

Increased Vitamin D Intake and Decreased Lung Cancer Risk for Never Smokers

October 21, 2013

JM Kocarnik

As the leading cause of cancer death in women in the United States, lung cancer is a considerable public health burden. While smoking cessation is an effective strategy for cancer prevention, additional approaches are necessary to help prevent the over 300,000 worldwide lung cancer deaths a year that are not attributable to tobacco use. In women, roughly half of lung cancer cases are not attributable to smoking. Emerging evidence has suggested that vitamin D concentrations may be associated with lung cancer risk and mortality, though perhaps only among certain subgroups. A recent report in *The American Journal of Clinical Nutrition* by Dr. Ting-Yuan David Cheng and colleagues, under the direction of Dr. Marian L. Neuhouser in the Public Health Sciences Division, found that increased vitamin D intake was associated with a lower lung cancer risk in never-smoking postmenopausal women.

To investigate this potential relationship between vitamin D intake and lung cancer risk, the researchers analyzed data from the nearly 130,000 postmenopausal women participating in the Women's Health Initiative (WHI), including 1,771 lung cancer cases. This large sample size was instrumental in making this study possible, notes lead author Cheng, "particularly the number of never smokers and detailed data on dietary intake and supplemental vitamin use collected by the WHI." The effect of total vitamin D intake on lung cancer risk was evaluated both categorically and linearly using Cox proportional hazard models. Never smokers were defined as those having smoked fewer than 100 cigarettes in their lifetime.

Initial evaluations, looking at the effect of vitamin D intake across all women, showed no effect. Given the subgroup-specific effects seen in previous studies, the authors also performed the analysis stratified by smoking status. While no effect was seen in current or former smokers, an inverse association was observed in never smokers. In this group, total vitamin D intake was statistically significantly associated with lower risk of lung cancer (P-trend = 0.01). Compared to a vitamin D intake of less than 100 IU/day, intakes of 400-599 and 600-799 IU/d were associated with a 45% reduction in risk (Hazard Ratio (HR) = 0.55), while a 63% reduction in risk was seen for ≥ 800 IU/day (HR = 0.37).

In further analyses by histological subtype of lung cancer, this reduction in risk in never smokers was similarly observed for adenocarcinoma (HR 0.34) and non-small cell lung cancer (HR 0.37) for ≥ 400 versus < 100 IU/day. Interestingly, adenocarcinomas tend to occur more often in never smokers than in smokers. The authors hypothesize that, at least for adenocarcinoma, the anti-carcinogenic functions of vitamin D may more effectively prevent or reverse mutations that are not tobacco-related, compared with tobacco-induced mutations. Additional research will be needed to further evaluate the biological mechanisms of this relationship, and to see whether vitamin D intake similarly reduces lung cancer risk in other groups, such as never-smoking men or premenopausal women.

Overall, "this study provides new evidence that vitamin D obtained from diet and vitamin supplements is associated with a lower risk of lung cancer in never-smoking women," states Cheng, which "is important because it gives us clues that insufficient vitamin D intake may be a new risk factor of lung cancer and we may be able to use vitamin D to prevent lung cancer in this population." This finding suggests that postmenopausal women who have already reduced their risk of lung cancer by never smoking may further reduce their lung cancer risk by ensuring they have sufficient total intake of vitamin D.

Other PHS investigators contributing to this project were Drs. Andrea Z. LaCroix, Shirley A.A. Beresford, Gary E. Goodman, Mark D. Thornquist, and Yingye Zheng.

[Cheng TY, Lacroix AZ, Beresford SA, Goodman GE, Thornquist MD, Zheng Y, Chlebowski RT, Ho GY, Neuhaus ML](#). Vitamin D intake and lung cancer risk in the Women's Health Initiative. *Am J Clin Nutr* 2013; 98(4):1002-11.

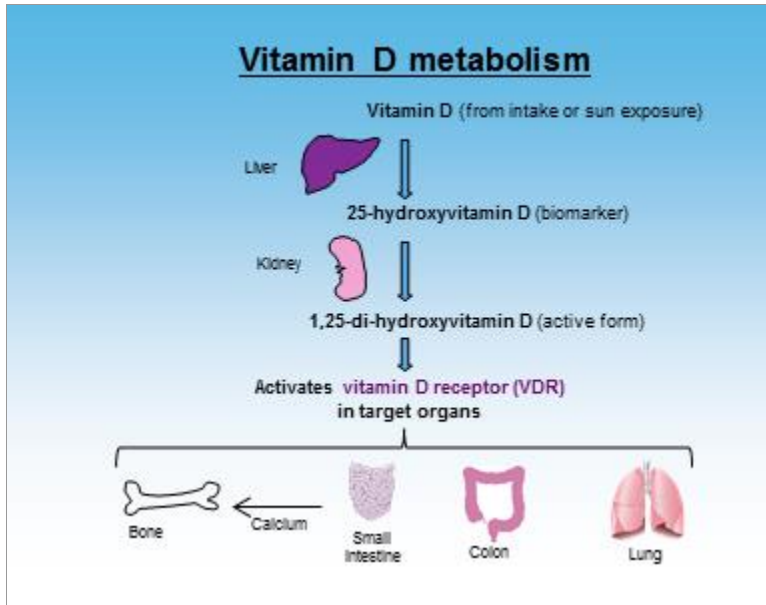


Image provided by David Cheng.

In the human body, vitamin D is converted in the liver to 25-hydroxyvitamin D, which is the standard biomarker of vitamin D status for research and clinical use. This form is further converted in the kidney to 1,25-di-hydroxyvitamin D, which is the active form of vitamin D. This form activates vitamin D receptors, which regulate numerous functions including cell cycles in the lungs.