# Diet and Stress Fractures

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The stress fracture is an injury that can be a threat to young athletes at the prime of their careers. A stress fracture occurs when the stress on a bone results in bone fatigue, resulting in a partial or sometimes complete break of the bone. This injury usually occurs when an athlete is at the height of his/her competitive season or when training becomes more intense, and the stress caused by training and other factors becomes too much on bones. For one to maintain healthy bones, a sound diet that meets the Recommended Dietary Allowances for calcium is very important. However, recent studies show that overall dietary balance may play a much larger role in maintaining bone health.

Lately, much attention has been placed on young female athletes and on the Female Athlete Triad, a group of disorders recognized by the American College of Sports Medicine shown to affect this population of athletes. These disorders include amenorrhea (lack of menstruation), osteoporosis (loss of bone mineral density) and disordered eating patterns.

**TABLE 1**
**GOOD CALCIUM SOURCES**

| Food | Amount of Calcium (mg) |
|---|---|
| 1 cup vanilla yogurt | 389 |
| 1/4 cup powdered skim milk | 377 |
| 3 oz sardines, canned | 324 |
| 1 cup skim milk | 302 |
| 1/2 cup tofu (firm) | 258 |
| 1 oz Cheddar cheese | 202 |
| 1/2 cup chocolate pudding | 150 |
| 1/2 cup fat free ice cream | 100 |
| 1/2 cup collards, cooked | 74 |
| 1/2 cup baked beans | 70 |
| 1/2 cup cottage cheese (1%) | 61 |
| corn tortilla (1 tortilla) | 42 |
| 6 medium oysters | 38 |

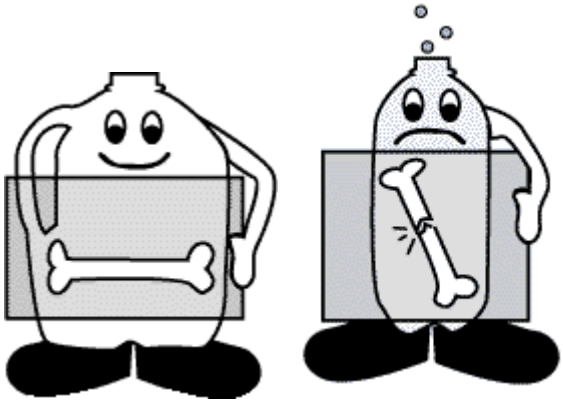
Source: Diet Balancer computer program, Nutridata software, 1996

Studies done recently on the effect of stress fractures in young women have focused on (but are not limited to) these elements of the triad. One of the most heavily studied areas has been the link between amenorrhea and the incidence of stress fractures. The connection between amenorrhea and a decrease in bone density comes partly from low levels of the hormones, estrogen and progesterone. Both of these hormones are needed in normal levels to help calcium deposit into bone and to maintain bone density. A majority of athletes studied who reported a history of stress fractures had some history of amenorrhea[1, 11, 13] and oligomenorrhea (infrequent menstruation)[2, 5]. Another component of the triad, disordered eating, may also play a role in amenorrhea, which has been linked to the incidence of stress fractures. Dietary intake and disordered eating patterns have been linked to amenorrhea in a number of studies. A concept that has been developed supporting the link between dietary intake and amenorrhea is called "energy drain"[14]. The human body must choose which functions it will tend to first. Things such as growth and development all come before reproduction and menstruation on the list of priorities. If calorie intake is too low, hormones such as estrogen and progesterone are lower on the list of priorities and may not be produced in amounts high enough to allow for menstruation to occur.

One factor that may override a diet low in calories and nutrients and its effects on

bone mineral density is the high-impact nature of the sport. Gymnastics is an example of this. Some studies have shown that gymnasts have higher bone mineral densities than non-gymnasts and other athletes, despite lower calorie intakes and histories of amenorrhea[12]. Despite this, however, gymnasts still do suffer from stress fractures[9, 13, 15]. A diet that is low in overall nutrients can have serious consequences for the young athlete. Ninety-nine percent of total body calcium is stored in bone. A diet that is low in calcium can put the athlete at risk for developing bone-related injuries. Even if a young female athlete is menstruating and eats enough calories, calcium requirements are still just as important for maintaining overall bone health. The Recommended Dietary Allowances for calcium are currently 1,300 mg/day for males and females age 9-18, and 1000 mg/day for males and females age 19-30. For females who are estrogen-deficient and not menstruating, it has been recommended that they increase their calcium intake to total 1,500mg/day[4]. A list of foods and their calcium contents can be found in Table 1.

It is important to approach keeping a healthy bone mineral density through prevention in all young athletes. An eating plan that is sufficient in calories as well as calcium is the best dietary measure to take for preventing a decrease in bone mass. A diet rich in calcium is extremely important for increasing bone mass. Too much salt, protein, phosphorous, caffeine and alcohol have a negative effect on the amount of calcium that the body is able to absorb[4]. One notable source of phosphorous is soft drinks. Phosphorous and calcium compete with one another for absorption in the body. Not only is this a problem, but soft drinks in most cases replace milk as a beverage throughout the day, which can even further create an overall calcium deficiency.



Stress fractures can easily shorten the life span of an athlete's career. Many different factors go into causing stress fractures. Diet can play an important role in helping to lower the potential for stress fractures. With a balanced diet that contains plenty of calories and calcium, athletes can help decrease their risk for stress fractures and increase their promise for athletic success.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