



*Betsy's Ultimate
Guide to...*

**Nutrition and
Bone Health For
Gymnasts**



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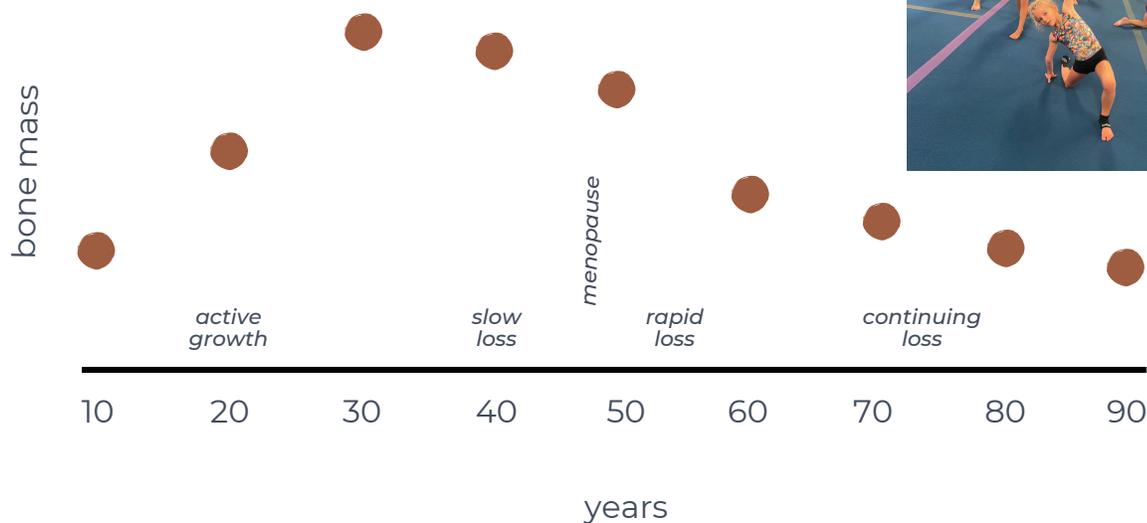
How do bones age?

Bone mass decreases with age, especially in women after they experience menopause. Here are a few specific ways the bones change over time. It is important to take this into consideration as a "long-term" issue especially for athletes.

- Bones lose calcium and other minerals
- The trunk of the body becomes shorter
- Vertebrae lose mineral content
- Bone spurs may form on the vertebrae
- The foot arches become less pronounced, contributing to a slight loss of height.
- The long bones of the arms and legs are more brittle
- The joints become stiffer and less flexible
- The cartilage may begin to rub together and wear away. Minerals may deposit in and around some joints (calcification), especially around the shoulder.

<https://medlineplus.gov/ency/article/004015.htm>

Bone Mass In Females





Calcium

Calcium is the most abundant mineral in the body. Most is stored in the bones and teeth. Bone goes through continuous remodeling through the processes of resorption and deposition. Bone formation is more rapid than resorption during periods of growth (in children and adolescents). In early and middle adulthood, the processes are relatively equal. In older adults, (specifically postmenopausal women), bone breakdown exceeds formation. This causes rapid bone loss. An athlete needs to take advantage of their periods of rapid bone growth by getting adequate calcium in their diet!

food sources



dairy



dark leafy greens



sardines



cereal

Recommended Daily Calcium Intakes	
Age	Recommended Daily Intake (mg/day)
0-6 months	200
6-12 months	260
1-3 years	700
4-8 years	1000
9-13 years	1300
14-18 years	1300
19-50 years	1000
51-70 years	Females 1200 Males 1000
70+ years	1200

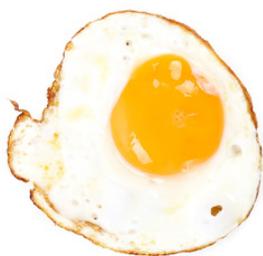
Vitamin D

Vitamin D promotes calcium absorption. It also assists in the maintenance of adequate serum calcium and phosphate concentrations to enable normal bone mineralization. Vitamin D is necessary for bone growth and remodeling by osteoblasts and osteoclasts. Without sufficient vitamin D, bones can become thin, brittle, or misshapen. Vitamin D is important in preventing rickets in children and osteomalacia in adults. It is also essential for immunity!

food sources



fatty fish



egg yolks



mushrooms



cheese

Recommended Daily Allowances (RDA) for Vitamin D in IU		
Age	Male	Female
0-12 months	400	400
1-13 years	600	600
14-18 years	600	600
19-50 years	600	600
51-70 years	600	600
> 70 years	800	800



Protein

It's important to get enough, but not too much protein for bone health and overall health. Protein is an important nutrient for bone health and in the prevention of osteoporosis. It gives bone its strength and flexibility and is also a big component of muscles, which are necessary for mobility and for injury prevention for our athletes. Oftentimes young athletes are missing protein drastically from their diets, here are some examples of protein.

food sources



meat



fish



dairy



beans & legumes

The Recommended Dietary Allowance (RDA) for protein is 0.8 grams of protein per kilogram of body weight. This is the amount of a nutrient you need to meet your basic nutritional requirements, but keep in mind it might not be adequate to meet specific nutrition goals for athletes, which I would recommend 1 gram of protein per kilogram of body weight. Instead of only focusing on total protein in your diet, consider the total nutrient package too. This includes fiber, vitamins/minerals and heart-healthy fats (like you would find in fish, for example).

calculate your protein needs

$$\frac{\text{body weight (in lbs)}}{2.2} = \text{body weight (in kgs)} \times 0.1 = \text{protein/day (grams)}$$



Magnesium

Magnesium contributes to the structural development of bone. It also plays a role in the active transport of calcium. An adult body contains approximately 25 g magnesium, with 50% to 60% present in the bones. The RDA for Magnesium for a growing child is between 130 and 410 mgs. Are you getting enough?

food sources



green leafy vegetables



legumes



nuts & seeds



whole grains

Recommended Daily Allowances (RDA) for Magnesium in mg		
Age	Male	Female
0-6 months	30	30
7-12 months	75	75
1-3 years	80	80
4-8 years	130	130
9-13 years	240	240
14-18 years	410	360
19-30 years	400	310
31+ years	420	320

Other Vitamins

vitamin A

Vitamin A is important for building healthy bones. It aids in formation of osteoblasts (bone building cells) and osteoclasts (bone breaking down cells). Keep in mind that more isn't always better. There is some research linking higher vitamin A levels with lower bone density and fractures. Good to know for our athletes who develop stress fractures frequently. Fruits and veggies rich in yellow and orange colors are high in vitamin A.

vitamin B12

One study showed that low levels of vitamin B12 are linked to a higher risk of osteoporosis in both men and women. Because of this, those who follow a vegan diet and don't supplement with vitamin B12 may be at risk for bone loss. If you have a vegan athlete, this is of specific importance! You can find this vitamin in organ meat, animal proteins, eggs, milk and salmon

vitamin C

Vitamin C is essential to the formation of collagen, which is the foundation of bone mineralization. There is also an association between higher vitamin C levels and greater bone density. Vitamin C and protein together create collagen so be sure you are getting both. Berries, oranges, red bell peppers and broccoli all have high vitamin c values.

vitamin K

Vitamin K attracts calcium to the bone. Low blood levels of vitamin K are associated with lower bone density and increased fracture risk. Research does not support supplementing vitamin K for bone density purposes at this time. All green leafy vegetables are high in vitamin K!



source: <https://americanbonehealth.org/>



Other Minerals

Boron

Insufficient boron intake may lower bone strength. There is some interest in whether boron can reduce osteoarthritis symptoms or keep bones healthy, however nothing is conclusive at this time. Avocados and apples are both good sources of boron.

Phosphorus

Phosphorus is found in every cell in the body, but most is in the bones and teeth. Phosphorus is necessary for making energy and carrying out many important chemical processes in the body. Turkey, milk and whole grains are high in phosphorus.

Potassium

People who have high potassium intakes seem to have stronger bones. Eating too little potassium can increase blood pressure, deplete calcium in bones, and increase the risk of kidney stones. Lentils, sweet potatoes, and bananas are all great sources of potassium.

Zinc

The body needs zinc to make proteins and DNA. During pregnancy, infancy, and childhood, zinc is important for proper growth and development. Zinc is found in shellfish like mussels, shrimp, clams and oysters along with nuts and seeds.





Why Gymnasts Should Take Their Bone Health Seriously

Stress

Injuries

Gymnasts are notoriously known for being at risk for stress fractures in the spine, wrists and feet/ankles. Therefore, gymnasts should include vitamin C, protein, magnesium, phosphorus zinc and boron in their diets. These vitamins and minerals help keep bones and tissues strong while practicing long hours in the gym.

Puberty/Growth

Spurts and Injuries

Just before and during puberty, young athletes are at risk for "growing pains" injuries such as Severs, Osgood Schlatter, etc. Eating both a strong-bone and anti-inflammatory diet will help during these times. Eating a bone friendly diet will also help with easing the hormonal shifts during puberty which- if needs are not met, can effect longterm risk for lower bone density.

Female

Athlete Triad

Risk

The female athlete triad contains three components, low energy due to lack of calories or nutrition in relation to high calorie output, lack of menstruation and low bone mineral density. These three components put athletes at a higher risk of stress and bone fractures. Be on the lookout for potential signs of this disorder- low energy, low immunity, lowering body weight, lack of menstruation, frequency of bone fractures. Speak with your physician if you feel your athlete maybe at risk.



Sample Bone-Strong Gymnast Meal Plan

Breakfast

Orange Ginger Overnight Oats

Lunch

Kale Salad with Creamy Tahini Dressing
Lean protein: tofu, grilled chicken,
Serve with whole grain toast, brown rice or beans.

Snack

Plain Greek yogurt topped with fresh berries

Dinner

Seed Crusted Salmon
Roasted Broccoli
Brown Rice

Dessert

Protein Brownie Skillet
Fortified Soy Milk





Orange Ginger Overnight Oats

Prep Time: 15 minutes

Total Time: 8 hours

Yield: 2 servings

Ingredients

- 1/2 cup Greek yogurt, plain
- 1 cup oats
- 1 cup almond milk, unsweetened
- 2 Tbs chia seeds
- 1 Tbs maple syrup
- 1 orange, zested
- 1/8 tsp ground ginger
- 1 Tbs pumpkin seeds
- 1 orange, sliced

Instructions

Prep

1. Zest orange for 1 tablespoon of zest.

Make

1. In a glass jar, mix yogurt, oats, milk, chia seeds, maple syrup, orange zest, and ginger. Add the lid to the jar and shake.
2. Leave in the refrigerator for 4 hours or overnight.
3. Top with pumpkin seeds and orange slices or other fruit.

Kale Salad with Creamy Tahini Dressing

Prep Time: 15 minutes

Total Time: 30 minutes

Yield: 4 servings

Ingredients

- 2 bunches kale, de-stemmed and shredded
- 3 lemons, juiced
- 1 tsp olive oil
- 1/4 tsp salt
- 1/2 small red onion, diced
- 1/2 cucumber, diced
- 1 pepper, orange, diced
- 1/2 cup tahini
- 2 cloves garlic, crushed
- 1 Tbs nutritional yeast
- 2 Tbs olive oil

Instructions

1. Add kale to large bowl with 1 tablespoon lemon juice, olive oil and salt. Massage until soft and bright green.
2. Add onion, cucumber, and pepper to kale - toss well.
3. Add tahini, garlic, remaining lemon juice, and nutritional yeast to food processor. Process until smooth, adding olive oil in a steady stream. Add more water if needed to thin.
4. Season dressing with salt and pepper to taste.
5. Drizzle salad with dressing and toss well before serving. Serve with whole grain toast, beans, or brown rice.



Seed Crusted Salmon

Prep Time: 5 minutes

Total Time: 25 minutes

Yield: 4 servings

Ingredients

- 2 lb salmon, fillets
- 1 Tbs olive oil
- 1/4 tsp salt
- 1/4 tsp black pepper
- 3 Tbs hemp seeds
- 2 Tbs sesame seeds, black (or regular)

Instructions

1. Preheat oven to 350° F and line a baking sheet with parchment paper.
2. Brush salmon with olive oil and season with salt and pepper.
3. Mix together hemp and sesame seeds in a shallow dish.
4. Press salmon, flesh-side down, into the seeds, and place face-up on the baking pan. Repeat with all fillets.
5. Bake in the oven until salmon is cooked through, about 20 minutes. Serve with whole grain pasta, beans or brown rice.

Protein Brownie Skillet

Prep Time: 15 minutes

Total Time: 40 minutes

Yield: 8 servings

Ingredients

- 1 Egg
- 3 Tbs Erythritol, plain
- 1/4 cup coconut oil, melted
- 1/3 cup almond butter
- 1 tsp Vanilla extract
- 1 Tbs Almond Milk, unsweetened, plain
- 1 Tbs Water
- 1 cup Almond flour
- 2 scoops Collagen Peptides
- 2 Tbs Cocoa Powder
- 1/4 tsp Baking Soda
- 1/2 tsp Cinnamon, ground
- 1/2 cup Chocolate Chips
- 1/4 tsp salt

Instructions

1. Preheat oven to 325° F.
2. Whisk together egg with erythritol, melted coconut oil, almond butter, vanilla and almond milk to whisk again.
3. Stir in almond flour, collagen, cocoa powder, baking soda, cinnamon, and salt. Fold in half of the chocolate, leaving the other half aside.
4. Very lightly spray a 8 or 9-inch skillet with coconut oil then pour batter into the base and spread out evenly. Sprinkle the remaining chocolate chips over the top. Bake in the oven for 25 minutes or until tooth pick comes out clean.
5. Remove from the oven and allow to cool for 5 minutes before slicing and serving.



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