AMERICAN COLLEGE of SPORTS MEDICINE®

Scanning Sports Medicine

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An Ultracyclist with Pulmonary Edema During the Bicycle Race Across America

A recently published case report in the January 2007 issue of *Medicine & Science in Sports & Exercise*, the official journal of the ACSM, highlights the pitfalls of overly aggressive sodium intake during an endurance race at altitude.

It is well known that multiday ultra-endurance athletic events tax the body's ability to maintain sodium and water homeostasis. Much focus has been placed on the danger associated with excessive water intake without sodium repletion, namely hyponatremia. This case study presents the risk associated with aggressive sodium intake coupled with heavy exertion at a high altitude.

The subject presented is an extremely fit 38-year-old male participant in the Bicycle Race Across America who developed severe pulmonary edema while cycling at an altitude of 2380 meters on the fourth day of his race. His daily sodium intake over the course of the race averaged between 1000 and 1100 mEq and his weight on the day of hospitalization was 2.7 kg greater than his prerace weight. The athlete responded appropriately to standard support for pulmonary edema while in the hospital and he made a full recovery. Later, he underwent testing for cardiopulmonary disease or susceptibility to high-altitude pulmonary edema. The results of the entire work-up were negative. The authors hypothesize that the excessive sodium intake led to an expanded extracellular volume, increased hydrostatic pressure, and decreased oncotic pressure. Racing at high altitudes, where a hypoxia-induced rise in pulmonary artery pressures already exists, may have exaggerated the effects of the changes in hydrostatic and oncotic pressures seen with extracellular volume expansion. This, coupled with ambient hypoxia, elevated cardiac output, and reduced renal perfusion associated with sustained high-

level exercise seems to lead to the development of acute pulmonary edema.

Preventing Osteoporosis the BEST Way

A recent feature published in the January/February 2007 issue of ACSM's *Health & Fitness Journal* reports that the loss of bone mineral density (BMD) can be prevented in postmenopausal women with adequate resistance and weight-bearing exercise combined with adequate calcium intake.

The article emphasizes that low BMD is a risk factor for osteoporotic fractures, and states that increasing BMD or maintaining BMD levels can decrease the risk for osteoporosis. This feature describes the 1- and 4-year results from the Bone Estrogen Strength Training (BEST) study. The BEST study demonstrated that over 4 years postmenopausal women maintained or increased their hip and lumbar spine BMD by participating in a program of weight-bearing and strength training resistance exercise for 3 days a week, combined with consuming an average of 1700 mg/d of calcium and a dietary iron intake that met or exceeded the current Dietary Reference Intakes. The study found that having adequate exercise, calcium, and iron intake was even more important for maintaining and increasing BMD in women who chose not to take hormone replacement therapy.

The article encourages healthcare professionals interested in implementing the BEST Exercise program to use the step-by-step educational book entitled *The BEST Exercise Program for Osteoporosis Prevention* (http://nutrition.arizona.edu/new/best_book.phtml). This book describes the 45-minute exercise session, including the strength training exercises that were found to have the most positive affect on bone density, training protocols, specific programming, motivational strategies, nutrition, and screening recommendations. The BEST study research has shown that individuals who consistently were able to increase the volume of weight lifted had the greatest affect on BMD. The book also provides additional client handout information and recommendations to prevent osteoporosis.

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