



## NEWS

### University of Michigan experts say proper nutrition essential for bone health

#### *Highlights:*

- *Protein is essential for developing and maintaining healthy skeletal tissue*
- *Carbonated beverages and sugar-filled sports drinks can decrease bone mineral density*
- *Diet recommendations for a healthy skeletal system are offered*

ANN ARBOR, MICH., MAY 8, 2009 — Musculoskeletal conditions, such as arthritis and joint pain, are the number one reason for physician visits and account for at least 50 percent of all chronic conditions in people over the age of 50 in the United States. With more than one in four Americans having a musculoskeletal condition requiring medical attention and the costs of these conditions toppling \$849 billion annually, it's now more important than ever to understand and take proactive steps to keep bones healthy and strong.

Researchers at the University of Michigan couldn't agree more. In a recent scholarly review published in *Sports Health: A Multidisciplinary Approach*, they concluded that adequate nutrition is essential for overall skeletal health of people of all ages and all activity levels.

Dr. Ronald Zernicke, Director of the University of Michigan Bone & Joint Injury Prevention & Rehabilitation Center, and his colleagues synthesized research conducted in the last 50 years on the role of diet on skeletal tissue and overall bone health. They specifically looked at the effects of dietary proteins, fats, and carbohydrates on bone health. What they found not only supports current facts about bone health and prevention of bone loss, but also validates nutritional strategies to help preserve bone structure and strength.

#### **Protein and Bone Health**

Historically, there has been debate about whether protein is detrimental or beneficial to bone health. Some of the earliest research suggested that high-protein diets are detrimental to skeletal health – particularly diets high in animal protein (red-meats). Conversely, there have been numerous studies to show that high-protein diets increase bone mineral content, decrease the risk of fractures, and increase fracture repair time after injury. High-protein diets are often recommended for adolescent and child athletes undergoing rigorous training. According to Dr. Zernicke's team, research suggests that adequate protein is essential for developing and maintaining healthy skeletal tissue.

## **Simple Carbohydrates and Bone Health**

Diets high in refined sugar have been studied extensively and shown to affect bone growth and mechanical strength. Surprisingly, something as simple as drinking carbonated beverages, such as soft drinks and even sports drinks, is associated with significant decreases in bone mineral density – both in males and females. Zernicke suggests that some of these detrimental changes in bone related to the consumption of soft drinks are due to the decreased consumption of milk and other available fluids in favor of soft drinks. Drinking soft drinks can also lead to weight gain, a decrease in lean muscle mass, and can contribute to the loss of calcium and iron which are crucial to health and athletic performance. Zernicke says, “While it’s vitally important to hydrate during any type of sport or physical activity, it might be worthwhile to drink bottled or tap water, milk, orange juice, or drinks fortified with calcium instead of reaching for a sugar-filled sports drink.”

## **Fats and Carbohydrates Beneficial to Bone Health**

Not all fats and carbohydrates are bad for you. Current research suggests that omega-3 fatty acids and complex carbohydrates, such as fruits and vegetables, may actually improve bone mass density and increase calcium absorption. Fruits and vegetables contain nondigestible carbohydrates, like inulin-type fructans, that cannot be digested by the small intestine. Hence, as they move toward the large intestine and begin to be processed, they produce organic acids that enhance the disbursement of calcium throughout the body.

## **Benefits of Calcium and Vitamin D**

We have always been told that calcium and vitamin D are keys to good bone health, but these nutrients are proving to be just as important for muscle contraction, heartbeat regulation, nerve impulse transmission, regulation of blood pressure, and immune system function. The review looked at clinical recommendations of optimal calcium intake and determined that intake varied by sex and age. The daily adequate intake recommendation for young adults is at least 1,200 mg of calcium per day; women between the ages of 25 and 50 years need 1,000 mg per day; and postmenopausal women not on hormone replacement therapy need 1,500 mg per day.

Getting the adequate daily dose of calcium can be as simple as eating foods like cheese, milk, and yogurt, but dairy products are not the only source of calcium. Kale, turnip greens, broccoli, tofu, and calcium-fortified foods like orange juice can also contribute to overall dietary calcium intake.

Based on their comprehensive review of the scientific literature, Zernicke and his team recommend the following dietary steps to achieve healthy bones:

- Avoid foods and beverages with poor nutrient density (such as sugars, carbonated beverages, or food high in sodium or saturated fat) because these will leave the body and skeleton devoid of the nutrients essential for healthy development.
- Incorporate high energy density foods (such as polyunsaturated fatty acids – foods containing omega-3 like salmon and walnuts – fruits and vegetables high in potassium and fiber and high-quality animal or plant based protein) into your diet to ensure vitamin and mineral adequacy.

- If there are dietary deficiencies, supplements (such as calcium carbonate or calcium citrates) can be used to enhance skeletal health.
- Athletes should be consuming at least 1,200 to 1,500 mg of calcium a day by way of low-fat, low-sodium dairy products, vegetable greens or supplements.
- Protein is extremely important for proper bone growth, especially in young athletes and physically active, growing children.

The review from the U-M Bone & Joint Injury Prevention & Rehabilitation Center has shown that it's not only the quantity or the cost of bone health issues today that is cause for concern, it's the larger role that the skeletal system plays to protect vital organs against damage. Zernicke summarized the group's findings by saying, "Adequate nutrition is critical to the development and maintenance of a healthy skeleton. It's important for everyone, young and old, people who participate in sport and recreational activities, and everyone in between to make dietary choices that provide the foundation for overall bone health and physical performance."

#### **About the Center**

The University of Michigan Bone & Joint Injury Prevention & Rehabilitation Center is a collaborative effort between the Medical School, the College of Engineering, the Division of Kinesiology and the School of Public Health. The Center's mission is to excel in the creation of new knowledge in all areas relevant to the prevention, treatment, and rehabilitation of musculoskeletal injury and arthritis. The Center is dedicated to conduct mission-driven research, train the next generation of multi-disciplinary researchers, provide leadership for local, national, and international collaborations and partnerships, promote the effective translation, use, and exchange of knowledge and develop organizational excellence. For more information about the Center, visit <http://bjiprc.umich.edu>.

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