvitamin D3 in meat. A human intervention study with supplements of vitamin D3, vitamin D2 and 25-hydroxy vitamin D3, in which the end-points are vitamin D status and PTH. A feeding trial in slaughter-pigs with vitamin D3 and 25-hydroxyvitamin D3 for further investigation of the impact of vitamin D in feed on vitamin D in food. Secondly, quantification of dihydroxy vitamin D3 derivatives will be included in the quantification of the total activity of vitamin D via the dietary intake of pork meat. Stable isotope, 13C-labelled vitamin D3, will be used to assess bioavailability and to investigate if it is possible to produce meat high in vitamin D.

Division of Food Chemistry

National Food Institute

Period: 01/01/2005 → 31/12/2008

Number of participants: 2

Project participant:

Bysted, Anette (Intern)

Project Manager, organisational:

Jakobsen, Jette (Intern)

Project

**Towards a strategy for optimal vitamin D fortification, OPTIFORD**

The overall research plan for the project included five specific objectives achieved through five work packages, of which Danish Institute for Food and Veterinary Research (DFVF) participated in two: To assess the dose necessary to replenish vitamin D status in an immigrant population group with minimal sun exposure and to determine the effect on bone mass (WP3) To examine the influence of dissimilarities in environmental and behaviouristic patterns on supply levels of vitamin D between different European countries (WP4) Besides, Division of Nutrition was the scientific, administrative and financial coordinator of the project.

Division of Nutrition

National Food Institute

University of Helsinki

Royal Veterinary and Agricultural University

University College Cork

Universidad Complutense

National Food and Nutrition Institute

Period: 01/01/2001 → 30/06/2004

Number of participants: 4

Project participant:

Andersen, Rikke (Intern)

Jakobsen, Jette (Intern)

Mejborn, Heddie (Intern)

Project Manager, organisational:

Trolle, Ellen (Intern)

Project
Activities:

5th International Vitamin Conference
Period: 8 Aug 2018 → 10 Aug 2018
Jette Jakobsen (Chairman)
National Food Institute
Research Group for Bioactives – Analysis and Application
Degree of recognition: International

Related event

5th International Vitamin Conference
08/08/2018 → 10/08/2018
Sydney, Australia
Activity: Attending an event » Participating in or organising a conference

UV-treatment of foods and animals as a vitamin D enrichment approach
Period: 5 Sep 2017
Jette Jakobsen (Invited speaker)
National Food Institute
Research Group for Bioactives – Analysis and Application
Degree of recognition: International

Related event

ODIN Vitamin D and Health in Europe: Current and future perspectives
05/09/2017 → 06/09/2017
Cork, Ireland
Activity: Talks and presentations » Conference presentations

Principle for studying the potency of the different vitamin D active compounds -usable for the vitamin B community?
Period: 17 May 2017
Jette Jakobsen (Invited speaker)
National Food Institute
Research Group for Bioactives – Analysis and Application

Description
Invited speaker
Degree of recognition: International

Related event

International Conference on Homocysteine and One-Carbon Metabolism 2017: "Taking science to the next level – challenging paradigms and conventions"
14/05/2017 → 18/05/2017
Århus, Denmark
Activity: Talks and presentations » Conference presentations

ANALYTICAL PLATFORM FOR ESTABLISHMENT OF FOOD COMPOSITION DATA FOR VITAMINS – EXEMPLIFIED BY VITAMIN D
Period: 3 Oct 2016
Jette Jakobsen (Invited speaker)
National Food Institute
Research Group for Bioactives – Analysis and Application
Documents:
Jette Jakobsen_2ndIMEKOFOODS
Related event

2nd IMEKOFOODS: Promoting Objective and Measurable Food Quality & Safety
02/10/2016 → 05/10/2016
Benevento, Italy
Activity: Talks and presentations › Conference presentations

Vitamin D in salmonids - wild and farmed
Period: 26 May 2016
Jette Jakobsen (Speaker)
National Food Institute
Research Group for Bioactives – Analysis and Application

Description
Documents:
IVC2016 - Salmon and vitamin D

Related event

International Vitamin Conference 2016
25/05/2016 → 27/05/2016
Copenhagen, Denmark
Activity: Talks and presentations › Conference presentations

International Vitamin Conference
Period: 25 May 2016 → 27 May 2016
Jette Jakobsen (Organizer)
National Food Institute
Research Group for Bioactives – Analysis and Application

Description
Chair for scientific committee and local organizing committee

Related event

International Vitamin Conference: IVC
25/05/2016 → 27/05/2016
Copenhagen, Denmark
Activity: Attending an event › Participating in or organising a conference

International Vitamin Conference 2016
Period: 15 May 2014 → 27 May 2016
Jette Jakobsen (Organizer)
National Food Institute
Research Group for Bioactives – Analysis and Application

Description
Chair of Steering and Scientific Committee and Local Organising Committee

Related event

International Vitamin Conference 2016
25/05/2016 → 27/05/2016
Copenhagen, Denmark
Activity: Attending an event › Participating in or organising a conference
Vitamin D - The sunshine vitamin in our food
Period: 15 May 2014
Jette Jakobsen (Invited speaker)
National Food Institute
Division of Food Chemistry

Related event
3rd International Vitamin Conference
12/05/2014 → 15/05/2014
Washinton DC, United States
Activity: Talks and presentations › Conference presentations

3rd International Vitamin Conference
Period: Dec 2012 → May 2014
Jette Jakobsen (Organizer)
Division of Food Chemistry
National Food Institute

Description
Chair Scientific Committee, reviewer

Related event
3rd International Vitamin Conference
12/05/2014 → 15/05/2014
Washinton DC, United States
Activity: Attending an event › Participating in or organising a conference

Vitamin D in milk from dairy cows housed indoor
Period: 24 May 2012
Jette Jakobsen (Lecturer)
National Food Institute
Division of Food Chemistry

Description
Foredrag ved 2nd International Vitamin Conference

Related event
2nd International Vitamin Conference: Vitamins in Foods and Supplement - Analytical Challenges in Human Nutrition
23/05/2012 → 25/05/2012
Copenhagen, Denmark
Activity: Talks and presentations › Conference presentations

2nd International Vitamin Conference
Period: 23 May 2012 → 25 May 2012
Jette Jakobsen (Organizer)
National Food Institute
Division of Food Chemistry

Description
Chair of Organizing and Scientific Committee

Related event
2nd International Vitamin Conference: Vitamins in Foods and Supplement - Analytical Challenges in Human Nutrition
23/05/2012 → 25/05/2012
Copenhagen, Denmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

**Current trends in human nutrition**
Period: 1 Jun 2010
Jette Jakobsen (Speaker)
National Food Institute
Division of Food Chemistry

*Description*
Current trends in human nutrition: Micro nutrients, vitamins in relation to food databases

*Related external organisation*
University of Copenhagen
Thorvaldsensvej 40, DK-1871 Frederiksberg C, Copenhagen, Denmark
Activity: Talks and presentations › Guest lectures, external teaching and course activities at other universities

**Current trends in human nutrition: Vitamins in relation to status**
Period: 1 Jun 2010
Jette Jakobsen (Speaker)
National Food Institute
Division of Food Chemistry

*Related external organisation*
University of Copenhagen
Thorvaldsensvej 40, DK-1871 Frederiksberg C, Copenhagen, Denmark
Activity: Talks and presentations › Guest lectures, external teaching and course activities at other universities

**2nd International Vitamin Conference**
Period: May 2010 → May 2012
Jette Jakobsen (Organizer)
National Food Institute
Division of Food Chemistry

*Description*
Chair for Scientific and Organising Committee

*Related event*
2nd International Vitamin Conference: Vitamins in Foods and Supplement - Analytical Challenges in Human Nutrition
23/05/2012 → 25/05/2012
Copenhagen, Denmark
Activity: Attending an event › Participating in or organising a conference

**First International Vitamin Conference**
Period: 19 May 2010 → 21 May 2010
Jette Jakobsen (Organizer)
Division of Food Chemistry
National Food Institute
Links:
http://www.vitamin2010.dk (REL-OA)

*Related event*
First International Vitamin Conference
19/05/2010 → 21/05/2010
Copenhagen
Activity: Attending an event › Participating in or organising a conference

**Netværk og National Funding**
Period: 7 Jan 2010 → 8 Jan 2010
Jette Jakobsen (Participant)
National Food Institute
Division of Food Chemistry

Related event

**Netværk og National Funding**
07/01/2010 → 08/01/2010
LMC Workshop, Slagelse, Danmark
Activity: Attending an event › Participating in or organising workshops, courses, seminars etc.

D-vitamin - hvor får vi det fra, hvilken betydning har det, og hvor meget har vi brug for?
Period: 24 Apr 2008
Jette Jakobsen (Speaker)
National Food Institute
Division of Food Chemistry

Description
Place: KH/Stat, Copenhagen, Denmark

Related external organisation

Unknown external organisation
Activity: Talks and presentations › Conference presentations

**Vitamin D metabolites in milk products**
Period: 1 Jan 2007 → …
Jette Jakobsen (Speaker)
National Food Institute
Division of Food Chemistry

Description
Place: Presented at 7th International Food Data Conference, Sao Paolo, Brazil

Related external organisation

Unknown external organisation
Activity: Talks and presentations › Conference presentations

**Bioavailability and bioactivity of vitamin D sources – pigs used as models for humans**
Period: 1 Jan 2006 → …
Jette Jakobsen (Speaker)
National Food Institute
Division of Food Chemistry

Description
Place: 6th international Symposium on Nutritional Aspects of Osteoporosis, Lausanne, Schweiz

Related external organisation

Unknown external organisation
How to validate vitamin D status?
Period: 1 Jan 2004 → …
Jette Jakobsen (Speaker)
National Food Institute
Division of Food Chemistry

Description
Place: Nordic Seminar, Helsinki, Finland

Related external organisation
Unknown external organisation
Activity: Talks and presentations › Conference presentations

Hypovitaminosis D in Europe
Period: 1 Jan 2004 → …
Jette Jakobsen (Speaker)
National Food Institute
Division of Food Chemistry

Description
Place: IOF world congress on osteoporosis, Rio de Janeiro, Brazil

Related external organisation
Unknown external organisation
Activity: Talks and presentations › Conference presentations

Press clippings:

Hvordan bevares mikronæringsstoffer bedst ved opvarmning af grøntsager?
Jette Jakobsen
22/09/2016
National Food Institute, Research Group for Bioactives – Analysis and Application

Media contribution (1)

Hvordan bevares mikronæringsstoffer bedst ved opvarmning af grøntsager?
22/09/2016
Forbrugerrådet Tænk, Print
Tage Majland
Jette Jakobsen
National Food Institute, Research Group for Bioactives – Analysis and Application
Press / Media

Indholdet af vitaminer og mineraler i vores fødevarer er lavere end tidligere
Jette Jakobsen
13/09/2016

Subject
Indholdet af vitaminer og mineraler i vores fødevarer er lavere end tidligere
National Food Institute, Research Group for Bioactives – Analysis and Application

Media contribution (1)

Indholdet af vitaminer og mineraler i vores fødevarer er lavere end tidligere
13/09/2016
DRs Sundhedsmagasin, Web