Bone Health in Children: A Guide for Patients and Parents

Why is bone health important in childhood?
Healthy bones are those that are strong and straight enough to bear weight and to resist breaking with normal amounts of activity. There are many factors that contribute to the normal health and growth of bone. The strength of a bone is dependent on its calcium content, its protein content and on the exercise that it has experienced. In addition, hormones associated with the development of puberty (estrogen and testosterone) are important in the process of bone growth and strength. Bone density or strength increases through the teen years and reaches its peak in the early 20s in most people. It then begins to decline. Inheritance is also important and having parents with weak bones is a risk factor for this problem in children.

What other factors contribute to bone health?
The amount of calcium in bone is determined by a number of factors, including dietary calcium, protein, and vitamin D. Although vitamin D is made in the skin when it is exposed to sunlight, it is clear at the present time that the vast majority of babies and children do not get sufficient vitamin D in this way. This may be due to the use of sun screen, to impurities in air, or to skin pigmentation. The important thing to remember is that everyone needs adequate vitamin D and calcium in order to have strong bones. Currently the recommendations for vitamin D intake are being revised. Infants (especially those who are breast fed) and young children should get at least 400 (international units) daily. (This is a recommendation of the American Academy of Pediatrics) According to the Endocrine Society, older children need slightly more. Recommendations for total calcium intake per day range from 400 mg in a newborn to 1200-1500 mg in an adolescent.

One of the most important factors in developing strong bone is weight bearing exercise. Walking and running or any other exercise where the muscles are moving the bones against gravity makes the bones stronger. Exercise where gravity is not important (for example swimming), is good for you in other ways, but it does not appear to be useful in terms increasing of bone strength. Because exercise is important for strong and healthy bones, children who are not able to be active because of neurologic disease or after trauma often have weak bones.

Chronic illness interferes with the normal development of healthy bones in several ways. Children who have significant malnutrition will often have weak bones even if their intake of vitamin D and calcium is sufficient. The presence of chronic illness of almost any kind can have negative effects on bone growth and calcium placement.
There are a number of medicines that interfere with bone health. Some of these interfere with vitamin D absorption and some of them have work in other ways. The list of such drugs include steroids, such as those used for asthma, inflammatory bowel disease or arthritis and medications used to control seizures. Other drugs that may have negative effects when used long term are proton pump inhibitors (used for acid reflux) and diuretics (often used for patients with heart disease).

For reasons that are not entirely clear, people who are overweight, especially when this is extreme, may have weaker bones. There are studies reporting that the ingestion of cola drinks may result in decreased bone strength and increased likelihood of fracture, especially in girls. Therefore, maintaining a healthy weight and avoiding cola drinks are also things that may contribute to good bones.

**How is bone strength measured?**

When your doctor has a suspicion that your child’s bone health may need to be evaluated, he or she may order laboratory tests, and in some cases a DEXA scan. DEXA scans measure the density or amount of calcium in bones. There are many things that make the interpretation of a DEXA scan complicated in children and adolescents, including size and maturation of the child. This is therefore not a routine test in pediatrics. If it is done, it is very important that the value is compared to age-adjusted norms and reported as a “z-score.” People who have a bone density below the normal range are said to have “osteopenia.” Osteoporosis is a more severe decrease in bone density.

**How is low bone density treated?**

Treatments for children with low bone density start with optimizing vitamin D and calcium intake and proper exercise. Bisphosphonates, the medications used for increasing bone density in older people are used only in very severe cases in childhood such as an inherited form of fragile bone called osteogenesis imperfecta or brittle bones. The safety and long term effectiveness of bisphosphonates has not yet been proven in children.

**What should you do with this information?**

In summary, in order to have healthy bones it is extremely important for children and adolescents to get adequate amounts of exercise and to eat a healthy diet with sufficient amounts of vitamin D and calcium. Children who have family members with fractures, or a history of weak bones, or children who experience fractures with small amounts of trauma should be seen by an endocrinologist and evaluated to see whether there are things that may help them avoid future problems.

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