

March 14, 2006

Comments on Biological effects of ultraviolet radiation relevant to health with particular reference to sun beds for cosmetic purposes, Adopted by the SCCP on 13 December 2005

By

William B. Grant, Ph.D.

SUNARC

2107 Van Ness Ave., Suite 403B

San Francisco, CA 94109-2529


USA

www.sunarc.org

wgrant@sunarc.org

Public consultation

SCCP Opinion on biological effects of ultraviolet radiation relevant to health with particular reference to sun beds for cosmetic purposes

The Commission, in consultation with the Committee, invites interested stakeholders to send their comments on the [opinion](#)  by Friday, 17 March 2006 to the following e-mail address: Sanco-Sc6-Secretariat@cec.eu.int

http://europa.eu.int/comm/health/ph_risk/committees/04_sccp/sccp_cons_03_en.htm

General comments:

This document emphasizes the adverse health effects and minimizes the beneficial effects, resulting in an unbalanced and less than objective review of the literature, leading to doubtful conclusions. Also, it should be considered that a preponderance of evidence would be a better guide for policy decisions, rather than ironclad evidence. Does a businessman delay important decisions until he can do a 10-year study when he has an assembly line in the production mode? No, he makes an informed decision based on the best available evidence at the time. In the U.S., we have both criminal and civil court proceedings. Murderers can sometimes get off in a criminal trial, in which greater than 90% certainty is required, but are often then convicted in a civil trial, where greater than 50% certainty is required.

Detailed comments:

Regarding non-melanoma skin cancer, it appears that sunburning and UVA are important risk factors for BCC, while total solar UV irradiance, especially UVB, is an important risk factor for SCC [Green et al., 1999]. For melanoma, UVA [Moan et al., 1999; Garland et al., 2003] and sunburning or intermittent exposure are very important, while vitamin D [Millen et al., 2004] and UVB reduce the risk.

p. 11. The evidence that UVB and vitamin D reduce the risk of internal cancers has gone well beyond the ecologic study results [Moon et al., 2005; Zhou et al., 2005; Gorham et al., 2005; Garland et al., 2006], although the ecologic results are quite useful [Garland and Garland, 1980; Grant, 2002, 2006; Grant and Garland, in press], and the mechanisms

of action are well known [van den Bemd and Chang, 2002; Krishnan et al., 2003; Lamprecht and Lipkin, 2003]. UVB has also been associated with increased cancer survival rates [Robsahm et al., 2005; Moan et al., 2005; Porojnicu et al., 2005; Grant, 2006].

The same can be said about autoimmune diseases.

As for multiple sclerosis, the evidence is rather strong as well, including direct measures of solar UVB irradiance or vitamin D with reduced risk [van der Mei et al., 2003; Goldacre et al., 2004; Munger et al., 2004; VanAmerongen et al., 2004] and an understanding of the mechanisms [Cantorna and Mahon, 2004, 2005; Embry, 2004; Mark and Carson, 2006].

Vitamin D may play an important role in reducing the risk of type 1 diabetes mellitus [Hypponen et al., 2001; Harris, 2005; Luong et al., 2005].

Recent studies have also indicated a benefit in type 2 diabetes mellitus [Chiu et al., 2004; Pittas et al., 2006] and in strokes [Poole et al., 2006].

For recent reviews of the health benefits of vitamin D, please see [Zittermann, 2003; Gorham et al., 2005; Grant and Holick, 2005; Grant et al., 2005; Holick, 2005a,b; 2006; Zittermann et al., 2005; Garland et al., 2006].

p. 14. A discussion of free radical production from UVA should be made. It is very likely that free radicals and indirect DNA damage are much more important for BCC and melanoma than is direct DNA damage. See, for example, Haywood et al., 2003, Agar et al., 2003, Halliday et al., 2004, 2005, Millen et al., 2004.

pp. 18-19

According to a recent multi-country study, sunbed use was not found to be a risk factor for melanoma [Bataille et al., 2005]. This reference was omitted from the document for some reason. It should be mentioned and discussed.

The studies regarding melanoma risk from use of sunbeds should be reanalyzed and reinterpreted in terms of beds that have 3-5% UVB and those, such as in France and Sweden that are limited to <1.5% UVB [Autier, 2004] as well as Switzerland [Gerber et al., 2002] and perhaps the U.K. [Woollons et al., 1999; Das et al., 2002]. In the U.S., melanoma has not been significantly linked to sunbed use [Holly et al., 1995, Chen et al., 1998], likely due to the higher UVB fraction in the U.S. compared to that in Europe.

Another good reference on UV risk for melanoma is Kennedy et al. [2004].

p. 24. The statement that UVB is the most harmful part of the UVR spectrum reaching the Earth's surface is incorrect. It is likely based on considering direct DNA damage rather than indirect DNA damage by free radicals, and overlooks the benefits of vitamin D. After all, mankind was able to escape from the tropics only by developing lighter skin

that permitted vitamin D production in lower UVB environments [Jablonski and Chaplin, 2000, Chaplin, 2004]. To place so little emphasis on vitamin D production is to seriously undermine the scientific credibility of the document and limit its usefulness in guiding public health policy.

p. 25. The last statement under Question 4 regarding sunbed generation of UVB and production of vitamin D is belied by the results in Tangpricha et al. [2004], cited in the report. See, also, Matsuoka et al., 1990, Koutkia et al., 2001.

In summary, the health benefits of sunbed lamps emitting 3-5% UVB out of the total UVR match the solar UVR spectrum reasonably well and produce vitamin D in the skin. It is the UVA portion of the spectrum that presents the health problems. The health benefits of vitamin D are becoming appreciated more each month. The health benefits of vitamin D production should be compared against the health risks of UVR, keeping in mind that many of the health risks arise from erythema, burning, and excess tanning, not regular, controlled UVR irradiance.

References to consult

Agar NS, Halliday GM, Barnetson RS, Ananthaswamy HN, Wheeler M, Jones AM. The basal layer in human squamous tumors harbors more UVA than UVB fingerprint mutations: a role for UVA in human skin carcinogenesis. *Proc Natl Acad Sci U S A*. 2004 Apr 6;101(14):4954-9.

Autier P. Perspectives in melanoma prevention: the case of sunbeds. *Eur J Cancer*, 2004;40:2367-2376.

Bataille V, Boniol M, De Vries E, Severi G, Brandberg Y, Sasieni P, Cuzick J, Eggermont A, Ringborg U, Grivegne AR, Coebergh JW, Chignol MC, Dore JF, Autier P. A multicentre epidemiological study on sunbed use and cutaneous melanoma in Europe. *Eur J Cancer*. 2005 Sep;41(14):2141-9.

Cantorna MT, Mahon BD. Mounting evidence for vitamin D as an environmental factor affecting autoimmune disease prevalence. *Exp Biol Med (Maywood)*, 2004;229:1136-1142.

Cantorna MT, Mahon BD. D-hormone and the immune system. *J Rheumatol Suppl*. 2005 Sep;76:11-20.

Chaplin G. Geographic distribution of environmental factors influencing human skin coloration. *Am J Phys Anthropol*. 2004 Nov;125(3):292-302.

Chen YT, Dubrow R, Zheng T, Barnhill RL, Fine J, Berwick M. Sunlamp use and the risk of cutaneous malignant melanoma: a population-based case-control study in Connecticut, USA. *Int J Epidemiol*. 1998 Oct;27(5):758-65.

Chiu KC, Chu A, Go VL, Saad MF. Hypovitaminosis D is associated with insulin resistance and beta cell dysfunction. *Am J Clin Nutr*, 2004;79:820-825.

Das S, Lloyd JJ, Walshaw D, Diffey BL, Farr PM. Response of psoriasis to sunbed treatment: comparison of conventional ultraviolet A lamps with new higher ultraviolet B-emitting lamps. *Br J Dermatol*. 2002 Nov;147(5):966-72.

Embry A. Vitamin D supplementation in the fight against multiple sclerosis. *J Orthomolec Med*, 2004;19:27-38.

Garland CF, Garland FC. Do sunlight and vitamin D reduce the likelihood of colon cancer? *Int J Epidemiol*. 1980 Sep;9(3):227-31.

Garland CF, Garland FC, Gorham ED. Epidemiologic evidence for different roles of ultraviolet A and B radiation in melanoma mortality rates. *Ann Epidemiol*. 2003 Jul;13(6):395-404.

Garland CF, Garland FC, Gorham ED, Lipkin M, Newmark H, Mohr SB, Holick MF. The role of vitamin d in cancer prevention. *Am J Public Health*. 2006 Feb;96(2):252-61.

Gerber B, Mathys P, Moser M, Bressoud D, Braun-Fahrlander C. Ultraviolet emission spectra of sunbeds. *Photochem Photobiol*. 2002 Dec;76(6):664-8.

Goldacre MJ, Seagroatt V, Yeates D, Acheson ED. Skin cancer in people with multiple sclerosis: a record linkage study. *J Epidemiol Community Health*. 2004 Feb;58(2):142-4.

Gorham ED, Garland CF, Garland FC, et al. Vitamin D and prevention of colorectal cancer. *J Steroid Biochem Mol Biol*, 2005;97:179-194.

Grant WB. An estimate of premature cancer mortality in the United States due to inadequate doses of solar ultraviolet-B radiation. *Cancer*. 2002;94:1867-75.

Grant WB. Lower vitamin D production from solar ultraviolet-B irradiance for black Americans compared to white Americans may explain some of the difference in cancer survival rates. *J Natl Med Assoc*. 2006;98:357-64.

Grant WB, Garland CF. The association of solar ultraviolet B (UVB) with reducing risk of cancer: multifactorial ecologic analysis of geographic variation in age-adjusted cancer mortality rates. *Anticancer Res*. 2006;26:, in press.

Grant WB, Holick MF. Benefits and requirements of vitamin D for optimal health: a review. *Altern Med Rev*, 2005;10:94-111.

Grant WB, Garland CF, Holick MF. Comparisons of estimated economic burdens due to insufficient solar ultraviolet irradiance and vitamin D and excess solar UV irradiance for the United States. *Photochem Photobiol*. 2005 Nov-Dec;81(6):1276-86.

- Grant WB, Gorham ED. Time for public health action on vitamin D for cancer risk reduction. *Int J Epidemiol*. 2005 Nov. 22 [Epub ahead of print]
- Green A, Williams G, Neale R, et al. Daily sunscreen application and betacarotene supplementation in prevention of basal-cell and squamous-cell carcinomas of the skin: a randomised controlled trial. *Lancet*, 1999;354:723-729.
- Halliday GM, Byrne SN, Kuchel JM, Poon TS, Barnetson RS. The suppression of immunity by ultraviolet radiation: UVA, nitric oxide and DNA damage. *Photochem Photobiol Sci*. 2004 Aug;3(8):736-40.
- Halliday GM, Agar NS, Barnetson RS, Ananthaswamy HN, Jones AM. UV-A fingerprint mutations in human skin cancer. *Photochem Photobiol*. 2005 Jan-Feb;81(1):3-8.
- Harris SS. Vitamin D in type 1 diabetes prevention. *J Nutr*. 2005 Feb;135(2):323-5.
- Haywood R, Wardman P, Sanders R, Linge C. Sunscreens inadequately protect against ultraviolet-A-induced free radicals in skin: implications for skin aging and melanoma? *J Invest Dermatol*. 2003 Oct;121(4):862-8.
- Holick MF. Sunlight and vitamin D for bone health and prevention of autoimmune diseases, cancers, and cardiovascular disease. *Am J Clin Nutr*, 2004;80:1678S-1688S.
- Holick MF. Vitamin D: important for prevention of osteoporosis, cardiovascular heart disease, type 1 diabetes, autoimmune diseases, and some cancers. *South Med J*, 2005a;98:1024-1027.
- Holick MF. The vitamin D epidemic and its health consequences. *J Nutr*. 2005b;135(11):2739S-48S.
- Holick MF. High prevalence of vitamin D inadequacy and implications for health. *Mayo Clin Proc*, 2006;81:353-373.
- Holly EA, Aston DA, Cress RD, Ahn DK, Kristiansen JJ. Cutaneous melanoma in women. I. Exposure to sunlight, ability to tan, and other risk factors related to ultraviolet light. *Am J Epidemiol*. 1995 May 15;141(10):923-33.
- Hypponen E, Laara E, Reunanen A, Jarvelin MR, Virtanen SM. Intake of vitamin D and risk of type 1 diabetes: a birth-cohort study. *Lancet*. 2001 Nov 3;358(9292):1500-3.
- Jablonski NG, Chaplin G. The evolution of human skin coloration. *J Hum Evol*. 2000 Jul;39(1):57-106.
- Kennedy C, Bajdik CD, Willemze R, De Gruijl FR, Bouwes Bavinck JN; Leiden Skin Cancer Study. The influence of painful sunburns and lifetime sun exposure on the risk of

actinic keratoses, seborrheic warts, melanocytic nevi, atypical nevi, and skin cancer. *J Invest Dermatol.* 2003 Jun;120(6):1087-93.

Koutkia P, Lu Z, Chen TC, Holick MF. Treatment of vitamin D deficiency due to Crohn's disease with tanning bed ultraviolet B radiation. *Gastroenterology.* 2001 Dec;121(6):1485-8.

Krishnan AV, Peehl DM, Feldman D. The role of vitamin D in prostate cancer. *Recent Results Cancer Res,* 2003;164: 205-221.

Lamprecht SA, Lipkin M. Chemoprevention of colon cancer by calcium, vitamin D and folate: molecular mechanisms. *Nat Rev Cancer,* 2003;3:601-614.

Luong K, Nguyen LT, Nguyen DN. The role of vitamin D in protecting type 1 diabetes mellitus. *Diabetes Metab Res Rev.* 2005 Jul-Aug;21(4):338-46.

Mark BL, Carson JA. Vitamin d and autoimmune disease-implications for practice from the multiple sclerosis literature. *J Am Diet Assoc.* 2006 Mar;106(3):418-24.

Matsuoka LY, Wortsman J, Hollis BW. Suntanning and cutaneous synthesis of vitamin D3. *J Lab Clin Med.* 1990 Jul;116(1):87-90.

Millen AE, Tucker MA, Hartge P, et al. Diet and melanoma in a case-control study. *Cancer Epidemiol Biomarkers Prev.* 2004 Jun;13(6):1042-51.

Moan J, Dahlback A, Setlow RB. Epidemiological support for an hypothesis for melanoma induction indicating a role for UVA radiation. *Photochem Photobiol,* 1999;70:243-247.

Moon SJ, Fryer AA, Strange RC. Ultraviolet radiation: effects on risks of prostate cancer and other internal cancers. *Mutat Res.* 2005 Apr 1;571(1-2):207-19.

Mosekilde L. Vitamin D and the elderly. *Clin Endocrinol (Oxf),* 2005;62:265-281.

Munger KL, Zhang SM, O'Reilly E, Hernan MA, Olek MJ, Willett WC, Ascherio A. Vitamin D intake and incidence of multiple sclerosis. *Neurology.* 2004 Jan 13;62(1):60-5.

Peterlik M, Cross HS. Vitamin D and calcium insufficiencies predispose for multiple chronic diseases. *Eur J Clin Invest,* 2005;35:290-304.

Poole KE, Loveridge N, Barker PJ, et al. Reduced Vitamin D in Acute Stroke. *Stroke,* 2006;37:243-245.

Porojnicu AC, Robsahm TE, Ree AH, Moan J. Season of diagnosis is a prognostic factor in Hodgkin's lymphoma: a possible role of sun-induced vitamin D. *Br J Cancer.* 2005 Sep 5;93(5):571-4.

Robsahm TE, Tretli S, Dahlback A, Moan J. Vitamin D3 from sunlight may improve the prognosis of breast-, colon- and prostate cancer (Norway). *Cancer Causes Control*. 2004 Mar;15(2):149-58.

Tangpricha V, Turner A, Spina C, Decastro S, Chen TC, Holick MF. Tanning is associated with optimal vitamin D status (serum 25-hydroxyvitamin D concentration) and higher bone mineral density. *Am J Clin Nutr*. 2004 Dec;80(6):1645-9.

VanAmerongen BM, Dijkstra CD, Lips P, Polman CH. Multiple sclerosis and vitamin D: an update. *Eur J Clin Nutr*. 2004 Aug;58(8):1095-109.

van den Bemd GJ, Chang GT. Vitamin D and vitamin D analogs in cancer treatment. *Curr Drug Targets*, 2002;3: 85-94.

van der Mei IA, Ponsonby AL, Dwyer T, et al. Past exposure to sun, skin phenotype, and risk of multiple sclerosis: case-control study. *BMJ*, 2003;327:316.

Woollons A, Kipp C, Young AR, Petit-Frere C, Arlett CF, Green MH, Clingen PH. The 0.8% ultraviolet B content of an ultraviolet A sunlamp induces 75% of cyclobutane pyrimidine dimers in human keratinocytes in vitro. *Br J Dermatol*. 1999 Jun;140(6):1023-30.

Zhou W, Suk R, Liu G, et al. Vitamin D is associated with improved survival in early stage non-small cell lung cancer patients, *Cancer Epidemiol Biomarkers Prev*, 2005;14:2303-2309.

Zittermann A. Vitamin D in preventive medicine: are we ignoring the evidence? *Br J Nutr*. 2003 May;89(5):552-72.

Zittermann A, Schleithoff SS, Koerfer R. Putting cardiovascular disease and vitamin D insufficiency into perspective. *Br J Nutr*, 2005;94:483-492.