



Vitamin D and cancer; a contradictory problem

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Abstract

Vitamin D has been reported as an essential factor for bone health as well as a protective factor for many cancers, with potential effect of the pandemic situation of vitamin D deficiency worldwide. Vitamin D could affect every cell in the human body. Living at higher latitudes and having vitamin D deficiency could result in increasing risk of common fatal cancers. Enough intake of vitamin D could have a beneficial influence on some cancers such as cancers of colon, breast, prostate, pancreatic and ovarian. Both observational and experimental epidemiologic studies have reported that higher intakes of vitamin D are related to lower risk of cancer.

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Vitamin D has been reported as an essential factor for bone health as well as a protective factor for many cancers, with potential effect of the pandemic situation of vitamin D deficiency worldwide (1). Vitamin D could also affect every cell in the human body (2). In addition, epidemiologic studies have shown that living at higher latitudes (3) and having vitamin D deficiency could result in increasing risk of common fatal cancers (4,5). Moreover, enough intake of vitamin D could have a beneficial influence on some cancers (6) such as cancers of colon (7), breast (8), prostate (9), pancreatic (10) and ovarian (11). Nowadays, there is a pandemic of obesity worldwide (12) and almost one-fifth of all cancers might cause by obesity (13). There is a relationship between obesity and low intake of vitamin D (13). In the following paragraphs, the association of vitamin D with some cancers will be discussed.

Breast cancer is the most common cancer among women all around the world (14). This cancer is also related to other chronic diseases such as type 2 diabetes (15) and cardiovascular diseases (16). It has reported that the intake of normal range of vitamin D may decline the mortality from breast cancer (17). In fact, vitamin D has a substantial role to protect women from breast cancer (2) which has been found in other studies too (18).

Pancreatic cancer is one of the fatal cancers

Key point

The intake of vitamin D might be needed to reduce cancer risk. Epidemiologic studies have reported that higher intakes of vitamin D are related to lower risk of many cancers. It is recommended that with avoidance of deficiency from vitamin D and by adding supplements of vitamin D, in a safe and economic way, it is possible to decline the cancer incidence and mortality

(10). It is the fourth cause of cancer deaths in western countries and fifth worldwide (19). Its association with vitamin D is still controversial (19).

Prostate cancer is the most second fatal cancer among American men and the most common diagnosed cancer (9). Nutrition and physical activity are the most important factors to prevent prostate cancer (20). In addition, the relationship between vitamin D deficiency and increasing risk of prostate cancer has been found before (21). Moreover, it has been reported that limited exposure to sunlight and/or vitamin D deficiency are associated with increasing of incidence and mortality from many common tumors like prostate cancer (22). In fact, chronic vitamin D deficiency in young and middle age men may increase the risk of prostate cancer among them (23). Therefore, for the treatment of prostate cancer, using of vitamin D is very helpful. It is recommended

that sufficient vitamin D in nutrition will be a priority for men at all ages (24). However, there is a controversy about the dairy intake and prostate cancer; while some studies found an increase in mortality from prostate cancer (25,26), some others have found no relationship (27,28). Colon cancer mortality rates are higher in the areas with lower sunlight compared to sunny areas (29). Many epidemiologic studies have found that less amount of vitamin D intake is associated with higher risk of colon cancer (30). In addition, there is some evidence that in areas with less sunlight, the intake of vitamin D should be more than the normal amount (31). Moreover, higher intakes of total calcium and milk after, but not before diagnosis of disease, may also be related to less risk of death in colorectal patients (31). It should be noted that there is still some controversy on the exact effect of vitamin D in the prevention of colon cancer (32).

As a conclusion, previous studies have found that intake of vitamin D might be needed to reduce cancer risk (29,33). Both observational and experimental epidemiologic studies have reported that higher intakes of vitamin D are related to lower risk of cancer (34). Furthermore, it has been proved that daily intake of vitamin D up to 40 000 IU may not result in its toxicity (33). Although more studies are needed to clarify the long-term and short-term effects of high-dose of vitamin D intake (32). Finally, due to increasing of the risk of cancer by vitamin D deficiency, it is recommended that with avoidance of deficiency from vitamin D and by adding supplements of vitamin D, in a safe and economic way, it is possible to decline the cancer incidence and mortality (35).

Author's contribution

MA is the single author of the paper.

Conflicts of interest

The author declares no conflict of interest.

Ethical considerations

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References

- Holick MF. Vitamin D: its role in cancer prevention and treatment. *Prog Biophys Mol Biol.* 2006;92:49-59.
- Obaidi J, Musallam E, Al-ghzawi HM, Azzeghaiby SN, Alzoghaybi IN. Vitamin D and its relationship with breast cancer: An evidence based practice paper. *Global J Health Sci.* 2015;7:261-6.
- Krishnan AV, Trump DL, Johnson CS, Feldman D. The role of vitamin D in cancer prevention and treatment. *Endocrinol Metab Clin North Am.* 2010;39:401-18.
- Grant WB. Geographic variation of prostate cancer mortality rates in the United States: Implications for prostate cancer risk related to vitamin D. *Int J Cancer.* 2004;111:470-1.
- Grant WB. A multicountry ecologic study of risk and risk reduction factors for prostate cancer mortality. *Eur Urol.* 2004;45:271-9.
- Freedman DM, Dosemeci M, McGlynn K. Sunlight and mortality from breast, ovarian, colon, prostate, and non-melanoma skin cancer: a composite death certificate based case-control study. *Occup Environ Med.* 2002;59:257-62.
- Garland CF, Garland FC. Do sunlight and vitamin D reduce the likelihood of colon cancer? *Int J Epidemiol.* 1980;9:227-31.
- Gorham ED, Garland CF, Garland FC. Acid haze air pollution and breast and colon cancer mortality in 20 Canadian cities. *Can J Public Health.* 1989;80:96-100.
- Schwartz GG, Hulka BS. Is vitamin D deficiency a risk factor for prostate cancer? (Hypothesis). *Anticancer Res.* 1990;10:1307-11.
- Chiang KC, Yeh CN, Chen TC. Vitamin d and pancreatic cancer-an update. *Cancers (Basel).* 2011;3:213-26.
- Lefkowitz ES, Garland CF. Sunlight, vitamin D, and ovarian cancer mortality rates in US women. *Int J Epidemiol.* 1994;23:1133-6.
- Lagunova Z, Porojnicu AC, Grant WB, Bruland O, Moan JE. Obesity and increased risk of cancer: does decrease of serum 25-hydroxyvitamin D level with increasing body mass index explain some of the association? *Mol Nutr Food Res.* 2010;54:1127-33.
- Shanmugalingam T, Crawley D, Bosco C, Melvin J, Rohrmann S, Chowdhury S, et al. Obesity and cancer: the role of vitamin D. *BMC Cancer.* 2014;14:712.
- De Angelis R, Sant M, Coleman MP, Francisci S, Baili P, Pierannunzio D, et al. Cancer survival in Europe 1999-2007 by country and age: results of EURO CARE--5-a population-based study. *Lancet Oncol.* 2014;15:23-34.
- Ma FJ, Liu ZB, Qu L, Hao S, Liu GY, Wu J, et al. Impact of type 2 diabetes mellitus on the prognosis of early stage triple-negative breast cancer in People's Republic of China. *Onco Targets Ther.* 2014;7:2147-54.
- Armenian SH, Xu L, Ky B, Sun C, Farol LT, Pal SK, et al. Cardiovascular disease among survivors of adult-onset cancer: a community-based retrospective cohort study. *J Clin Oncol.* 2016;34:1122-30.
- Mohr SB, Gorham ED, Kim J, Hofflich H, Garland CF. Meta-analysis of vitamin D sufficiency for improving survival of patients with breast cancer. *Anticancer Res.* 2014;34:1163-6.
- Yao S, Sucheston LE, Millen AE, Johnson CS, Trump DL, Nesline MK, et al. Pretreatment serum concentrations of 25-hydroxyvitamin D and breast cancer prognostic characteristics: a case-control and a case-series study. *PLoS One.* 2011;6:e17251.
- Jemal A, Siegel R, Ward E, Murray T, Xu J, Thun MJ. Cancer statistics, 2007. *CA Cancer J Clin.* 2007;57:43-66.
- Kushi LH, Doyle C, McCullough M, Rock CL, Demark-Wahnefried W, Bandera EV, et al. American Cancer Society Guidelines on nutrition and physical activity for cancer prevention: reducing the risk of cancer with healthy food choices and physical activity. *CA Cancer J Clin.* 2012;62:30-67.
- Ahonen MH, Tenkanen L, Teppo L, Hakama M, Tuohimaa P. Prostate cancer risk and prediagnostic serum 25-hydroxyvitamin D levels (Finland). *Cancer Causes Control.* 2000;11:847-52.
- Grant WB. An estimate of premature cancer mortality in the U.S. due to inadequate doses of solar ultraviolet-B radiation. *Cancer.* 2002;94:1867-75.
- Tangpricha V, Pearce EN, Chen TC, Holick MF. Vitamin D insufficiency among free-living healthy young adults. *Am J Med.* 2002;112:659-62.
- Chen TC, Holick MF. Vitamin D and prostate cancer prevention and treatment. *Trends Endocrinol Metab.* 2003;14:423-30.
- Song Y, Chavarro JE, Cao Y, Qiu W, Mucci L, Sesso HD, et al. Whole milk intake is associated with prostate cancer-specific mortality among U.S. male physicians. *J Nutr.* 2013;143:189-96.
- Aune D, Navarro Rosenblatt DA, Chan DS, Vieira AR, Vieira R, Greenwood DC, et al. Dairy products, calcium, and prostate

- cancer risk: a systematic review and meta-analysis of cohort studies. *Am J Clin Nutr.* 2015;101:87-117.
27. Koh KA, Sesso HD, Paffenbarger RS Jr, Lee IM. Dairy products, calcium and prostate cancer risk. *Br J Cancer.* 2006;95:1582-5.
 28. Rodriguez C, McCullough ML, Mondul AM, Jacobs EJ, Fakhraabadi-Shokoohi D, Giovannucci EL, et al. Calcium, dairy products, and risk of prostate cancer in a prospective cohort of United States men. *Cancer Epidemiol Biomarkers Prev.* 2003;12:597-603.
 29. Garland CF, Garland FC, Gorham ED, Lipkin M, Newmark H, Mohr SB, et al. The role of vitamin D in cancer prevention. *Am J Public Health.* 2006;96:252-61.
 30. McCullough ML, Robertson AS, Rodriguez C, Jacobs EJ, Chao A, Carolyn J, et al. Calcium, vitamin D, dairy products, and risk of colorectal cancer in the Cancer Prevention Study II Nutrition Cohort (United States). *Cancer Causes Control.* 2003;14:1-12.
 31. Giovannucci E. The epidemiology of vitamin D and colorectal cancer: recent findings. *Curr Opin Gastroenterol.* 2006;22:24-9.
 32. Davis CD. Vitamin D and cancer: current dilemmas and future research needs. *Am J Clin Nutr.* 2008;88:565-69.
 33. Garland CF, French CB, Baggerly LL, Heaney RP. Vitamin D supplement doses and serum 25-hydroxyvitamin D in the range associated with cancer prevention. *Anticancer Res.* 2011;31:607-11.
 34. Schwartz GG, Blot WJ. Vitamin D status and cancer incidence and mortality: something new under the sun. *J Natl Cancer Inst.* 2006;98:428-30.
 35. Feldman D, Krishnan AV, Swami S, Giovannucci E, Feldman BJ. The role of vitamin D in reducing cancer risk and progression. *Nat Rev Cancer.* 2014;14:342-57.