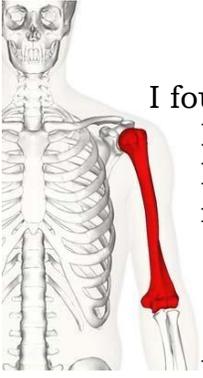


Post-Polio Osteoporosis

From Primary Care Physician

[Dr. Marny Eulberg, MD](#)



I found this humerus . . .

I've been told that I have a "weird" sense of humor, but I loved seeing a T-shirt that has this idea emblazoned on its front. For those of us who have studied anatomy it's probably a funnier joke! (Humerus . . . Humorous) Anyway . . .

All joking aside, while actively practicing primary care medicine and in the last few years since I have limited my practice to treating polio survivors, I have received many questions from polio survivors about osteoporosis/osteopenia and their treatments. Unfortunately, there has not been much written in medical journals about the issues that come with a diagnosis of osteoporosis in polio survivors.

The PA Polio Network recently forwarded an article to me that appeared in [Science Direct](#) in their Endocrine Practice section (1).

The article raised some new questions for me and re-enforced that, although much is known about osteoporosis in a "normal" population, not much is known about the specifics of bone health in polio survivors. We do know that many, many polio survivors are at risk of falling and breaking bones and many polio survivors have osteoporosis or osteopenia. I'd like to start at the beginning.

Bone Formation

- Bones begin to form in utero around three months and bone formation continues into adolescence.
- Bone formation during childhood and adolescence depends on adequate nutrition including Vitamin D, calcium and normal weight bearing through that bone.
- After a person reaches their late 20s, the amount of mineral in that person's bones no longer increases and beginning in their 30s the amount of minerals (mostly calcium) begins to slowly decrease.
 - In women, these decrease more rapidly after menopause - either naturally occurring menopause (or) surgically induced by removal of both ovaries.
 - Men also experience bone loss - just a little later in life.
- Think about this like a bank account in which deposits are made regularly for the first thirty years of your life and then withdrawals are being made on a regular basis for the rest of your life.
- Just like a bank account, your bone mineral "balance" equals the total amount of bone mineral laid down in childhood/young adulthood minus the withdrawals. As *when* the "balance" approaches zero you are at risk of a broken bone/fracture because the bone structure has become weak.

Early Effects of insufficient bone formation in Polio Survivors

What this means for polio survivors is that if you contracted polio at 2 years of age, you only had 2 years beyond the womb to build normal bone in those parts of your body that were affected by the polio.

- After that, how much bone mineral content your bones built up depended on how much weight bearing you were able to do through that part of your body plus background factors like nutrition (including Vitamin D intake).
- On the other hand, your unaffected limb(s) may have laid down denser bone because it was doing more than the usual share of weight bearing. Examples would be:
 - The arms of crutch users.
 - The stronger of your two legs.
 - If you walked using a brace the bones in that limb (or limbs) will experience less weight bearing than normal through those bones because the brace did some of the weight bearing.

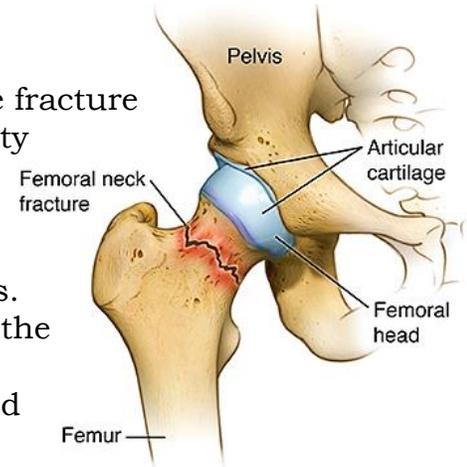
Post-Polio Bone Loss

Decades later, we all find ourselves in the bone mineral loss phase. We probably started with less bone density, at least in some parts of our bodies, as we enter this phase, so it makes perfect sense that many aging polio survivors are being diagnosed with osteopenia and osteoporosis. This does make polio survivors more likely to suffer broken bones/fractures when they fall or incur another injury.

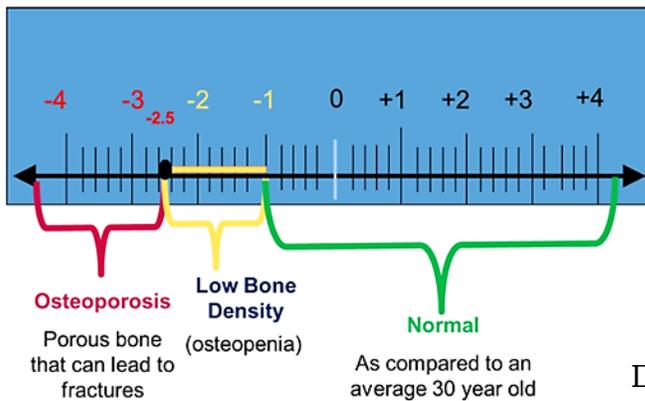
Osteoporosis: The Test

Osteoporosis is diagnosed after a person has experienced a bone fracture with little or no significant trauma (or) after some sort of bone density imaging study has been done such as a DEXA (dual energy x-ray absorptiometry) test.

- The [DEXA](#) scan test, sometimes abbreviated as DXA, is similar to a normal x-ray with extra time given for additional measurements.
- The test normally looks at the bone density in your spine and/or the left and possibly right upper thigh bones at the location that hip fractures most often happen (the report refers to this as hip and neck - meaning femoral neck).
- Some machines are set up to only look at the left hip, but it is important to ask that the technician also looks at your right hip if polio affected your left leg.
- Bone density can also be measured in your forearm.
- Any metal, such as surgical hardware, will prohibit the ability to take an accurate measurement of bone density in that particular bone, so bone density may need to be measured in other bones.



Osteoporosis/Osteopenia – The Criteria for Diagnosis



Usually, the result that your physician will receive is the T-score, which compares the bone density of the patient with normal results for a 30-year-old person of the same sex.

- Osteopenia is a T-score of -1 to -2.5.
- Osteoporosis is diagnosed by a T-score of -2.5 or less.
- Severe Osteoporosis is indicated by a T-score of -3.0 or less.

Due to the way calculations are made, the actual bone density in a bone that is smaller than normal may be falsely low. This calculation uses a “normal” size for the bone(s) that was studied as part of the equation to yield a bone density result. Note: This chart(2) is from [American Bone Health](#)

Osteoporosis – What is my Risk for Fracture?

The important issue for anyone (both men and women) concerned about osteoporosis is not so much the score on a single test such as the DEXA, but the need to ask yourself the question “What is MY risk of fracture” ?

- There are some on-line bone fracture risk assessment tools available to health care professionals that include factors such as family history, smoking history, alcohol consumption, race, and history of taking certain medications or medical conditions that are associated with bone mineral loss in addition to a person’s T-score.
- Again, remember the final result showing fracture risk is based on “normal” people.
- The risks may be greater for persons with lower extremity weakness and/or increased risk of falls and less for people who primarily use wheelchairs for their mobility.

Treatment for Osteoporosis (or) Osteopenia

You have been diagnosed with osteopenia or osteoporosis and your doctor is recommending treatment. What do you need to know?

- **Non-Drug Treatments:**

If the recommended treatment is for one or a combination of the following things, you probably should do it!

- fall prevention measures,
- balance training,
- stopping smoking,
- limiting alcohol consumption,
- increasing calcium* via your diet or with supplements, or increasing intake of Vitamin D via diet, sunlight exposure, or supplements

* There are a few medical conditions with which you probably should *not* increase calcium or Vitamin D. - Always, consult with a doctor who knows you and your entire history. -

- History of chronic kidney disease (CKD),
- History of kidney stones,
- Certain endocrine problems such as hyperparathyroidism.

Osteoporosis Medications

The guidance regarding whether polio survivors should take one of the various medications used to treat osteoporosis is less clear. Initially, studies of osteoporosis medications judged their effectiveness based on whether the DEXA scan showed improvement in people taking a particular medication. Later it was discovered that some medications improved the results on DEXA scans *but* did not decrease the number of fractures experienced by the users of those medications.

Obviously, the result that is most important to individuals considering taking an osteoporosis medication is whether it can decrease their risk of having a broken bone or compression fracture!

There are two broad classifications of medications used to treat osteoporosis

- **Antiresorptive medications** include a class of drugs called bisphosphonates. These medications include:

- Alendronate (Fosamax™, Fosamax™ Plus D)
- Risedronate (Actonel™, Actonel™ with Calcium and Atelvia™)
- Ibandronate (Boniva™)
- Zoledronic acid (Reclast™)
- Denosumab (Prolia™)
- Estrogen therapy or hormone therapy (including estrogen, selective estrogen receptor modulators, and testosterone) that reduce bone resorption and subsequently bone formation.

Note: These medications preserve, but do not increase bone mineral density

- **Anabolic agents** that stimulate bone formation and subsequently bone resorption.

- Abaloparatide (Tymlos™)
- Romosozumab (Evenity™)
- Teriparatide (Forteo™)

Note: These medications increase bone density.

Medications That Have Been Shown To Decrease Fractures

- **Oral Bisphosphonates**

- The “ronates” including (brand names):
 - Actonel, Boniva, Didronel, Fosamax
 - Aclasta, Reclast, Zometa (zoledronic acid)

Note: Several of the bisphosphonates are now generic and cost about \$10 for a month's supply(3).

- Intranasal Calcitonin (brand names): (3)
 - Fortical and Miacalcin – approx. \$30 to \$100 for a one-month supply
- Estrogen and selective estrogen receptor stimulators (known as SERMs)
 - Estrogen - approx. \$6 per tablet to \$30 or more dollars per month for the patch or ring forms.
 - Evista and Osphena (SERMS) – approx. \$7 per tablet and \$3.00 per tablet (generic)
- Anabolic Agents* (brand names): (3)

Note: These anabolic agent medications are not available in oral form, require injection and are expensive. Some can be self administered by the person themselves, similar to giving oneself insulin. Others can only be given by medical personnel and are usually, but not always, given via an intravenous infusion.

 - Synthetic Parathyroid Hormones (3)
 - Forteo - approx. \$3,400/dose
 - Tymlos – approx. \$1,800/dose
 - Prolia - approx. \$1,300 once every six months (3)

Osteoporosis Medications – A Summary

No drug is without any adverse side effects and these drugs are no exception. Some of the known side effects of many of these drugs is a rare spontaneous fracture of the femur (thigh bone) or bony destruction of the jawbone (osteonecrosis). The estrogens and SERMs can increase the risk of blood clots in persons using them. The bisphosphonates can irritate the esophagus, so it is strongly recommended that persons taking these pills take them with a full glass of water at least 30 minutes before eating or drinking and sit/stand upright (don't bend over) for at least 30 minutes (60 minutes for Boniva). There are other less common or less serious side effects and any adverse side effects need to be brought to the attention of the prescriber.

The bottom line is that we don't have any research studies or data to predict how any of the osteoporosis medications will work in polio survivors. In the bones in limbs, or in the trunk, that were not affected by muscle weakness all these drugs will likely work as well as they do in the bones of "normal" people.

But we simply do not know how well these medications will work in bones that continue to do less than normal weight bearing and have begun the process of normal bone loss, with a lot less mineral in them.

(1) <https://www.sciencedirect.com/science/article/pii/S1530891X20481868>

(2) <https://americanbonehealth.org/bone-density/understanding-the-bone-density-t-score-and-z-score/>

(3) Price guides effective January, 2021 for a person paying out-of-pocket in the U.S.

Dr. Eulberg's series of Articles and Videos are in the
“[Primary Care Perspective](#)” section of our website:
www.papolionetwork.org/primary-care-and-pps

Do you have a question for Dr. Eulberg ?
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