

Sunlight Omnisense® 7000P: Assessing Children's Bones



Pediatric Bone Health

“A pediatric disease with geriatric consequences” – osteoporosis is thus defined by health care professionals today. This position has led to a strong focus on the development of healthy bones during childhood and adolescence. This trend is expected to contribute to a decrease of osteoporosis among tomorrow's adults.

A large collection of clinical evidence shows that children's lifestyles can impact their bone development and affect their skeletal health for years to come.¹

Both lifestyle and nutrition have a significant impact on bone during skeletal development and growth. By the end of adolescence, an adult has accumulated most of the bone that will bring him to maximal peak bone strength. This peak determines the starting point for the decline of bone strength in late adulthood. Along with subsequent bone loss, it will determine a person's risk of osteoporosis later in life.^{2 3}

A Healthy Lifestyle as the Key to Developing Strong Bones

One of the most important factors in building bone and maintaining bone health is the intake of calcium. Calcium is one of the most important mineral components of bone, supplying strength and stiffness to the skeleton.⁴ Recommendations suggest that children and adolescents increase their calcium intake considerably above present average levels to ensure adequate development of bone.^{5 6}

Regular physical activity is another significant factor in bone development. Studies have shown that regular exercise helps strengthen bones.^{7 8} Exercise causes muscles to contact against bone, exerting force on the bone, and strengthening it. Current recommendations include moderate physical activity on most days of the week.⁹

Various other factors are also known to be associated with a negative effect on bone status and the eventual development of osteoporosis. Among these factors are repeated dieting which leads to anorexia nervosa,¹⁰ smoking,¹¹ alcohol consumption,¹² and intake of cola soft drinks.^{13 14} Over-exercising that leads to amenorrhea, a frequent problem of some professional athletes, can also lower their bone strength.¹⁵

Bone Assessment with Sunlight Omnisense® 7000P

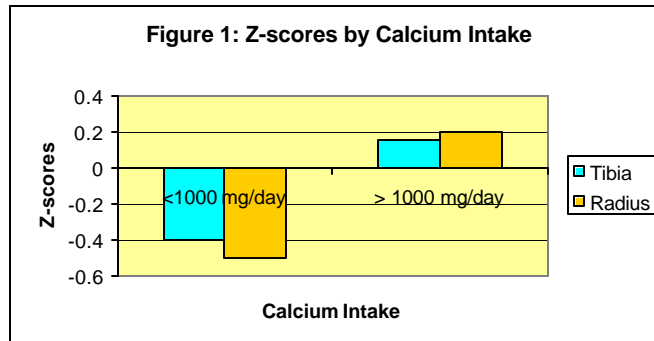
Regular monitoring of bone throughout childhood is recommended in order to follow the bone-building process and keep children on the path towards healthy bones. With its sensitivity to lifestyle habits that directly affect bone development, Sunlight Omnisense® 7000P (Omnisense 7000P) provides an important tool for the assessment and monitoring of

bone health throughout childhood and adolescence. It also provides an additional tool, alongside height and weight measurements, to help physicians track the growth of children and adolescents.

Omnisense 7000P is sensitive to lifestyle factors

Calcium intake levels

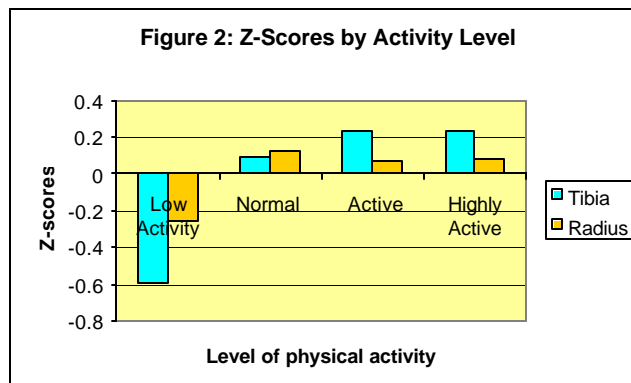
The sensitivity of Omnisense 7000P measurement to different levels of calcium intake has been clinically demonstrated. In a study conducted on approximately 600 children, the SOS values for children with higher levels of calcium intake (more than 1000mg/day) were found to be significantly higher than SOS levels of children who consume less foods with calcium (Figure 1).^{16 17}



This issue is a crucial factor in pediatric bone health, because the diet of many presumably healthy children contains inadequate amounts of dairy products, green vegetables, and other calcium-rich foods.

Physical Activity Levels

Physical exercise during childhood is related to enhanced bone strength and reduced risk of osteoporosis.⁸ Both impact and non-impact physical exercise are related to enhanced bone properties as measured by Omnisense 7000P. Studies performed with Omnisense 7000P concluded that children who engage in little or no physical activity have particularly low SOS values (Figure 2).¹⁷ On the other end of the physical



activity scale, teenage basketball and volleyball have significantly higher SOS values than other adolescents.^{18 19} An increasingly sedentary lifestyle among children and adolescents has made the issue of physical activity particularly important for today's youth.

Other Factors Affecting Bone Health

Omnisense 7000P measurements have shown that obesity is correlated with low SOS scores.²⁰ Similar results have been demonstrated in other studies.²¹ Obese children, both girls and boys, have significantly lower SOS values than their normal-weight peers. This finding may serve as additional backing for clinical research results regarding the effects of adequate nutrition and exercise on bone. In addition, children who were born pre-term or at a low birth weight have low SOS values for at least six years after birth, indicating an increased risk for weak bones well after infancy. This is probably a result of the high prevalence of Osteopenia of Prematurity in premature infants.

A Healthy Future with Omnisense 7000P

The impact of all of these lifestyle factors on bone health creates a need for the assessment of bone during these crucial years. There is a growing trend among health professionals to urge children and adolescents to adopt an overall healthy lifestyle to help bone reach its maximal peak. Periodic Omnisense 7000P measurements that reflect positive changes in lifestyle may provide an incentive for children and teens to follow a healthy lifestyle. This, in turn, can influence overall health, including risk for osteoporosis, for decades to come.

References

¹ Duane Alexander, M.D., Director of NICHD, quoted in “‘Calcium Crisis’ Affects American Youth,” NIH News Release, December 10, 2001

² Bonjour, J., “Invest in your Bones,” International Osteoporosis Foundation, 2001

³ “Osteoporosis Prevention, Diagnosis, and Therapy,” National Institutes of Health Consensus Statement, 17:1, March 27-29, 2000

⁴ Farley, D., “Bone Builders: Support Your Bones with Healthy Habits,” FDA Consumer, September-October 1997

⁵ New, S.A., “Nutritional Factors Influencing the Development and Maintenance of Bone Health Throughout the Life Cycle,” World Congress on Osteoporosis 2000, June 15, 2000

⁶ Heaney, R.P., “Perspectives: There Should Be a Dietary Guideline for Calcium,” American Journal of Clinical Nutrition, March 2000, 71(3): 658-661

⁷ Lloyd, T., V.M. Chinchilli, N. Johnson-Rollings, K. Kieselhorst, D.F. Egli, and R. Marcus, “Adult Female Hip Bone Density Reflects Teenage Sports-Exercise Patterns But Not Teenage Calcium Intake,” Pediatrics, July 2000, 106(1): 40-44

⁸ Janz, K.F., T.L. Burns, J.C. Torner, S.M. Levy, R. Paulos, M.C. Willing, and J.J. Warren, “Physical Activity and Bone Measures in Young Children: The Iowa Bone Development Study,” Pediatrics, June 2001, 107(6): 1387-1393

⁹ “Physical Activity and Health – A Report of the Surgeon General,” Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, President’s Council on Physical Fitness and Sports, 1996

¹⁰ Bachrach, L.K. D. Guido, D. Katzman, I.F. Litt, and R. Marcus, “Decreased Bone Density in Adolescent Girls with Anorexia Nervosa,” Pediatrics, September 1990, 86(3): 440-447

¹¹ Brodish, P.H., “The Irreversible Health Effects of Cigarette Smoking,” American Council on Science and Health, June 1998

¹² “Topics in Osteoporosis: Alcohol and Bone Health,” National Institutes of Health – Osteoporosis and Related Bone Diseases Center, August 2001

¹³ Wyshak, G., “Teenaged Girls, Carbonated Beverage Consumption, and Bone Fractures,” Archives of Pediatric and Adolescent Medicine, 2000, 154: 610-613

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- ¹⁴ Wyshak, G., and R.E. Frisch, Carbonated Beverages, Dietary Calcium, the Dietary Calcium/Phosphorus Ratio, and Bone Fractures in Girls and Boys, Journal of Adolescent Health, 1994, 15: 210
- ¹⁵ Rencken, M.L., C.H. Chestnut III, B.L. Drinkwater, "Bone Density at Multiple Skeletal Sites in Amenorrheic Athletes," Journal of the American Medical Association, 1996, 276(3): 238-240
- ¹⁶ Prais, D., G. Diamond, D. Inbar, Z. Zadik, "Calcium Intake and Bone Mineralization in Children," Presented at the Pediatric Academic Societies Annual Meeting, Baltimore, May 2001
- ¹⁷ Zadik, Z., E. Burondukov, L. Malach, M. Chen, A. Zung, "Effect Of Growth And Calcium Intake On Bone Development Measured By Quantitative Ultrasound, Birth To Age 18," Presented at the Endocrine Society 83rd meeting – ENDO2001, Denver, June 2001
- ¹⁸ Zigel, B. Falk, Z. Burstein, N. Constantini, A. Eliakim, "The Effect Of Moderately-Intense Volleyball Training On Bone Quantitative Ultrasound Velocity In Adolescent Boys And Girls," Presented at Advancing Children's Health 2000, Boston, USA, May 2000
- ¹⁹ Falk, B., L. Zigel, Z. Bronstein, O. Paz, "Higher Tibial Ultrasound Velocity In Young Adult Female Basketball Players," Presented at the Congress of Sport Sciences, Finland, July 2000
- ²⁰ Eliakim, A., D. Nemet, B. Wolach, "Quantitative Ultrasound Measurements of Bone Strength in Obese Children and Adolescents," Journal of Pediatric Endocrinology and Metabolism February 2001, 14(2): 159-64
- ²¹ Specker B.L., N. Johannsen, T. Binkley, K. Finn, "Total Body Bone Mineral Content and Tibial Cortical Bone Measures in Preschool Children," Journal of Bone and Mineral Research, 2001, 16(12): 2298-2305