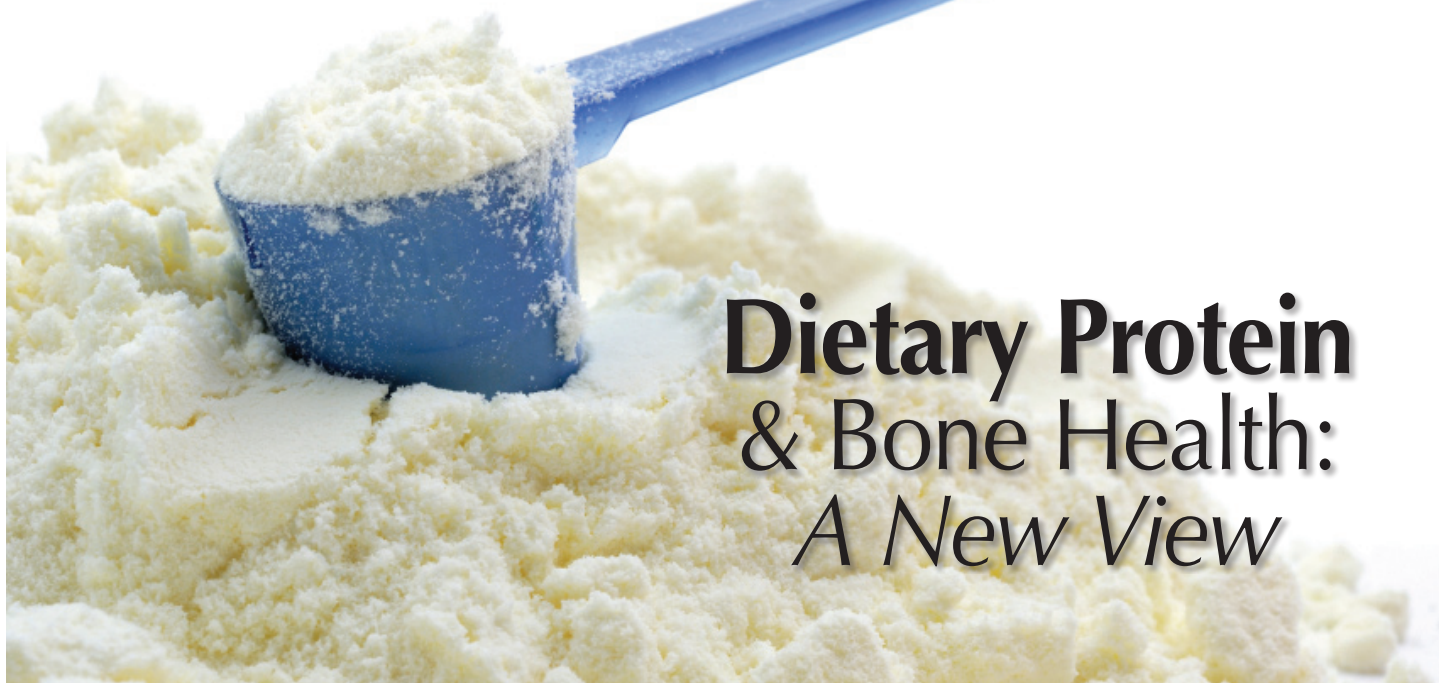


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Dietary Protein & Bone Health: *A New View*

From our skeleton, which is living tissue, our bodies constantly build new bone and remove old and damaged bone tissue. As we age, and particularly in women after menopause, there is more break down than replacement, leading to a net loss of bone, which can cause osteopenia or, ultimately, osteoporosis. Osteopenia is a condition in which there is mild thinning of the bones in the body, which may be a precursor to osteoporosis. Osteoporosis is a disease in which the bones thin to such a degree that even minor injury can cause a fracture. For those with osteoporosis, simply lifting a heavy bag of groceries out of the car can cause a spine fracture. It is a “silent” disease until a fracture occurs. Thinning bones do not hurt until they break.

Both osteopenia and osteoporosis are common problems affecting more than 44 million Americans over age 50. Since bone is living tissue, it makes sense that nutrition is important to skeletal health. Despite this, a detailed understanding of how nutrition influences the skeleton is still lacking for many nutrients. However, studies of two of the most intensively researched nutrients, calcium and vitamin D, have shown that adequate amounts of both are important for slowing the rate of bone loss as we age and reducing the risk of fractures.

Dietary proteins supply the body with the necessary components for proper functioning of living cells. They cannot be made by the body and are, therefore, attainable only through the diet. Nearly half of all women over 60

consume a diet containing less than the recommended allowance for protein (0.8 grams/kilogram of body weight per day). Increasing dietary protein does not mean a person necessarily has to eat more fat. Skim milk, fish, egg whites and soy are all examples of sources of low fat, high quality protein.

Traditional thinking has been that dietary protein leaches calcium from the skeleton and causes thinning of the bones. Many scientists still believe this because with increased intake of dietary protein, the amount of calcium in the urine can rise. The assumption has been that this extra calcium in the urine was coming from the bones. However, ten years ago our research group at Yale University and the University of Connecticut, began investigating the effect of dietary protein on bone health. To our surprise, we found that dietary protein actually causes a significant improvement in the body’s efficiency to absorb calcium from the diet. When we increased dietary protein intake from low-normal (0.7 grams of protein per kilogram of body weight per day) to high normal (2.1 grams of protein

¹ Dawson-Hughes B, Harris SS, Krall EA, et al. Effect of Calcium and Vitamin D Supplementation on Bone Density in Men and Women 65 Years of Age or Older. *N Engl J Med* 1997;337:670-6

² Kerstetter JE, O'Brien KO, Caseria DM, et al. The Impact of Dietary Protein on Calcium Absorption and Kinetic Measures of Bone Turnover in Women. *J Clin Endocrinol Metab* 2005;90:26-31

³ Hunt JR, Johnson LK, Roughead ZF. Dietary Protein and Calcium Interact to Influence Calcium Retention: A Controlled Feeding Study. *Am J Clin Nutr* 2009;89:1357-65

per kilogram of body weight per day) the body's ability to absorb calcium from the diet improved by more than 35%. Additionally, the increase in dietary protein did not affect the rate at which the skeleton was breaking down. Finally, we discovered the rise in urine calcium that had troubled prior investigators was caused by the increase in calcium absorption from the intestinal tract. It was not due to bone breakdown. Instead, the body was simply eliminating, through the urine, some extra calcium it had absorbed.

A research group from the University of North Dakota has recently reported similar findings. They also concluded that increasing dietary protein helped bones retain calcium, particularly when the level of dietary calcium had been low. A report from a Framingham Osteoporosis Study has shown, in both men and women, that a higher level of dietary protein was associated with better bone mineral density and a slower rate of bone loss with aging.

Both osteopenia and osteoporosis are common problems affecting more than 44 million Americans over age 50.

Although our work suggests an increase in dietary protein may be helpful in preventing bone loss in individuals who consume low levels of dietary protein, the only way to prove this is through a scientific controlled study. At present, our team, led by Dr. Karl L. Insogna, is recruiting participants for a multi-center trial, funded by the National Institutes of Health. The study is titled SPOON (Supplemental Protein to Outsmart Osteoporosis Now). It seeks to determine the effect of a natural protein supplement on bone health in women over 60 and men over 70 who have low levels of dietary protein intake

and thin bones. Participants incorporate a protein (or placebo) powder or bar into their diet for 18 months. Bone density, bone health and physical strength will be measured during the course of the study. The ultimate goal is to find alternative, safe and effective therapies for the prevention of osteoporosis.

Principle Investigator Karl L. Insogna, M.D. received his medical degree from the University of Connecticut. He joined the faculty at Yale in 1984, is currently a professor in the Department of Internal Medicine, director of the Yale Bone Center, and director of the NIH-funded Yale Core Center for Musculoskeletal Disorders. An internationally recognized expert in the field of metabolic bone diseases, he has published widely on the topic in the field's leading scientific journals.

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This is an NIH funded study, conducted by Yale University and the UConn Health Center, The Center on Aging.
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