



## Vitamin D Levels in Elders

*Most older people had low serum levels, and at least 25% of elders had frank vitamin D deficiency.*

Two studies in the *Journal of Clinical Endocrinology and Metabolism* focus on vitamin D in older populations.

Researchers measured serum 25-hydroxyvitamin D (25(OH)D) in 6000 community-dwelling men (age range, 65–99) who lived in various U.S. regions. Average serum 25(OH)D level was 25 ng/mL; one quarter of subjects had levels lower than 20 ng/mL. In multivariable analysis, lower 25(OH)D levels were associated with older age, obesity, black or Latino ethnicity, blood sampling in winter, and residence at a northern latitude (e.g., Minneapolis, compared with San Diego). Use of vitamin D supplements and engaging in outdoor activities were associated with higher vitamin D levels.

Dutch researchers examined relations between vitamin D levels and bone metabolism in 1300 randomly selected older adults (age range, 65–88). Mean serum 25(OH)D level was 21 ng/mL; half the participants had levels lower than 20 ng/mL. Findings included the following:

- Serum parathyroid hormone levels were *inversely* proportional to vitamin D levels, without any plateau effect.
- Markers of bone turnover (serum osteocalcin and urinary deoxypyridinoline) were *inversely* proportional to 25(OH)D levels until the latter exceeded 20 ng/mL; above that point, bone turnover markers plateaued.
- Total hip bone-mineral density was *directly* proportional to 25(OH)D levels until the latter exceeded 20 ng/mL; above that point, bone density plateaued.

### COMMENT

Average vitamin D levels were similar in both of these studies in older people. The factors that predisposed elders to vitamin D deficiency in the U.S. study have been

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recognized previously in younger populations. The Dutch results suggest that bone metabolism is affected adversely when 25(OH)D levels drop below a threshold of about 20 ng/mL. This finding supports 20 ng/mL as a reasonable cutoff for a designation of vitamin D deficiency.

— Allan S. Brett, MD

*Orwoll E et al. Vitamin D deficiency in older men. J Clin Endocrinol Metab 2009 Apr; 94:1214.*

*Kuchuk NO et al. Relationships of serum 25-hydroxyvitamin D to bone mineral density and serum parathyroid hormone and markers of bone turnover in older persons. J Clin Endocrinol Metab 2009 Apr; 94:1244.*

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## Rising Prevalence of Vitamin D Insufficiency

Mean vitamin D levels dropped in both sexes and across all age and ethnic groups.

Vitamin D insufficiency is associated with elevated risks for cardiovascular disease, cancer, and infections. Researchers examined U.S. population trends in vitamin D insufficiency by comparing data from National Health and Nutrition Examination Surveys that were collected in 1988–1994 and 2001–2004.

Mean serum 25-hydroxyvitamin D (25[OH]D) levels dropped from 30 ng/mL during 1988–1994 to 24 ng/mL during 2001–2004; these mean values are in the “relative insufficiency” range, as defined by some experts. Mean levels decreased in both sexes, across all ethnic groups, and across all age groups; the reduction was significantly greater among younger individuals than among older participants. One constant across both time periods was that nonwhites continued to have lower levels of vitamin D than whites. Overall, prevalence of 25(OH)D levels  $\geq 30$  ng/mL dropped from 45% to 23%.

### COMMENT

This study demonstrates substantial decreases in vitamin D levels during the past 2 decades. If vitamin D levels are linked definitively to nonskeletal diseases, the rising incidence of insufficiency could have substantial health consequences.

—**Jamaluddin Moloo, MD, MPH**

Ginde AA et al. Demographic differences and trends of vitamin D insufficiency in the US population, 1988–2004. *Arch Intern Med* 2009 Mar 23; 169:626.

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## Causes of Excess Mortality Associated with Low and High BMIs

*For both sexes and all ages, 13-year overall mortality was lowest in people with baseline BMIs of 22.5–25 kg/m<sup>2</sup>.*

Both low and high body-mass indexes are associated with excess risk for short- and long-term death. To further explore the relation between BMI and mortality, Oxford investigators pooled individual data on baseline BMI and subsequent mortality from 57 prospective cohort studies (900,000 participants; 61% male; mean

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baseline age, 46). Mean follow-up was 8 years following a 5-year blackout period to minimize the effect of reverse causality.

For both sexes and all ages, overall mortality was lowest in people with baseline BMIs between 22.5 kg/m<sup>2</sup> and 25 kg/m<sup>2</sup>; it rose by about 30% for each 5-unit rise in BMI above this level and by about 25% for each 5-unit drop in BMI below this level. Mortality from ischemic heart disease rose by about 40% for each 5-unit rise in BMI, regardless of baseline BMI; mortality from stroke and other vascular causes increased along a similar gradient, but only when baseline BMI was higher than 25. Overall cancer mortality rose by about 10% for each 5-unit increase in BMI when baseline BMI exceeded 25; at lower levels, cancer mortality rose with lower BMI and was driven by a steep gradient for smoking-related cancers. Deaths from chronic obstructive pulmonary disease increased fourfold for every 5-unit decrease in BMI below 25.

#### COMMENT

BMI's strong correlation with blood pressure, lipid levels, and diabetes at baseline probably explains much of its effect on cardiovascular mortality. The association of low BMI with elevated mortality might be attributable in part to the higher prevalence of smoking among leaner patients and some long-term reverse causality from COPD. An editorialist suggests that this inverse association, which persisted to some extent even in lifelong nonsmokers, is attributable to the benefit of fat reserves in managing acute insult, favorable metabolic effects of certain fat deposits, and