Summary:

The optimal crystallization and bone mineral deposition during childhood and adolescence is considered to be of utmost importance for overall bone health and the subsequent prevention of osteoporosis and related fractures. There is increasing evidence that nutritional factors in addition to others (genetic, physical activity, etc) can influence bone mineral density and overall bone accrual during the developmental years. In the present study, 95 healthy adolescent males were recruited and their bone mineral density (BMD) was measured via scanning (X-ray absorptiometer) at an average age of 16.7 years including total body, hip, and spine measurements. As well, their omega-3 fatty acid status (reflective of dietary intakes of omega-3 fatty acids) was determined by blood sampling and measurement of the omega-3 fatty acid levels in their blood serum phospholipid fraction. These measurements (bone mineral density/bone accrual and omega-3 status) were repeated after approximately 6 years later. The results indicated a highly positive relationship between the level of DHA (docosahexaenoic acid omega-3) in their blood samples and the changes in BMD. Interestingly, of all the polyunsaturated fatty acids evaluated including the omega-3 fatty acids, it was DHA which specifically showed the most positive relationship to BMD after 6 years (at 22 years of age) and the changes in BMD of the spine between ages 16 and 22 years. With respect to the potential mechanisms by which increased intakes of DHA omega-3 fatty acid might support and promote peak bone mineral density and bone accrual, the authors suggest that omega-3 fatty acids may potentially influence calcium absorption in the intestine, reduce bone demineralization, increase synthesis of bone collagen, and affect immunological/inflammatory factors which have overall benefits on bone health.
Dr. Holub's Comments:

The present study is of interest since it suggests that higher intakes of DHA omega-3 fatty acid from fish/fish oils as well as functional foods containing DHA may possibly have beneficial effects on bone health including bone mineralization and strengthening which may possibly reduce the risk of osteoporosis and bone fractures in the elderly later in life. However, future studies will be needed to perform long-term randomized control trials where subjects receive a placebo or supplementation with DHA omega-3 during their childhood/adolescent period along with repeat bone measures over a multi-year period to possibly confirm the relationships reported herein. In addition, the intakes of DHA omega-3 fatty acid in the diet were not reported in this study such that optimal intakes of dietary DHA for overall bone health cannot be extrapolated or projected from the present data. It can be pointed out, however, that the reported level of DHA in the blood serum phospholipid (averaged at 3.6% of total fatty acids) are to be expected with average North American intakes of approx. 80 mg DHA/day. The higher levels of DHA in the blood biomarker found some of the subjects studied (up to 7% of total fatty acids) would likely require daily intakes of approx. 1000 mg DHA for a 3-6 week period.