

What about bone quality?

Bone strength correlates not just to the amount of mineral/(area)² or bone density, but also is dependent on the **quality** of the bone. Going back to the ladder analogy – does the ladder have rungs missing? Does the bone show signs of damage (on a micro-architectural basis or a large-scale, i.e. small cracks or big ones)? Is there a repairman around, fixing any damage in the structure? Maybe we wouldn't get a repairman to come in to fix a small crack in our ladder, but healthy pre-menopausal bone does have a built-in self-repairing system where about one-fourth of the lacy type of bone in your spine (called trabecular bone) turns over a year. Bone showing surface irregularities is removed by remodeling cells called *osteoclasts* that remove or digest the damaged bone, and then the bone is replaced by bone-building cells called an *osteoblasts*, which lay down new pre-bone (osteoid) which then gets mineralized (i.e. calcium then gets put in the pre-bone to make it stronger).

Other factors contributing to bone quality and strength include the geometry (the shape and size of your bone) and patterns of mineralization. We currently have no easy test for bone quality, but the best measure of bone quality is if you have fractured your bones (even with a fall, if it was from standing height or less), especially since age 50. If you've already had a fracture of your wrist, spine, ankle or hip, especially if it occurred with only mild trauma, you not only need a bone density but should also ask your doctor to check for other metabolic factors such as low vitamin D, parathyroid or thyroid problems, and calcium absorption/excretion problems, as fractures are often a sign of compromised bone quality. Even a small wrist fracture increases your risk of subsequent types of fractures by several-fold. Osteoporosis drugs can mediate their effects on bone fracture rates by effecting bone quality and bone density or mineralization to various degrees.