

Osteoporosis and the Female Triad

Foundation: Your bone is in a constant cycle of remodeling (osteoclasts always removing, osteoblasts always adding).

Osteopenia-->Osteoporosis occurs when the osteoclasts remove bone, but the osteoblasts don't keep up with adding. On a scan this shows up looking more like a spiderweb than a bone scan. This is what is meant by "low bone density", and it predisposes you to a fracture.

Vertebral fractures are most common, causing age related kyphosis as the back rounds abnormally. Often seen in elderly women, comes with back pain and a reduced ability to breath.

Hip fractures are second most common, up to 20% of elderly with hip fracture die within the first year. 50% permanently handicapped.

Osteoporosis CAN be avoided/ fought against!

- Proper Calcium and Vitamin D intake
- Exercise
- Don't drink or smoke
- Avoid Female Triad

Make calcium a consistent part of your daily diet. Calcium requires Vitamin D to absorb efficiently, oftentimes milk is already Vitamin D fortified, making it a great option.

Exercise with both low-moderate impact movements (running, jump rope, biking) as well as muscle strengthening exercises (weightlifting/resistance training)! AVOID forward flexion of the spine, which is doubly detrimental with a rotational component. This means do not perform most exercises that mimic a sit up, and when picking things up, approach straight on and bend at the knees (do not round the back)!

Focus on hips and back for resistance training (Squats, Hip abduction and adduction, most leg exercises, Machine Rows, Supermans, Shrugs, back exercises WITHOUT forward flexion/unilateral component).

We often think of resistance training building muscle, but bone? Just like muscle, your bone is adaptable. When you do a movement such as a biceps curl, your muscle is really just the connector between two solid points that accept the force, your Scapula and your Radius (bones). With this in mind, your bones must be strong enough to support this weight that you are demanding. The more weight you demand the stronger the bone must become. So as a general rule, as you progress in a workout program, your bone is getting stronger alongside your muscle. Similar to how your muscle hypertrophies (gets bigger), your bone should become more dense.

Smoking is generally a detrimental habit. Kick it. Alcohol has very slight merit in health, don't consume it excessively or you're in for a world of trouble.

The Female Triad

Quite the underpublicized problem, one that's so unfortunate but yet so avoidable!

Audience: mainly teenage-young adult females. Often in a sport that emphasizes body composition or endurance.

Problem: Multifaceted.

The female athlete triad is a three pronged problem: Low energy availability (not enough food) leads to menstrual disturbances (irregular periods), which can then lead to low bone mass. Left unchecked this can permanently set you up for osteoporosis in the future.

It is not uncommon in such sports as: figure skating, diving, and endurance running to be heavily instructed on maintaining or achieving a very lean form. Sometimes it has to do with aesthetics, other times efficiency (fat mass is dead weight for a runner). Unfortunately this can lead to severe cases where already lean girls are becoming unhealthily low in their bodyfat. It is here that problems arise. Oftentimes a huge warning to this is menstrual disturbances. Oligomenorrhea is a term for when a period becomes irregular (36-90 days without menstruation). This is often a beginning sign that the body is under attack from functioning optimally.

Side Note: The body is a very complex system of cycles, systems and pathways. Overall a few main componenets help to sustain these intricacies; water, oxygen, and calories. When someone restricts their calories, the body turns to bodyfat stores for the energy necessary to carry out its basic tasks. When bodyfat reaches unhealthy low levels, the body adapts in the only ways it can. Think of the body like an average worker, receiving compensation for his service. If he starts spending more than he earns (using more calories than he's eating), he must withdraw from his bank account to make up the extra (bodyfat stores are stored energy). Eventually, this can not continue, one day he will realize that all he has left in his bank account is his emergency fund (we need a certain amount of reserve body fat for "emergencies"). So the only thing left to do is to adjust his lifestyle and cut costs. This is exactly what the body does! Two bodily functions that are not necessary for immediate (self) survival are Growth (muscle, bone, etc) and the Reproductive System. The body cuts energy to these systems to bring itself out of "debt," even though there are significant consequences down the road.

So after reading the side note, we can conclude that the body will shut off reproductive and growth pathways in order to increase chances of survival. Oligomenorrhea is a sign of this starting, and if the caloric deficit continues (as it often does when uninformed) it can lead to Amenorrhea. Amenorrhea is defined as a complete loss of menstruation for over 90 days. Some coaches actually tell their athletes that they aren't pushing themselves hard enough until they lose their period (possibly up to 60% of female athletes experience menstrual disturbances). This is absolutely horrible and uninformed advice, and should NEVER be accepted. If this occurs it means that the female's estrogen and progesterone are severely suppressed, and problems are quick to follow.

Estrogen is the main hormone responsible for cuing the female body to maintain bone mass, therefore preserving bone density. During the teenage years (puberty), the body is in a stage of growth that will never again be experienced. It is during these few short years that people determine how much bone mass they will have to work with for the rest of their life (in almost all scenarios you never have more bone mass than your teenage self, aka you're always slowly losing with age). Any significant hurdle to bone growth during this time will permanently stunt the bone growth possible for that person. I can not stress this timeframe ENOUGH. In the scenario of the Female Triad, the combination of suppressed growth signals and estrogen lead to a decrease in bone growth, and an increase in bone breakdown. In essence it's a double whammy.

By this point it's hopefully apparent that being sucked into the Female Triad is a bad thing. But once the problem is identified, there is a way out, and it's fairly simple! The whole problem started with a caloric imbalance, therefore the solution is at the root, increasing caloric balance. Eat more! Amazingly, studies have found that a modest increase in caloric intake can often restore proper menstrual health (putting the body out of survival mode and halting bone loss in its tracks). This is often accompanied by a slight weight gain of 5-10lbs (very little considering these individuals are already incredibly lean).

Some medical practitioners may try to prescribe contraceptives or hormone therapy, unfortunately committing the error of treating the symptom, not the problem. Although this should stop the bone loss temporarily and restore menstruation, putting a female athlete on estrogen is incredibly comparable to putting a male athlete on steroids (in the terms of hormonal secretion). Think about it objectively, going back to a simple financial model. Imagine you get paid \$200/day (normal amount of estrogen) by your employer to complete a very specialized task. Now imagine he told you he would pay you the same amount of money, but you had the option of coming to work or not, totally your decision with no strings attached (hormone supplement). Most people would rather take the money and do something else with their time. Fast forward 5 years (possible timeframe for estrogen therapy), and all of the sudden your employer calls you and retracts his "non-work" offer as you're in the middle of your fourth round of escargot during your international country tour. At this point you've totally forgotten how to do that specialized task and can't go back to work for him even if you wanted to (body no longer

knows how to produce proper levels of estrogen). In essence you're up the creek without a paddle.

So, the best treatment is to increase calories to calmly assure the body that you are no longer fighting against it. Once this is done it is very likely for menstruation to return to normal (amongst many things, maintaining bone) and growth signals to once again roam freely (growing bone).

I hope this was informative for you to take in! If you have any questions arise after reading my exposition of Osteoporosis and the Female Triad, feel free to reach out and ask me! Most of all, I hope you took away knowledge that you can later use as wisdom for everyone's well-being.

Always Striving,

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