Why is Bone Health Important?
- Bones provide structure, protect organs, and anchor muscles, allowing for mobility and for protection against injury.

Why is Bone Health Important to me NOW?
- Throughout life, bone is constantly renewed through a two-part process called remodeling, which consists of resorption and formation. This process is responsible for bone strength, allows for bone to grow normally, and is needed to repair and replace damaged or brittle areas of bone.
- During times of growth – birth to thirty years old – formation of new bone is added to the skeleton faster than old bone is removed, contributing to larger, heavier, and denser bones.
- These years, which can last until you’re 20 to 30, are critical for building bone mass, specifically peak bone mass.
- Peak bone mass refers to the genetic potential for bone density and it is the point when you have the greatest amount of bone density you will ever have.
  o The more bone you have at the time of peak bone mass, the better you will be protected against weak bones once bone loss begins.
  o Reaching a high peak bone mass allows for stronger and healthier bones and avoidance of osteoporosis and other bone problems later in life.

How Can I Reach Peak Bone Mass?
- While genetic factors play a significant role in determining bone mass, controllable lifestyle factors can mean the difference between a frail and strong skeleton. The most influential factors are a balanced diet rich in calcium and vitamin D and physical activity.

How Does Calcium Influences Bone Mass?
- You can build strong bones by getting enough calcium. Your body stores 99% of its calcium in your teeth and bones. The other 1% is circulating in your blood and soft tissue.
- The calcium in your bones form a latticelike crystal called hydroxyapatite, which binds to collagen fibers found in bone. This combination of materials allows bone to be resilient and strong.
- However, your body also wants calcium blood levels to be within a normal range, so if you do not consume enough calcium through your diet or supplements, then your body will release the calcium it needs from your bones into your blood stream, gradually weakening your bones.
  o As a result, calcium intake is critically important to bone health – it helps build bones and helps slow the loss of bone as we age. Yet, the average American consumes levels of calcium that are far below the amount recommended for optimal bone health.

How Much Calcium is Enough and Where Can I Find it?
- The recommended intake of calcium for men and women 19-50 years old is 1,000 mg per day.
- The best way to get this amount of calcium is to eat enough calcium-rich foods every day.
- Low-fat and fat-free milk and other dairy products are great sources of calcium. (1 cup of milk = 300 mg; 1 cup of plain, low-fat yogurt = 415 mg)
- Other good sources of calcium include dark green, leafy vegetables, such as spinach (291 mg/cup), broccoli, kale, and bok choy, and foods with calcium added, such as calcium-fortified tofu (163 mg/3 oz.), orange juice, soy beverages, and breakfast cereals or breads.
- Other sources include canned salmon (180 mg /3 oz), almonds (70 mg/24 nuts), baked beans (154 mg/cup), figs, and peas (211 mg/cup).
- Although getting calcium from food is ideal, calcium supplements can be taken if you think you are not receiving the recommended amount from food alone.

Source: http://www.hpb.gov.sg/health_articles/howmuchcalcium/
What is Vitamin D’s Role in Bone Health?

- Vitamin D is critical for bone health because it helps in the absorption and utilization of calcium. Therefore, when you have good vitamin D status, your calcium absorption is increased.

- One of the ways to get vitamin D is through sun exposure since our skin has a unique way of transforming ultraviolet rays to a precursor form of vitamin D. However, there are several factors that can limit the production of vitamin D by the skin: season, location in latitude, skin pigmentation, sun screen use, etc.
  
  o Not to mention, the sun also brings many potential dangers such as wrinkling, sun burn, and skin cancer.
  
  Therefore, sun exposure is not always the best option or sufficient.

- The best food sources of Vitamin D are fatty fish (sardines, mackerel, and salmon), cod liver oil, fortified milk, and some fortified breakfast cereals; if needed, vitamin D can be acquired through supplements.

- The recommended amount of vitamin D needed to prevent or slow bone loss for those aged 14-30 is 600 IU per day; this recommendation was just recently reported by the Institutes of Medicine on November 30, 2010. In this report, the IOM proposed new reference values for vitamin D that are based on much more information and higher-quality studies than were available when the values for these nutrients were first set in 1997. Further, emerging evidence indicates that too much of vitamin D and calcium may be harmful, challenging the concept that “more is better.”

How Can Physical Activity Contribute to Bone Health?

- Physical activity is vital at every age for healthy bones. Not only does exercise improve your bone health, it also increases muscle strength, coordination, and balance, and it leads to better overall health.

- Like muscle, bone is living tissue that responds to exercise by producing new bone and becoming stronger. Muscles push and tug against bones during physical activity, (allowing bone mass to become responsive to the mechanical loads placed on the skeleton) which create signals to build more bone.

- Activities that are weight bearing or involve impact are most useful for increasing or maintaining bone mass.
  
  o Some examples of weight-bearing exercises include weight training, walking, hiking, jogging, climbing stairs, tennis, and dancing.
  
  o Variation is best! Just one form of physical activity will not strengthen all bones, just those that are stressed. Try a variety of exercises or activities to keep all your bones healthy.

What Other Factors May Influence Bone Mass?

- About 85 percent of the body’s phosphorus is found in the skeleton, specifically in hydroxyapatite, the mineral compound found in bone. Both phosphorus deficiency and excess - usually through heavy soda consumption - have adverse effects on bone health by altering the dietary balance between calcium and phosphorous.

- Smoking may harm the skeleton both directly and indirectly. The nicotine and cadmium found in cigarettes can have a direct toxic effect on bone cells and smoking may also harm bone indirectly by lowering the amount of calcium absorbed from the intestine or altering the body’s handling of vitamins D and various hormones needed for bone health.

- Heavy alcohol use (more than 1 drink per day for women, more than 2 for men) has been associated with reduced bone mass and increased fracture risk because alcohol inhibits bone remodeling, possibly by affecting vitamin D or by reducing bone formation. It may also increase calcium and magnesium losses from the body.

- Sixty percent of the body’s magnesium is found in the skeleton. Magnesium may enhance bone quality by influencing growth of crystals of hydroxyapatite. Eating a wide variety of legumes, nuts, whole grains, and vegetables will help you meet your daily dietary need for magnesium.

- Potassium also appears to play an important role in bone health. Diets abundant in potassium-rich fruits and vegetables may reduce the need for calcium to be removed from the skeleton.

- Other nutrients/dietary components that appear to play a positive role in bone health include vitamin K, vitamin C, copper, manganese, zinc, and iron. These micronutrients are essential to the function of enzymes and local regulators and, therefore, are important in forming an optimal bone matrix.
  
  o Therefore, while calcium, vitamin D, and physical activity play a significant role in determining bone mass, many other factors contribute to bone health. You should focus on consuming a well varied, healthful diet and making sensible lifestyle choices in order to keep your bones stronger, longer.

Resources:
American Bone Health. www.americanbonehealth.org