Das Land Steiermark

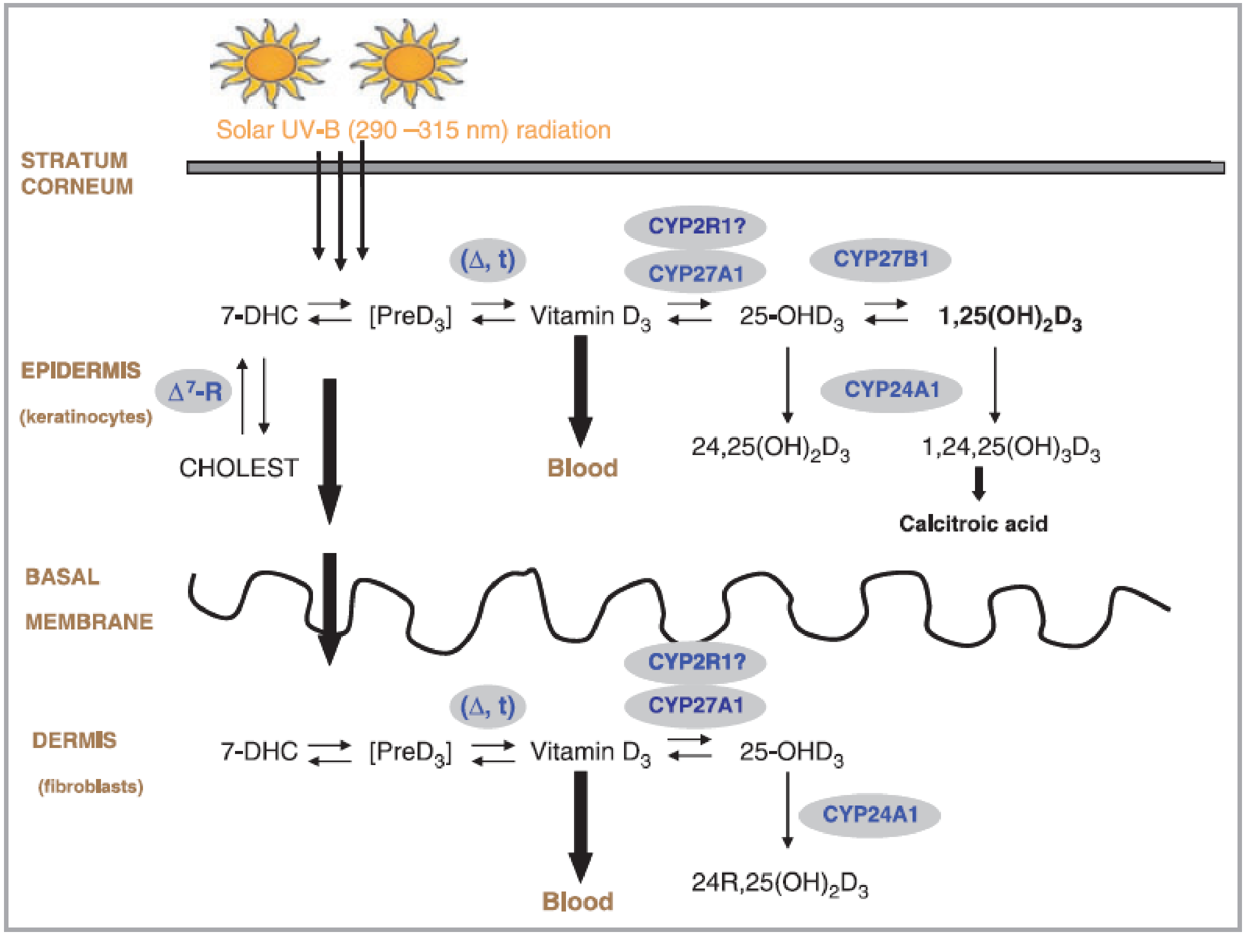
Medizinische Universität Graz

Sonnenlicht und Vitamin D
Wege zur Gesundheitsprävention

Stefan Pilz
Medizinische Univ. Klinik, Abteilung für Endokrinologie und Stoffwechsel,
Medizinische Universität Graz, Österreich

Vitamin D und Sonne

Medizinische Universität Graz



Reichrath J. British Journal of Dermatology, 2009; 161: 54-60

Vitamin D

Vitamin D Stoffwechsel

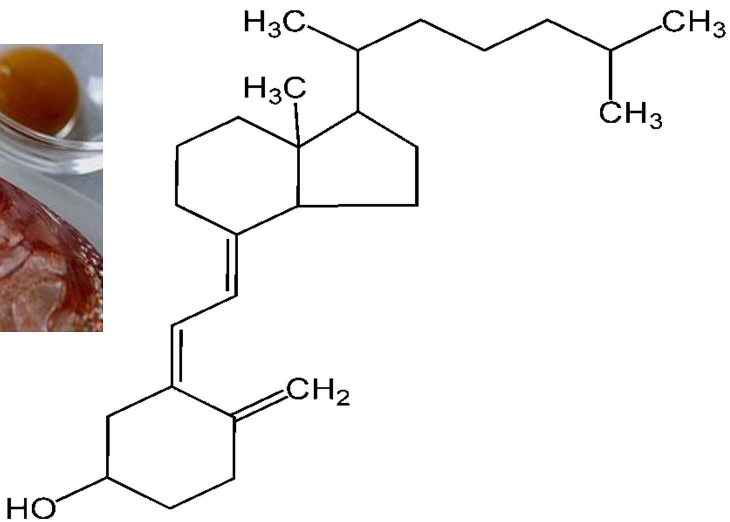
Vitamin D Quellen

UV-B induzierte Vitamin D Bildung in der Haut

80-90%

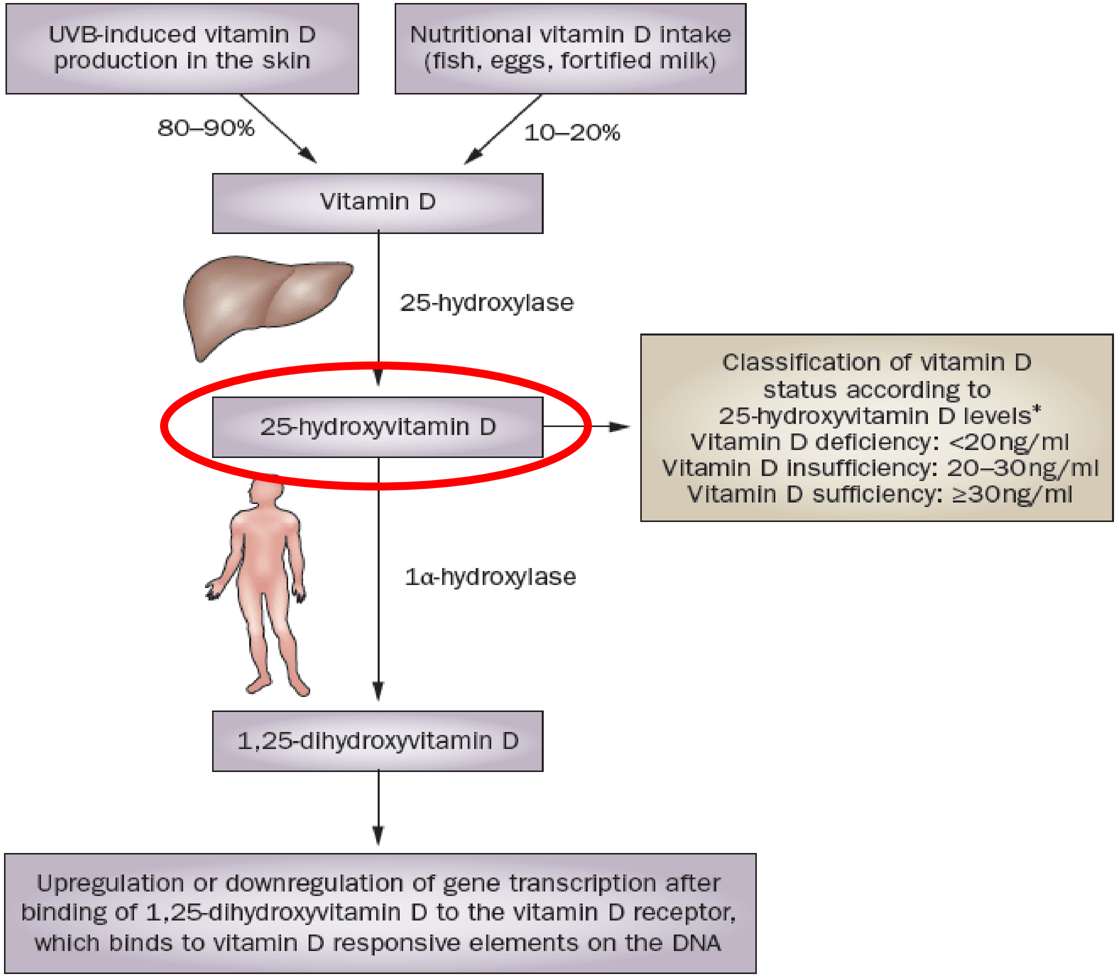
Ernährung

10-20%



Pilz S, et al. J Lab Med 2008, 32: 200-208

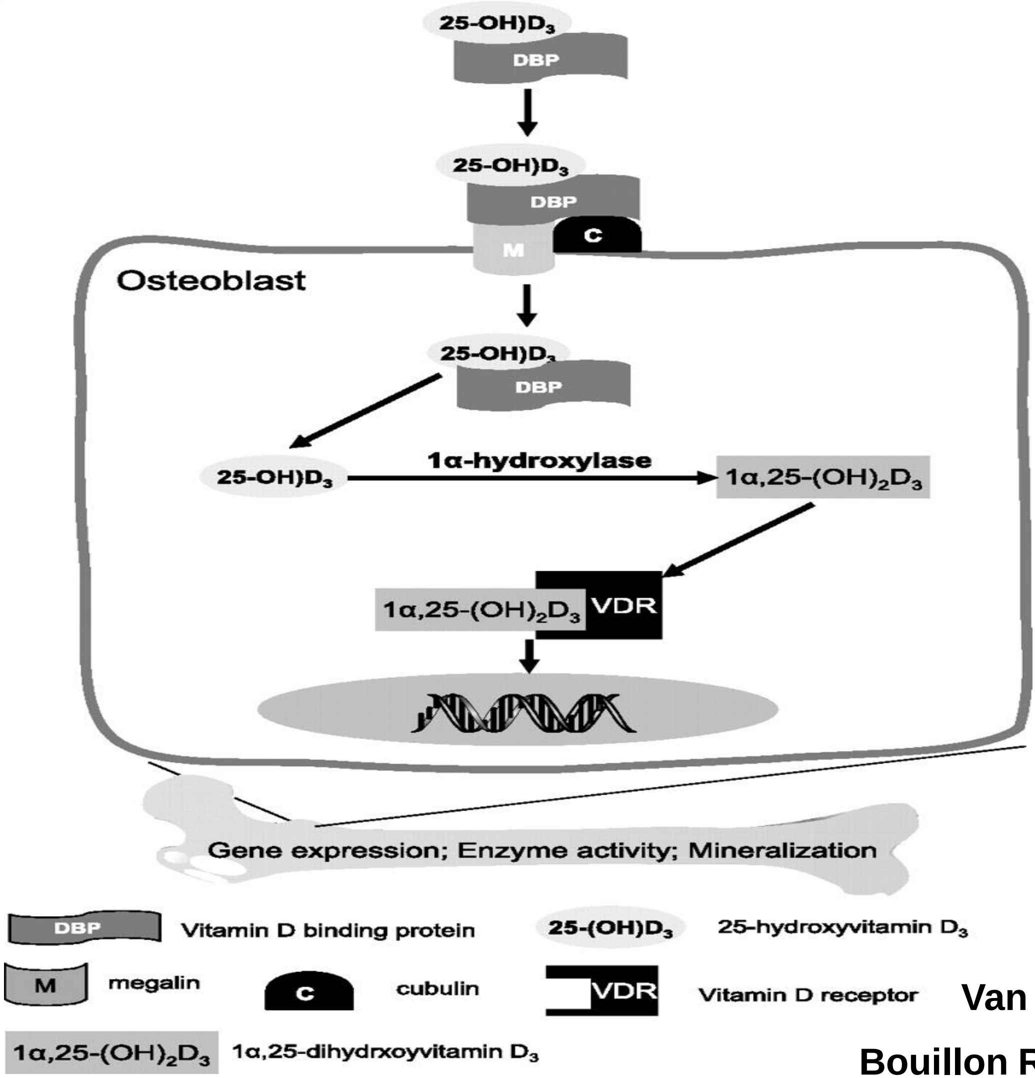
Vitamin D Stoffwechsel



Pilz S, et al. Nature Reviews Cardiology 2009, 6: 621-630

Vitamin D Effekte

Medizinische Universität Graz



Vitamin D reguliert ca. 3 Prozent des menschlichen Genoms

Van Driel M, et al. FASEB J 2006; 20:2417-9

Bouillon R et al. Endocrine Reviews 2008; 29:726-776

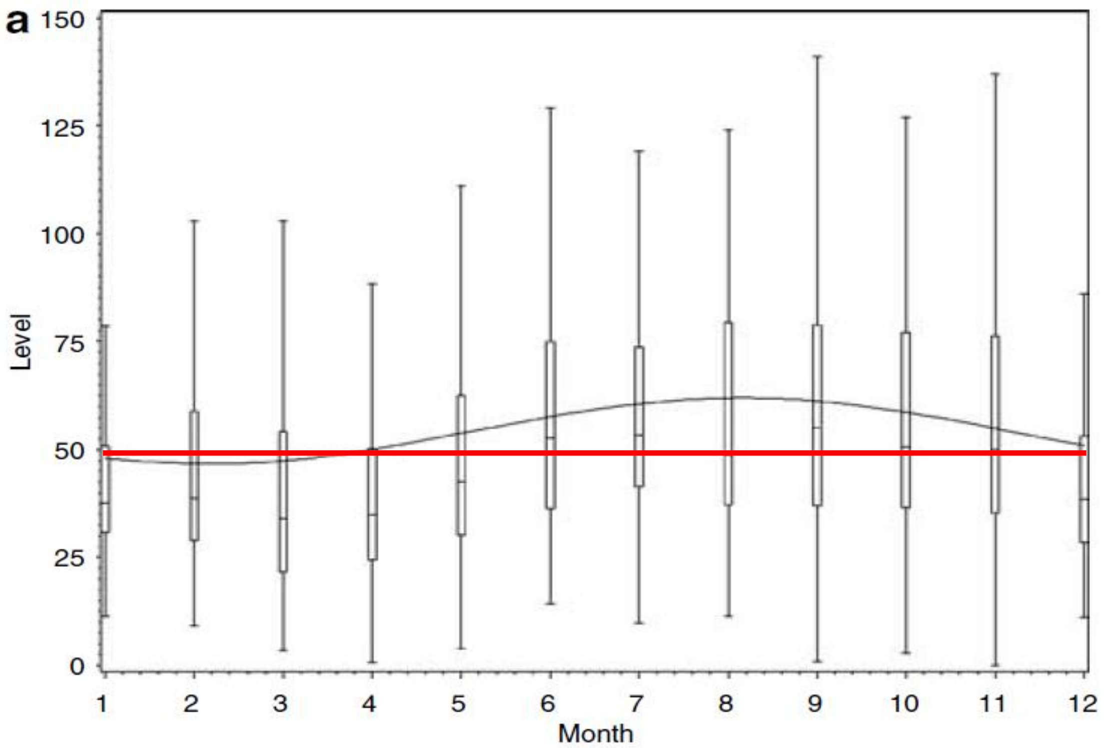
Vitamin D and Haut

„Es gab einen Überlebensvorteil durch eine helle Hautfarbe als unsere Vorfahren in nördlichere Regionen migrierten. Es wird diesbezüglich angenommen, dass dies mit der Bedeutung einer Aufrechterhaltung adäquater Vitamin D Spiegel bei eingeschränkten UV-B Exposition zusammenhängt.“

Giovannucci E, Therapy 2008; 5:655-658

Vitamin D Status

Medizinische Universität Graz



Vitamin D status and health correlates among German adults

European Journal of Clinical Nutrition (2008) 62, 1079–1089

B Hintzpeter[1], GBM Mensink[1], W Thierfelder[1], MJ Müller[2] and C Scheidt-Nave[1]

Vitamin D Mangel
(<20 ng/mL, <50 nmol/L)

1) Reduzierte Kalziumaufnahme im Darm
2) Parathormon (PTH)-Anstieg
3) Osteomalazie/Rachitis

Vitamin D: An overview of vitamin D status and intake in Europe

A. Spiro and J. L. Buttriss
British Nutrition Foundation, London, UK

Nutrition Bulletin, **39**, 322–350

Medizinische Universität Graz

Österreichischer Ernährungsbericht 2012

BUNDESMINISTERIUM FÜR GESUNDHEIT

Table 5 Prevalence of low vitamin D status in selected European countries

Country, source	n	Age (range or mean)	<25 nmol/l (<10 ng/ml)	<45/50 nmol/l (<20 ng/ml)
Austria (Austrian Nutrition Report 2012)	1002	7–14 F	22.3	40.0
		7–14 M	17.7	38.1
		18–64 F	11.6	28.2
		18–64 M	14.2	29.7
		65–80 F	19.9	42.4
		65–80 M	20.4	44.4

Vitamin D Mangel

Medizinische Universität Graz

Wenn Vitamin D Mangel nur für eine einzige dieser Erkrankungen mitverantwortlich ist, dann haben wir ein Public Health Problem mit dem Vitamin D Mangel

Fig. 1. Vitamin D (calcidiol) insufficiency is associated with an increased risk of several chronic diseases.

P. Tuohimaa / Journal of Steroid Biochemistry & Molecular Biology 114 (2009) 78–84

A Pooled Analysis of Vitamin D Dose Requirements for Fracture Prevention

Heike A. Bischoff-Ferrari, M.D., Dr.P.H., Walter C. Willett, M.D., Dr.P.H., Endel J. Orav, Ph.D., Paul Lips, M.D., Pierre J. Meunier, M.D., Ronan A. Lyons, M.D., M.P.H., Leon Flicker, M.D., John Wark, M.D., Ph.D., Rebecca D. Jackson, M.D., Jane A. Cauley, Dr.P.H., Haakon E. Meyer, M.D., Ph.D., Michael Pfeifer, M.D., Kerrie M. Sanders, Ph.D., Hannes B. Stähelin, M.D., Robert Theiler, M.D., and Bess Dawson-Hughes, M.D.

N Engl J Med 2012;367:40-9.

Table 2. Incidence of Fracture among 31,022 Participants, According to Vitamin D Treatment Dose and Actual Intake.*

Analysis	No. of Participants	Hip Fracture			Any Nonvertebral Fracture		
		No. of Fractures	Relative Risk (95% CI)	P Value	No. of Fractures	Relative Risk (95% CI)	P Value
Actual-intake analysis‡							
Control	15,495	586	1.00		1948	1.00	
0–360 IU/day	3,935	100	1.00 (0.79–1.26)	0.99	425	0.96 (0.86–1.07)	0.44
361–637 IU/day	3,836	110	1.03 (0.83–1.29)	0.78	520	1.01 (0.91–1.12)	0.85
638–791 IU/day	3,790	164	1.01 (0.83–1.23)	0.92	419	0.90 (0.80–1.01)	0.08
792–2000 IU/day	3,966	151	0.70 (0.58–0.86)	<0.001	458	0.86 (0.76–0.96)	0.007

European guidance for the diagnosis and management of osteoporosis in postmenopausal women

J. A. Kanis · E. V. McCloskey · H. Johansson ·
C. Cooper · R. Rizzoli · J.-Y. Reginster ·
on behalf of the Scientific Advisory Board
of the European Society for Clinical and Economic
Aspects of Osteoporosis and Osteoarthritis
(ESCEO) and the Committee of Scientific Advisors
of the International Osteoporosis Foundation (IOF)

Osteoporos Int (2013) 24:23–57
DOI 10.1007/s00198-012-2074-y

POSITION PAPER

… die Einnahme von zumindest 800 Internationalen Einheiten Vitamin D pro Tag kann in der allgemeinen Behandlung der Osteoporose empfohlen werden

DVO-LEITLINIE 2014

Bei einem hohen Sturz- und/oder Frakturrisiko und einer geringen Sonnenlichtexposition 800-1000 IE Vitamin D3 täglich oral (B)

Vitamin D und Stürze

Vitamin D Treatment for the Prevention of Falls in Older Adults: Systematic Review and Meta-Analysis

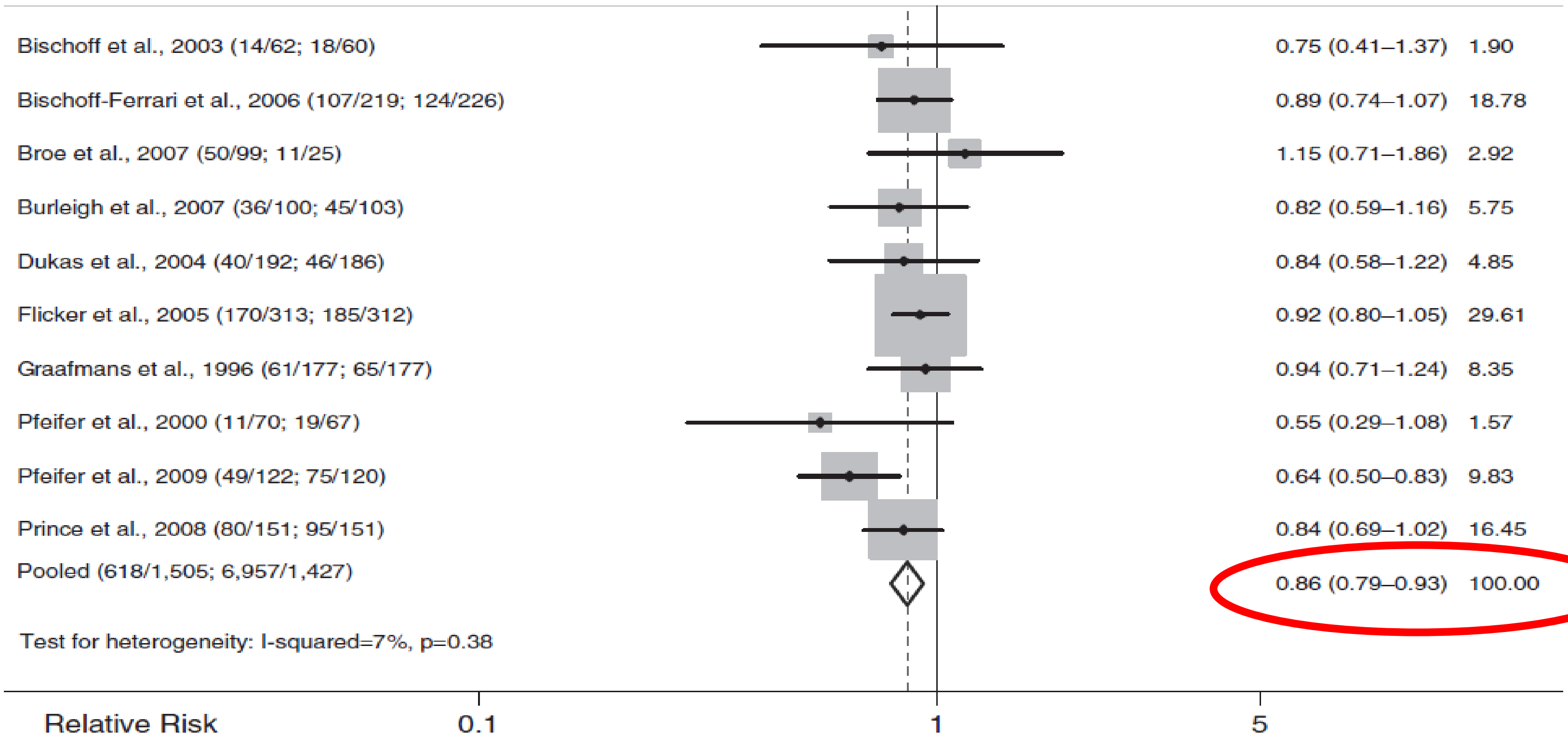
Rita Rastogi Kalyani, MD, MHS, Brady Stein, MD, MHS,† Ritu Valiyil, MD, MHS,‡ Rebecca Manno, MD, MHS,‡ Janet W. Maynard, MD, MHS,‡ and Deidra C. Crews, MD, ScM§*

J Am Geriatr Soc 58:1299–1310, 2010.

Primary Analysis

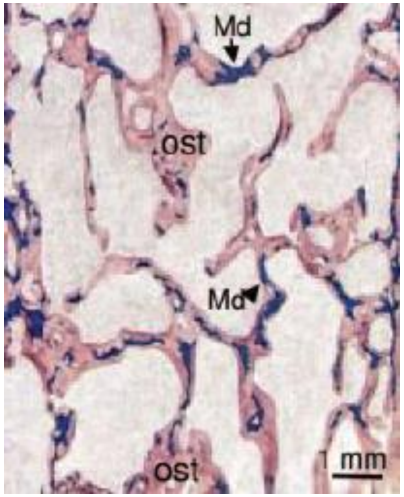
Source (Number fallers/total per arm for treatment; control)	RR (95% CI)	%
Bischoff et al., 2003 (14/62; 18/60)	0.75 (0.41–1.37)	1.90
Bischoff-Ferrari et al., 2006 (107/219; 124/226)	0.89 (0.74–1.07)	18.78
Broe et al., 2007 (50/99; 11/25)	1.15 (0.71–1.86)	2.92
Burleigh et al., 2007 (36/100; 45/103)	0.82 (0.59–1.16)	5.75
Dukas et al., 2004 (40/192; 46/186)	0.84 (0.58–1.22)	4.85
Flicker et al., 2005 (170/313; 185/312)	0.92 (0.80–1.05)	29.61
Graafmans et al., 1996 (61/177; 65/177)	0.94 (0.71–1.24)	8.35
Pfeifer et al., 2000 (11/70; 19/67)	0.55 (0.29–1.08)	1.57
Pfeifer et al., 2009 (49/122; 75/120)	0.64 (0.50–0.83)	9.83
Prince et al., 2008 (80/151; 95/151)	0.84 (0.69–1.02)	16.45
Pooled (618/1,505; 6,957/1,427)	0.86 (0.79–0.93)	100.00

Test for heterogeneity: I-squared=7%, p=0.38



Vitamin D Mangel

OSTEOMALAZIE



- **Knochenschmerzen**
- **Muskelschwäche**
- … Adynamie, Müdigkeit, Depression, Schlafstörungen …
- Tetanische Symptome

Endocrine Reviews 2007; 28:151-164

Internist 2008; 49: 1170-1177

Low 25-Hydroxyvitamin D Is Associated with Increased Mortality in Female Nursing Home Residents

Medizinische Universität Graz

J Clin Endocrin Metab. First published ahead of print February 8, 2012 as doi:10.1210/jc.2011-3043

Stefan Pilz, Harald Dobnig, Andreas Tomaschitz, Katharina Kienreich, Andreas Meinitzer, Claudia Friedl, Doris Wagner, Claudia Piswanger-Sölkner, Winfried März, and Astrid Fahrleitner-Pammer

Design, Setting, and Participants: This is a prospective cohort study among elderly female patients (age >70 yr) recruited from 95 nursing homes in Austria.

Appeal for Vitamin D Therapy

Dtsch Arztebl Int 2012; 109(19)

We examined 961 study participants (age 83.7 ± 6.1 yr)

During a mean follow-up time of 27 ± 8 months, 284 patients died.

TABLE 2. Hazard ratios (with 95% confidence intervals) for mortality according to 25(OH)D quartiles

	1st quartile	2nd quartile	3rd quartile	4th quartile
Range (nmol/liter)	<14.0	14.0–17.5	17.6–25.5	>25.5
Crude	1.74 (1.25–2.43)	1.41 (1.00–1.98)	1.08 (0.75–1.55)	1.00 reference
Model 1	1.49 (1.07–2.10)	1.32 (0.93–1.86)	1.03 (0.72–1.48)	1.00 reference
Model 2	1.45 (1.03–2.06)	1.25 (0.88–1.79)	1.08 (0.75–1.56)	1.00 reference
Model 3	1.57 (1.10–2.23)	1.30 (0.90–1.86)	1.16 (0.80–1.68)	1.00 reference
Model 4	1.88 (1.28–2.76)	1.49 (1.02–2.16)	1.31 (0.90–1.93)	1.00 reference
Model 5	1.56 (1.01–2.40)	1.21 (0.80–1.84)	1.32 (0.88–1.97)	1.00 reference

Model 1 was adjusted for age. Model 2 was adjusted for age, BMI, and albumin. Model 3 was adjusted for covariates of model 2 plus creatinine clearance, glycated hemoglobin, arterial hypertension, and coronary artery disease. Model 4 was adjusted for covariates of model 3 plus serum calcium, serum phosphate, and PTH. Model 5 was adjusted for covariates of model 4 plus knee extensor strength and mobility status.

Vitamin D Mangel bei Kindern (Rachitis)

Medizinische Universität Graz

Vitamin D Mangel verursacht Rachitis bei Kindern und Osteomalazie bei Erwachsenen
Lips P Endocrine Reviews 2001;22:477-501

Es gibt allgemeine Empfehlungen zur Vitamin D Supplementierung bei allen Kindern (zumindest) im ersten Lebensjahr

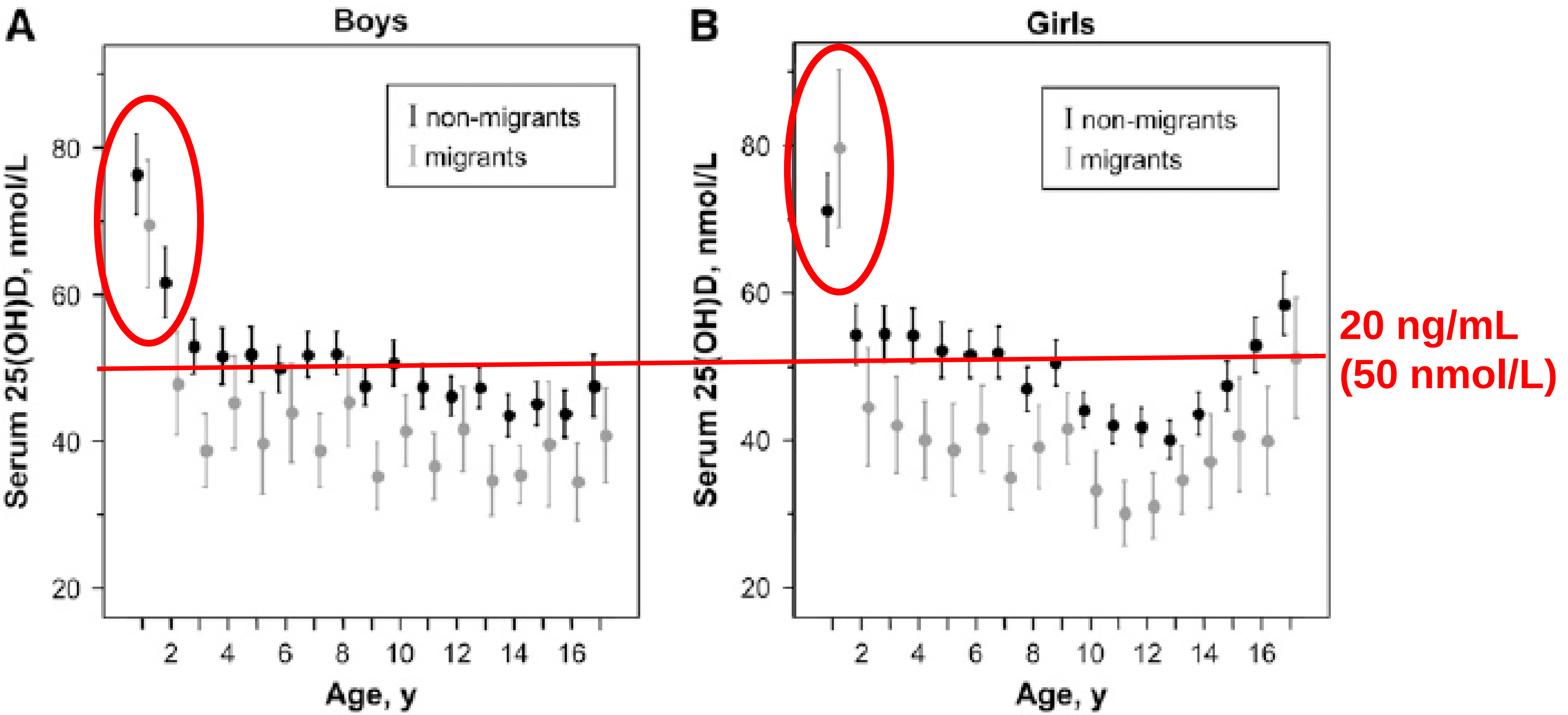
21 SEPTEMBER 2012 VOL 337 SCIENCE

–KAI KUPFERSCHMIDT

British children in 1938

Vitamin D Mangel bei Kindern in Deutschland

Medizinische Universität Graz



J. Nutr. 138: 1482–1490, 2008.

Birte Hintzpeter,[3*] Christa Scheidt-Nave,[3] Manfred J. Müller,[4] Liane Schenk,[5] and Gert B. M. Mensink[3]

Vitamin D Mangel bei Kindern (Rachitis)

Resurrection of vitamin D deficiency and rickets

Michael F. Holick

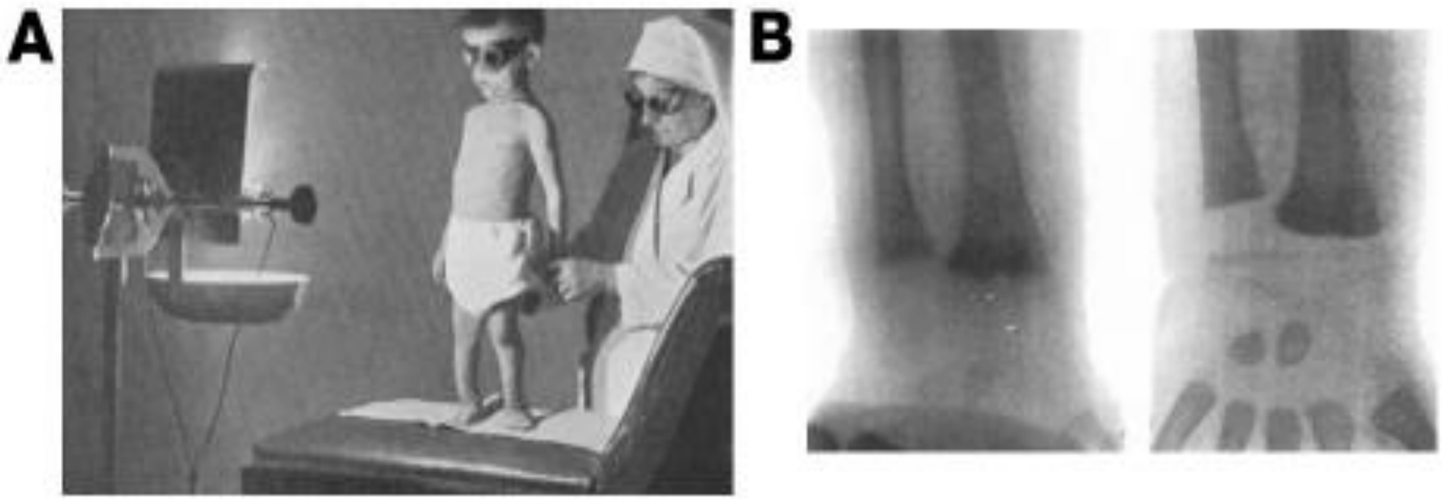


Figure 2
UV radiation therapy for rickets. (**A**) Photograph from the 1920s of a child with rickets being exposed to UV radiation. (**B**) Radiographs demonstrating florid rickets of the hand and wrist (left) and the same wrist and hand taken after treatment with 1 hour UV radiation 2 times a week for 8 weeks. Note mineralization of the carpal bones and epiphyseal plates (right). Reproduced from ref. 126.

J. Clin. Invest. **116**:2062–2072 (2006).

Hautkrebs und Sonnenlicht

Medizinische Universität Graz

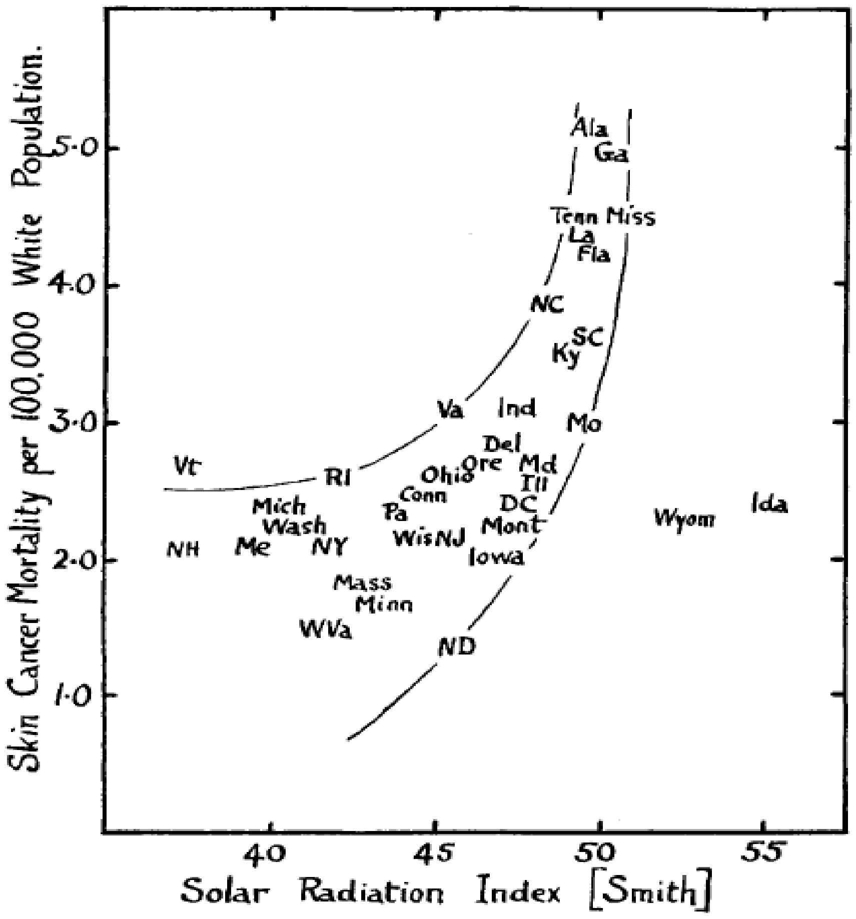


Fig. 2.—Showing the relation of skin cancer mortality rate (white population, adjusted for age) to Smith's Solar Radiation Index in the American states.

Apperly FL

Cancer Res 1:191-195, **1941**

Krebssterblichkeit und Sonnenlicht

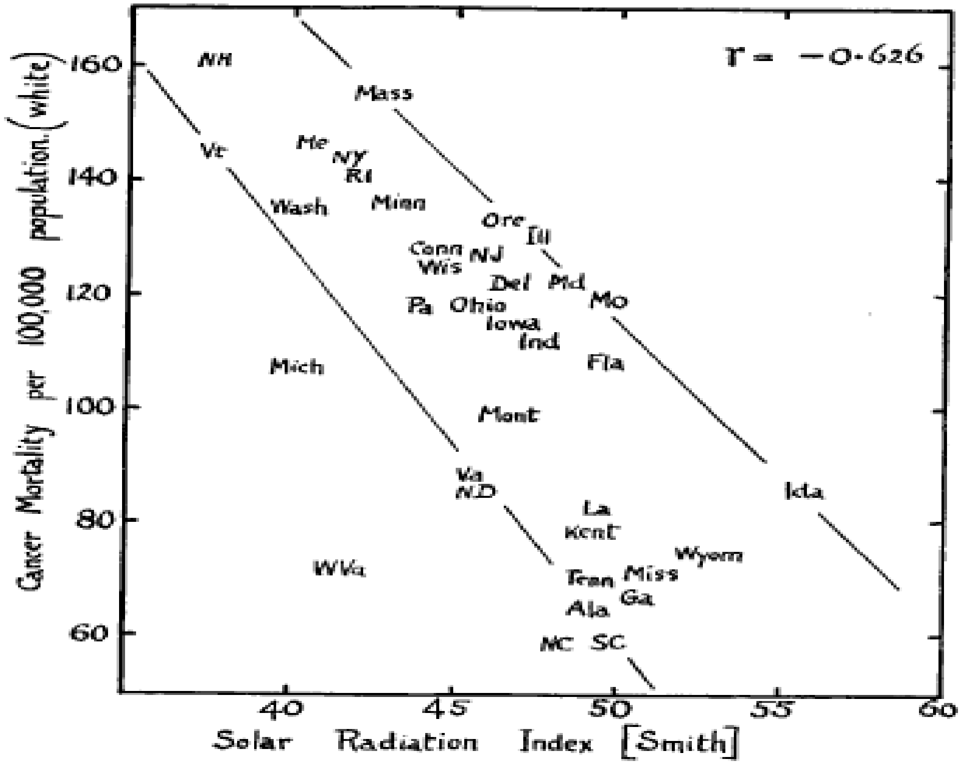


Fig. 5.—Showing the relation of total cancer mortality rates to Smith's Solar Radiation Index in the American states, (white population only).

Apperly FL. Cancer Res 1:191-195, 1941

Solar radiation and colon cancer

Medizinische Universität Graz

Do sunlight and vitamin D reduce the likelihood of colon cancer?

Cedric F Garland and Frank C Garland

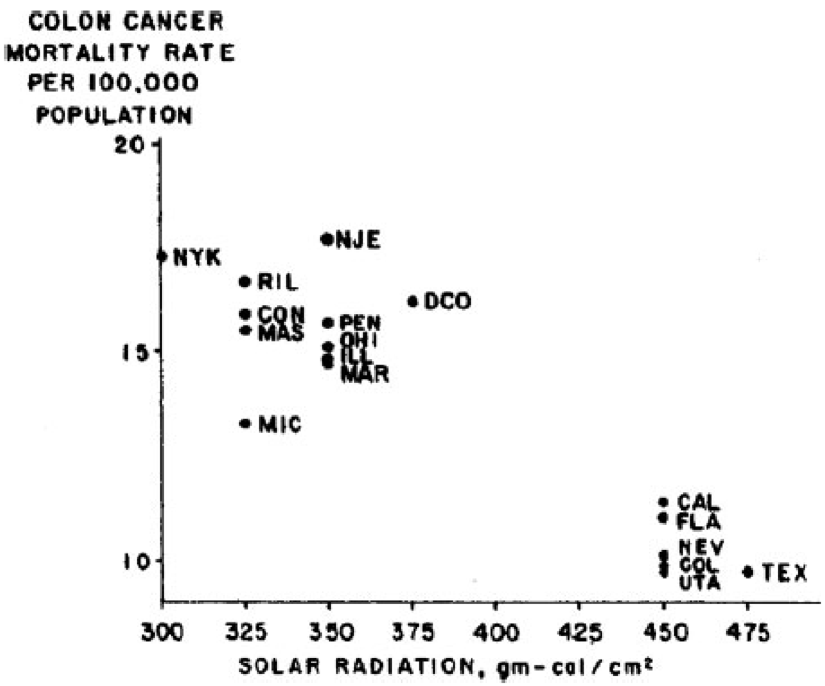


Figure 2 Annual mean daily solar radiation (gm-cal/cm^2) and annual age-adjusted colon cancer death rates per 100 000 population, white males, 17 non-metropolitan states, United States, 1959–61

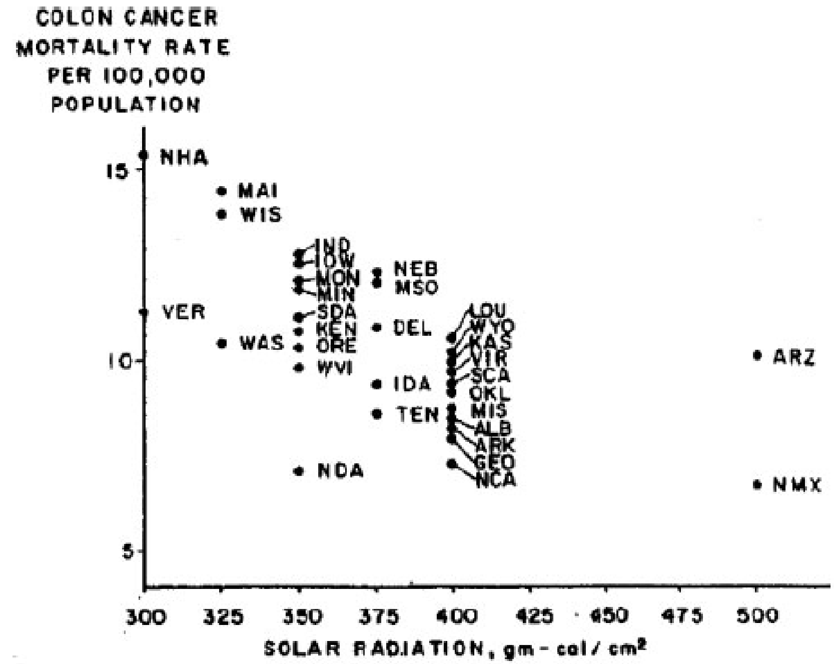


Figure 3 Annual mean daily solar radiation (gm-cal/cm^2) and annual age-adjusted colon cancer death rates per 100 000 population, white males, 32 non-metropolitan states, United States, 1959–61

Int J Epidemiol 1980; 9:227-231

UV-B and cancer mortality

Medizinische Universität Graz

An Estimate of Premature Cancer Mortality in the U.S. Due to Inadequate Doses of Solar Ultraviolet-B Radiation

William B. Grant, Ph.D.

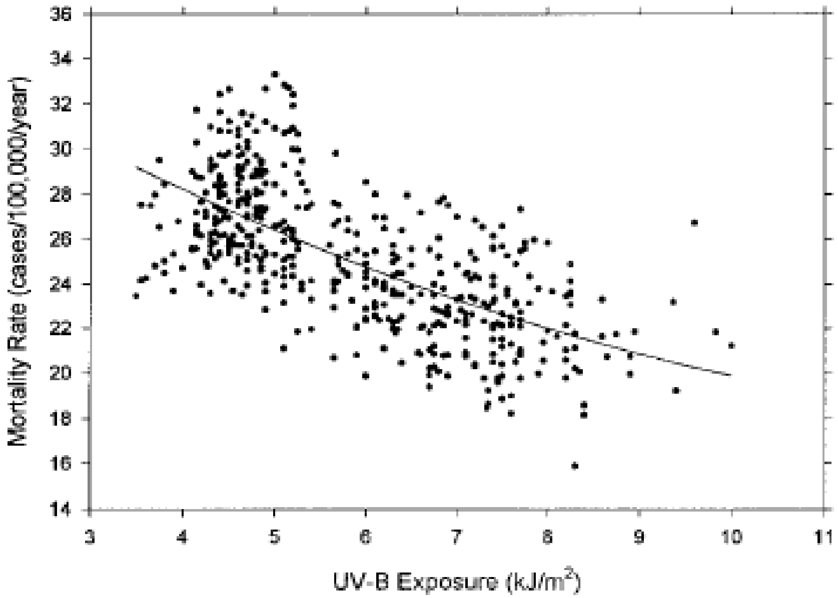


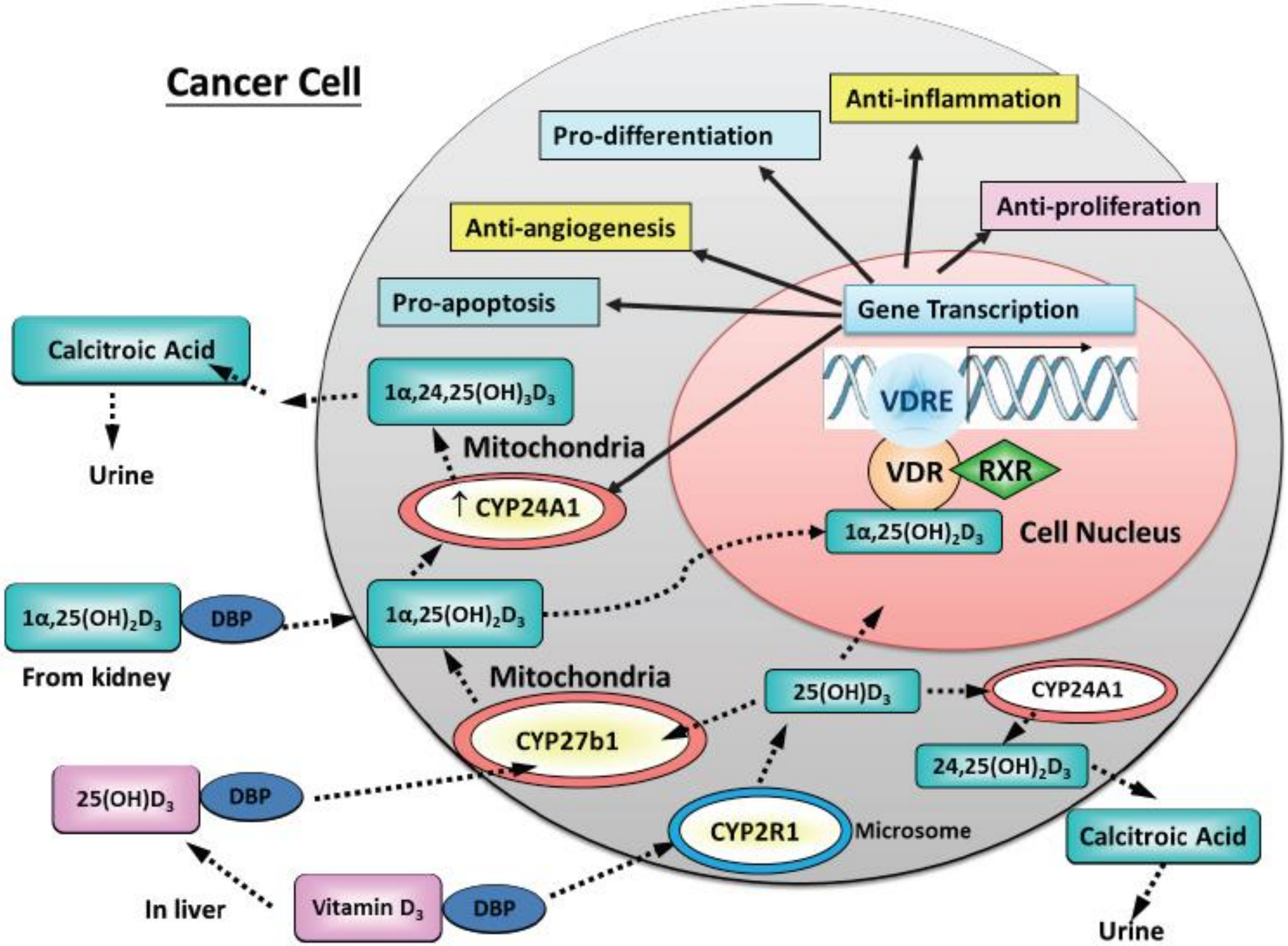
FIGURE 2. Annual mortality rates for breast carcinoma in white females (1970–1994) versus DNA-weighted ultraviolet (UV) radiation for July 1992 from the Total Ozone mapping Spectrometer (TOMS).

Cancer 2002;94:1867-1875

The Anti-cancer Actions of Vitamin D

Anti-Cancer Agents in Medicinal Chemistry, 2013, *13*,

Kun-Chun Chiang[1,2] and Tai C. Chen[3,*]

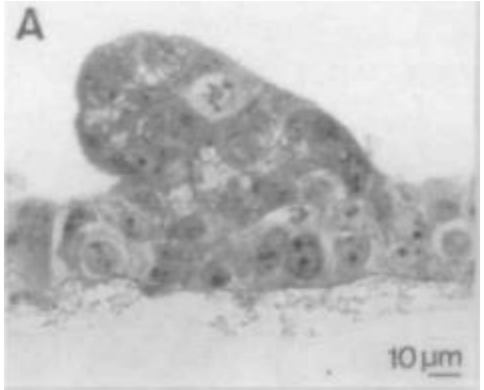


Anti-Krebs-Effekte von Vitamin D

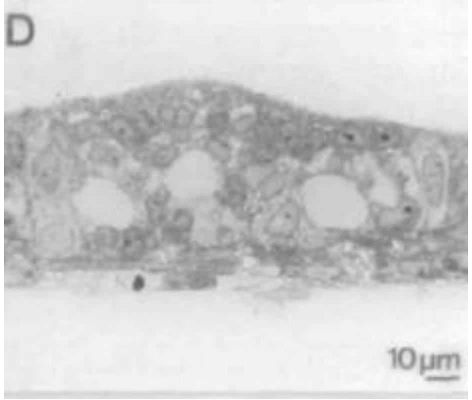
Heide S. Cross, Margit Pavelka, Jan Slavik, Meinrad Peterlik*

Growth Control of Human Colon Cancer Cells by Vitamin D and Calcium In Vitro

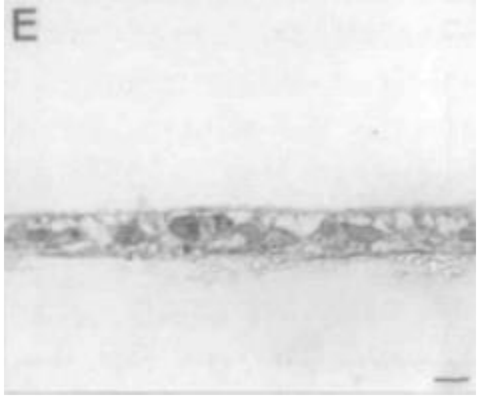
JNCI J Natl Cancer Inst (1992) 84(17): 1355-1357



10 n*M* 1,25-$(OH)_2D_3$



10 n*M* 1,25-$(OH)_2D_3$



Anti-Cancer Agents in Medicinal Chemistry

Volume 13, Number 1, January 2013

Contents

Hot Topic

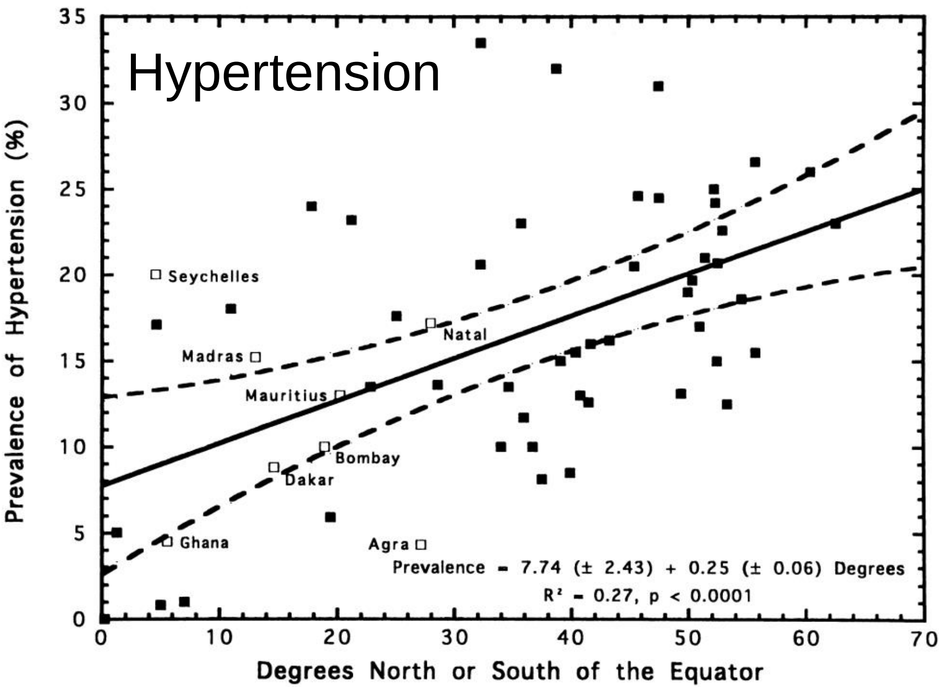
Vitamin D and Cancer: Current Evidence and Future Perspective

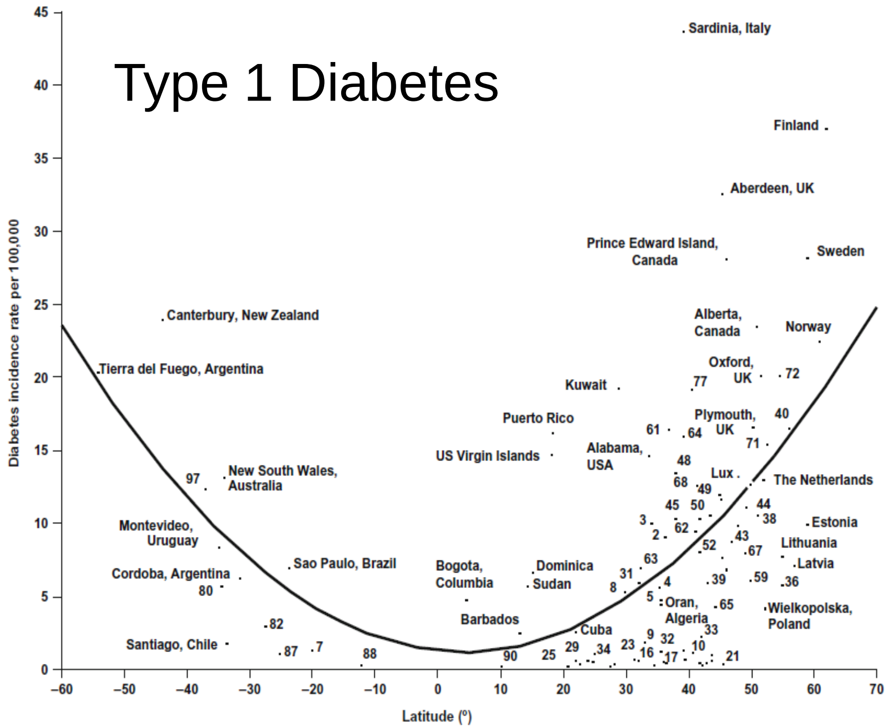
Guest Editor: Stefan Pilz

UV und Herz-Kreislauf Erkrankungen

Medizinische Universität Graz

Robert Scragg
Seasonality of cardiovascular disease mortality and the possible protective effect of ultra-violet radiation.
Int J Epidemiol 1981; 10: 337-41





Rostand SG. Hypertension 1997; 30:150-156

Mohr SB et al. Diabetologia 2008; 51:1391-1398

Referenzwerte für die Nährstoffzufuhr

Vitamin D

Deutsche Gesellschaft für Ernährung (DGE)
Österreichische Gesellschaft für Ernährung (ÖGE)
Schweizerische Gesellschaft für Ernährungsforschung (SGE)
Schweizerische Vereinigung für Ernährung (SVE)

1. Auflage,
4. korrigierter Nachdruck
2012

Alter	Vitamin D bei fehlender endogener Synthese µg[1]/Tag	
Säuglinge (0 bis unter 12 Monate)	10[2]	**400 IE**
Kinder (1 bis unter 15 Jahre)	20[3]	**800 IE**
Jugendliche und Erwachsene (15 bis unter 65 Jahre)	20[3]	**800 IE**
Erwachsene ab 65 Jahre	20[3]	**800 IE**
Schwangere	20[3]	**800 IE**
Stillende	20[3]	**800 IE**

[1] 1 µg = 40 Internationale Einheiten (IE); 1 IE = 0,025 µg

Vitamin D status and health correlates among German adults

B Hintzpeter[1], GBM Mensink[1], W Thierfelder[1], MJ Müller[2] and C Scheidt-Nave[1]
[1] Department of Epidemiology and Health Reporting, Robert Koch-Institute, Germany and
[2] Institute of Human Nutrition and Food Science, University of Kiel, Germany

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TABLE 1 Participant characteristics by gender [a]

Variable	Men (n=1763)	Women (n=2267)
Serum levels [b]		
25OHD (nmol/l)	45.2 (30.5-68.6)	44.7 (30.7-72.2)
iPTH (pmol/l)	3.5 (2.2-4.9)	2.9 (1.7-4.5)
Calcium, corr. (mmol/l)	2.14 (2.06-2.21)	2.18 (2.10-2.26)
Dietary intake (from diet and supplements)		
EI/REE (MJ/d) [c]	1.40 (1.13-1.73)	1.32 (1.10-1.60)
Vitamin D (µg/d)	2.81 (1.89-4.44)	2.31 (1.53-3.56)
Calcium (mg/d)	1181 (902-1535)	1082 (849-1379)
Supplement use (%)		
Vitamin D (yes)	1.5	3.8
Calcium (yes)	12.1	19.3

~100 IE

(2008) European Journal of Clinical Nutrition, 62 (9), pp. 1079-1089.

A Systematic Review: Influence of Vitamin D Supplementation on Serum 25-Hydroxyvitamin D Concentration

Philippe Autier, Sara Gandini, and Patrick Mullie

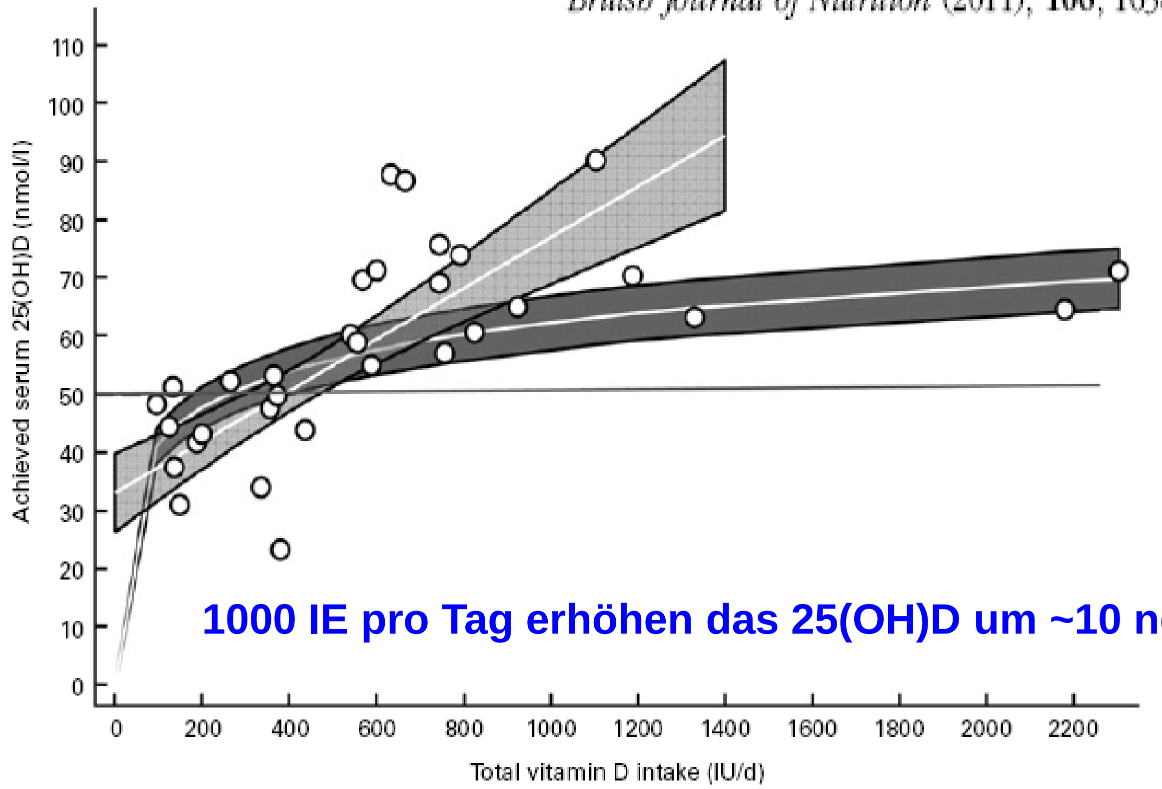
J Clin Endocrin Metab.
June 14, 2012

Medizinische Universität Graz

Results of our meta- analysis are compatible with the hypothesis that concomitant calcium supplementation can reduce the compliance to vitamin D supplementation.

A systematic review and meta-regression analysis of the vitamin D intake–serum 25-hydroxyvitamin D relationship to inform European recommendations

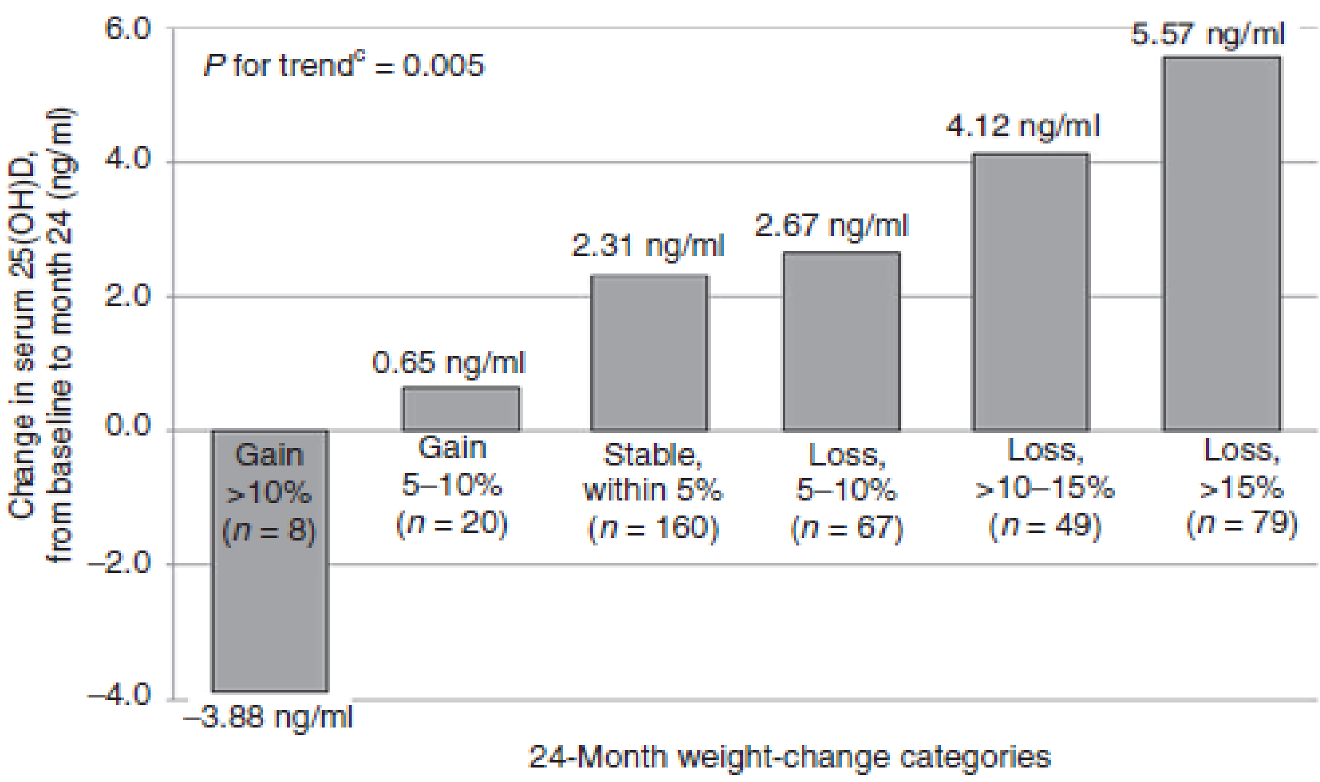
British Journal of Nutrition (2011), **106**, 1638–1648



Weight Loss Is Associated With Increased Serum 25-Hydroxyvitamin D in Overweight or Obese Women

Medizinische Universität Graz

Cheryl L. Rock[1], Jennifer A. Emond[1], Shirley W. Flatt[1], Dennis D. Heath[1], Njeri Karanja[2], Bilge Pakiz[1], Nancy E. Sherwood[3] and Cynthia A. Thomson[4]
Obesity (2012) **20**, 2296–2301. doi:10.1038/oby.2012.57



Vitamin D Supplementierung und Körpergewicht

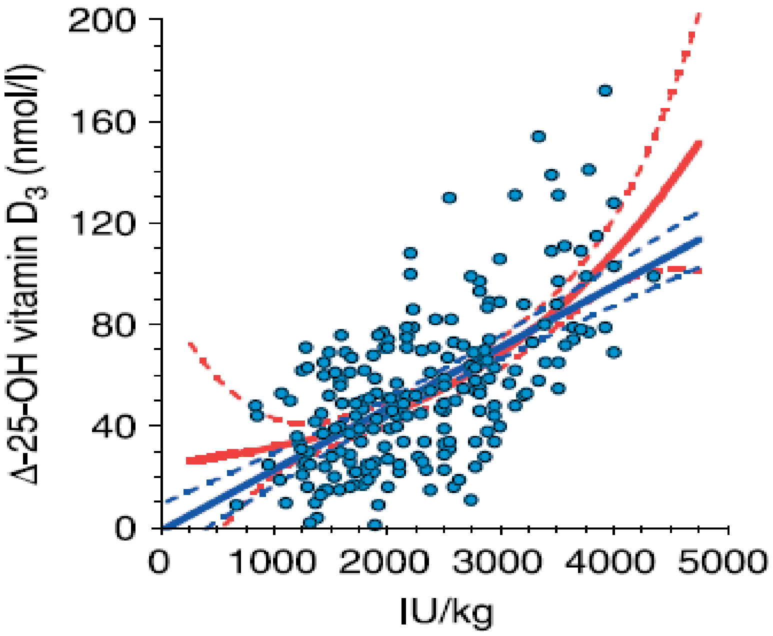
Medizinische Universität Graz

Cholecalciferol loading dose guideline for vitamin D-deficient adults

Lenneke van Groningen[1], Susanne Opdenoordt[1], Adriaan van Sorge[2], Darryl Telting[3], Astrid Giesen[2] and Hans de Boer[1]

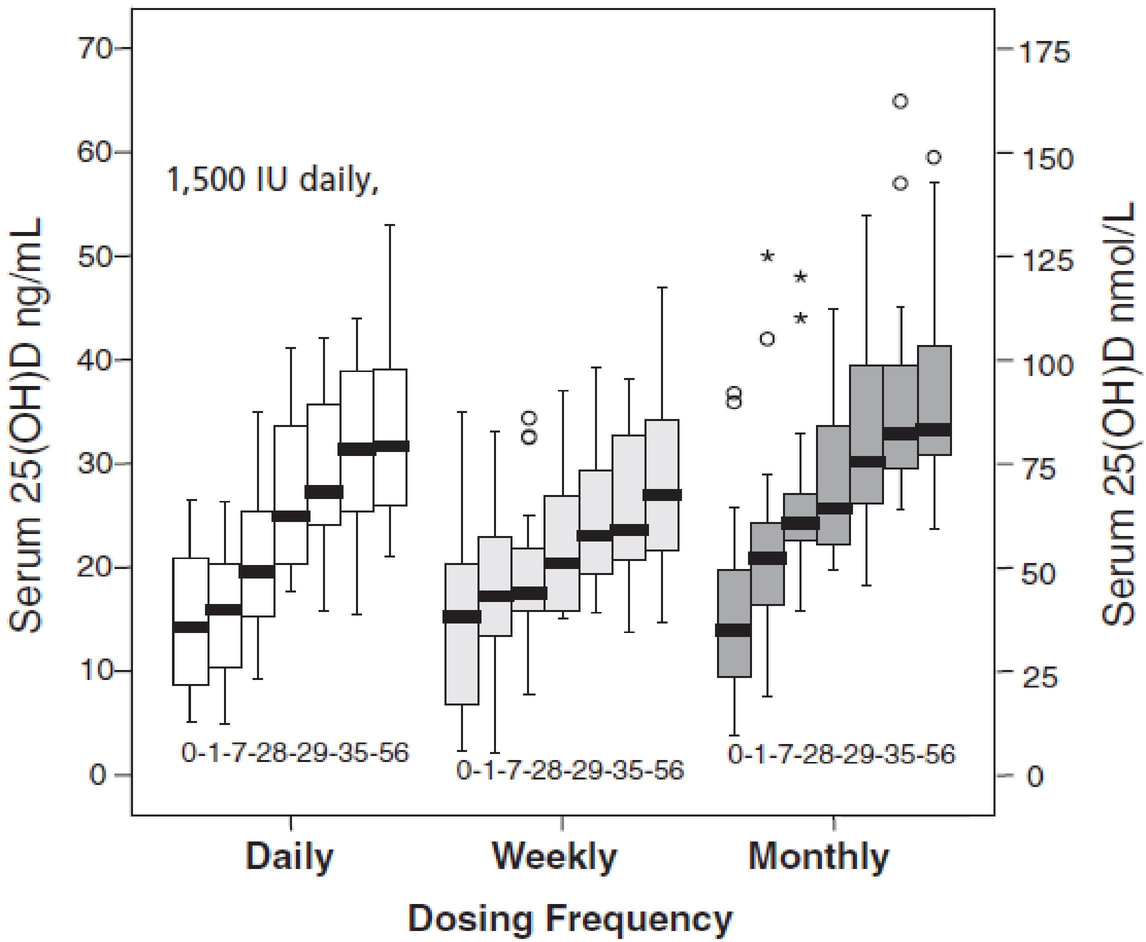
European Journal of Endocrinology (2010) **162** 805–811

ProbandInnen (25(OH)D < 50nmol/L) wurden mit kumulativen Vitamin D Dosen von 100.000 bis 200.000 Internationalen Einheiten über 8 Wochen behandelt (entsprechend ca. 2000 bis 4000 Internationalen Einheiten pro Tag)



Comparison of Daily, Weekly, and Monthly Vitamin D3 in Ethanol Dosing Protocols for Two Months in Elderly Hip Fracture Patients

(*J Clin Endocrinol Metab* 93: 3430–3435, 2008)



Efficacy and safety of vitamin D_3 intake exceeding the lowest observed adverse effect level[1–3]

Am J Clin Nutr 2001;73:288–94.

Reinhold Vieth, Pak-Cheung R Chan, and Gordon D MacFarlane

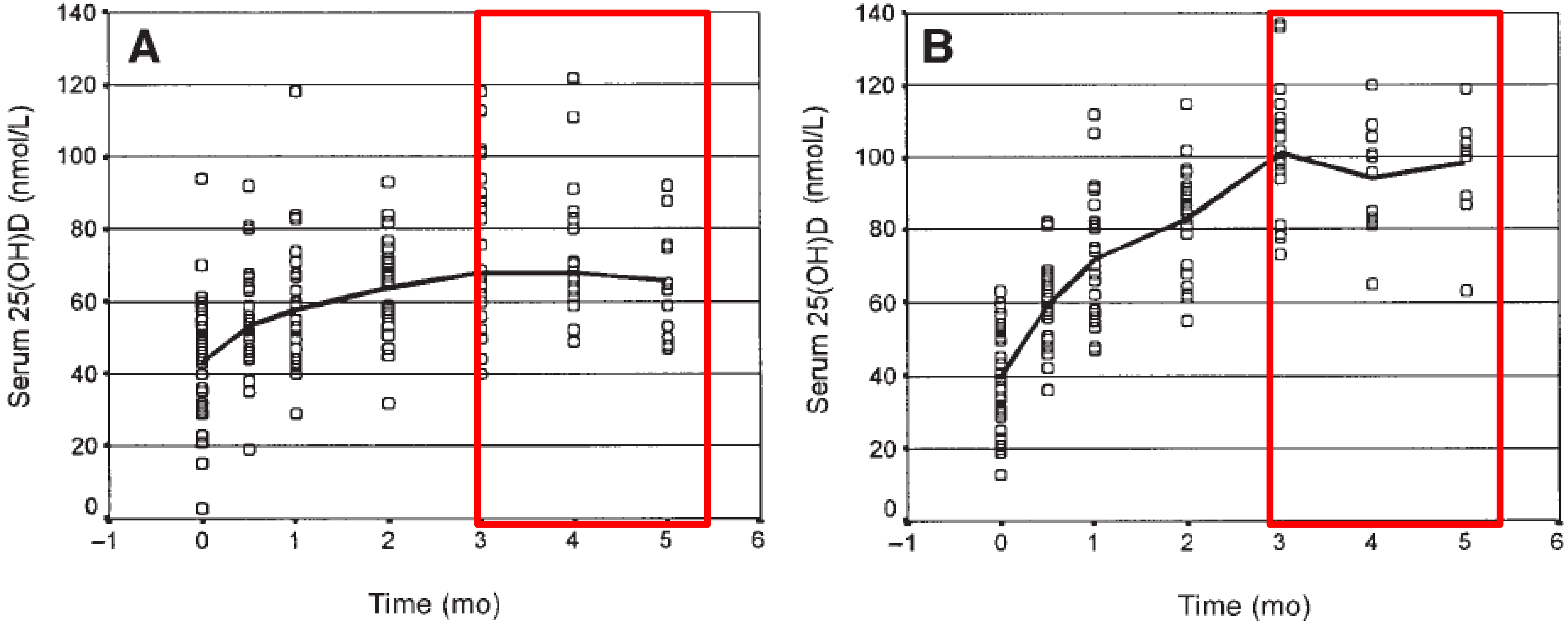


FIGURE 1. Serum 25-hydroxyvitamin [25(OH)D] concentrations in healthy adults before and during supplementation with 25 (A) and 100 (B) µg vitamin D_3/d.

European Food Safety Authority

Medizinische Universität Graz

Scientific Opinion on the Tolerable Upper Intake Level of vitamin D[1]

EFSA Panel on Dietetic Products, Nutrition and Allergies (NDA)[2, 3]

European Food Safety Authority (EFSA), Parma, Italy

Summary of Tolerable Upper Intake Levels for vitamin D

Age (years)	Tolerable Upper Intake Level (UL) for vitamin D (µg/day)
Children	
0-1	25
1-10	50
11-17	100
Adults[1] ≥18	100

[1] The UL for adults also applies to pregnant and lactating women.

Bis 4000 Internationale Einheiten Vitamin D pro Tag bei Erwachsenen sind sicher!

EFSA Journal 2012;10(7):2813

Vitamin D und Mortalität in der Allgemeinbevölkerung

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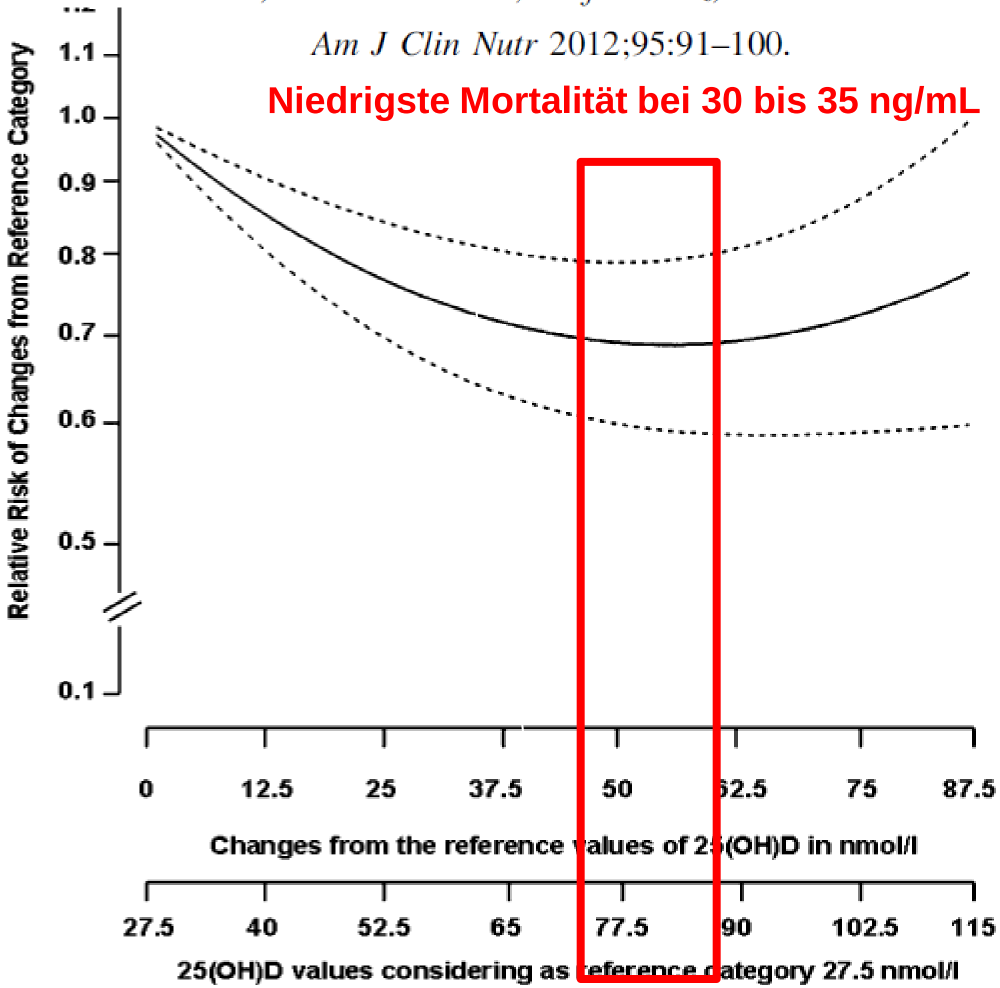
Armin Zittermann, Simona Iodice, Stefan Pilz, William B Grant, Vincenzo Bagnardi, and Sara Gandini

Am J Clin Nutr 2012;95:91–100.

Niedrigste Mortalität bei 30 bis 35 ng/mL



Vitamin D status classification	
Status	25-hydroxyvitamin D
Vitamin D deficiency	< 50 nM
Vitamin D insufficiency	51 to 74 nM
Vitamin D optimal range	75 to 100 nM
Vitamin D sufficiency	75 to 250 nM
Vitamin D intoxication	> 375 to 500 nM

Clinical Endocrinology (2011) 75, 575–584

Stefan Pilz*,†, Andreas Tomaschitz*, Winfried März‡,§,¶, Christiane Drechsler**, Eberhard Ritz††, Armin Zittermann‡‡, Etienne Cavalier§§, Thomas R. Pieber*, Joan M. Lappe¶¶, William B. Grant***, Michael F. Holick††† and Jacqueline M. Dekker†

Vitamin D supplementation for prevention of mortality in adults (Review)

Bjelakovic G, Gluud LL, Nikolova D, Whitfield K, Wetterslev J, Simonetti RG, Bjelakovic M, Gluud C

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Cochrane Database of Systematic Reviews 2014, Issue 1. Art. No.: CD007470.

Vitamin D supplementation for prevention of mortality in adults

Population: adults
Settings: any
Intervention: vitamin D
Comparison: placebo or no intervention

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of participants (studies)	Quality of the evidence (GRADE)
	Assumed risk	Corresponding risk			
	Placebo or no intervention	Vitamin D			
All-cause mortality in trials using vitamin D_3 (cholecalciferol) (Follow-up: 0.08 to 7 years)	Study population		RR 0.94 (0.91 to 0.98)	75,927 (38)	⊕⊕⊕◯ moderate[a]
Cancer mortality in trials using vitamin D_3 (cholecalciferol) (Follow-up: 5 to 7 years)	Study population		RR 0.88 (0.78 to 0.98)	44,492 (4)	⊕⊕⊕◯ moderate[a]
	29 per 1000	25 per 1000 (22 to 31)			

META-ANALYSIS

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Key results

This review suggests that vitamin D_3 may reduce mortality, showing that about 150 participants need to be treated over five years for one additional life to be saved. We found comparable effects of vitamin D_3 in studies that included only women compared with studies including both women and men. Vitamin D_3 also seemed to decrease cancer mortality, showing a reduction in mortality of 4 per 1000 persons treated for five to seven years. We also observed adverse effects to vitamin D such as renal stone formation (seen for vitamin D_3 combined with calcium) and elevated blood levels of calcium (seen for both alfacalcidol and calcitriol). In conclusion, we found some evidence that vitamin D_3 seems to decrease mortality in elderly people not dependent on help or living in institutional care.

Quality of the evidence

A large number of study participants left the trial before completion, and this raises concerns regarding the validity of the results. More randomised clinical trials are needed on the effects of vitamin D_3 on mortality in younger, healthy persons, as well as in elderly community-dwelling and institutionalised persons without apparent vitamin D deficiency.

BMJ Open

Cost-effectiveness and budget impact of Empirical vitamin D therapy on unintentional falls in older adults in the UK

C D Poole,[1] J Smith,[2] J S Davies[3]

BMJ Open 2015;5:e007910. doi:10.1136/bmjopen-2015-007910

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Table 6 Budget impact on NHS for alternative age-bound empiric vitamin D maintenance therapy strategies

Strategy	Well	Minor fall	Major fall	Care after major fall	Long-term care	Total	Net BIM
Current care							
All 60+	£ M	£1062 M	£3472 M	£3540 M	£9378 M	£17 451 M	
All 65+	£ M	£863 M	£3302 M	£3540 M	£9378 M	£17 083 M	
All 70+	£ M	£703 M	£3088 M	£3540 M	£9378 M	£16 709 M	
All 75+	£ M	£550 M	£2693 M	£3386 M	£8994 M	£15 623 M	
Empiric vitamin D maintenance							
All 60+	£2703 M	£944 M	£2857 M	£2886 M	£7642 M	£17 032 M	–£420 M
All 65+	£1903 M	£767 M	£2717 M	£2886 M	£7642 M	£15 915 M	–£1168 M
All 70+	£1270 M	£626 M	£2540 M	£2886 M	£7642 M	£14 963 M	–£1746 M
All 75+	£771 M	£490 M	£2216 M	£2761 M	£7330 M	£13 567 M	–£2056 M

NHS, National Health Service.

Conclusions: This study shows that treatment of the elderly UK population with colecalciferol 800 iu daily would be associated with reductions in mortality and substantial cost-savings through fall prevention.

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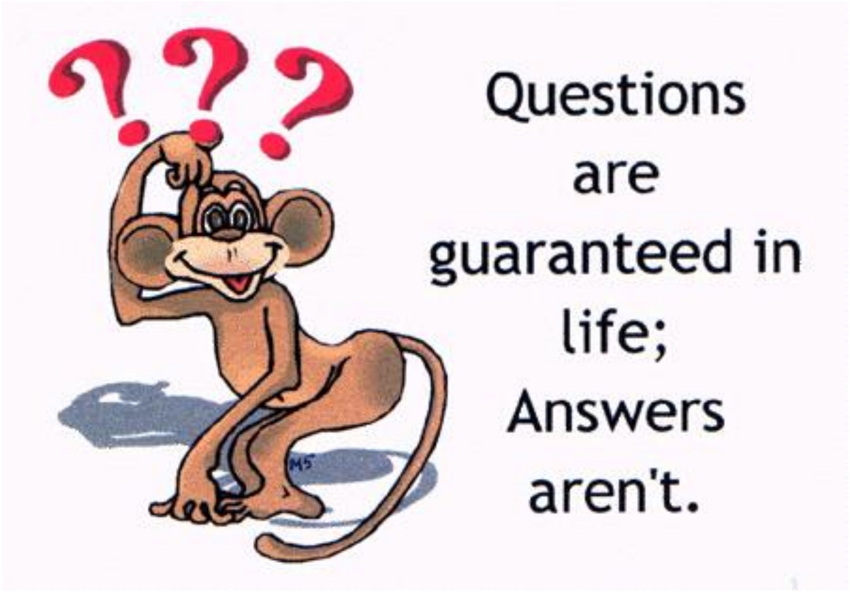
Danke fürs Zuhören!



Uncertain Verdict as Vitamin D Goes On Trial

–KAI KUPFERSCHMIDT

21 SEPTEMBER 2012 VOL 337 SCIENCE

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NAME	PLACE	PARTICIPANTS	DOSE	MAIN OUTCOMES	Cl
VITAL	U.S.	20,000, men: 50+ women: 55+	2000 IU D_3 daily	Cancer, Cardiovascular disease	Re fir
FIND	Finland	18,000 men: 60+, women: 65+	1600 IU D_3 daily or 3200 IU D_3 daily	Cancer, Cardiovascular disease, Diabetes	Re st su to
ViDA	New Zealand	5100, 50+	100,000 IU D_3 a month (200,000 IU in June)	Cardiovascular disease, Respiratory disease, Fractures	Re fir
DOHealth	8 European cities	2150, 70+	2000 IU D_3 daily	Infections, Fractures, Blood pressure, Cognitive function, Lower extremity function	Re
VIDAL	U.K.	20,000, 65–84	60,000 IU monthly	Longevity and others	Pl fe or is

Disease Prevention: Vitamin D Trials

ALTHOUGH THERE IS A DEBATE ON CUT-OFFS for appropriate vitamin D supplementation ("Uncertain verdict as vitamin D goes on trial," K. Kupferschmidt, News, special section on Disease Prevention, 21 September, p. 1476), clinicians universally agree that vitamin D deficiency is detrimental for bone health (*1*). We also know that vitamin D overdosing can be toxic. What quantity will prevent both deficiency and toxicity?

To find the ultimate vitamin D dose and to evaluate its effectiveness, researchers should learn from randomized controlled trials (RCTs) of drugs for diabetic or hypertensive patients, who were usually treated with the goal of achieving well-defined targets, such as certain HbA1c or blood pressure levels. In the case of vitamin D, this would mean performing RCTs in individuals with overt vitamin D deficiency and using doses to achieve optimal vitamin D levels.

Instead of performing these kinds of RCTs, the design of the ongoing vitamin D trials resembles previous (disappointing) vitamin trials, which attempted to establish a dose that should fit for the entire population (*2*). If the current vitamin D trials fail, we will ask ourselves why we did not perform RCTs exclusively in vitamin D–deficient patients rather than attempting to base conclusions on a heterogeneous population. Subgroup analyses of existing trials will not satisfy health authorities.

STEFAN PILZ,[1,2]* FEMKE RUTTERS,[1]
JACQUELINE M. DEKKER[1]

[1]Department of Epidemiology and Biostatistics, EMGO Institute for Health and Care Research, VU University Medical Centre, 1081 BT, Amsterdam, Netherlands. [2]Department of Internal Medicine, Division of Endocrinology and Metabolism, Medical University of Graz, 8036, Graz, Austria.