





STRONG FOR LIFE

Want to ensure a healthy, pain-free yoga practice for years (and years) to come? This fun and simple three-part plan is for you.

ASK SEVERAL YOGIS what motivates their practice, and you're sure to get a range of responses, from "stress relief" to "spiritual growth." What you probably *won't* hear: "a strong skeleton."

But new research shows that yoga is surprisingly protective when it comes to staving off fractures and helping to prevent osteoporosis, a bone-thinning disease that will cause approximately half of women age 50 and older to break a bone. (Men get osteoporosis too, but 80 percent of sufferers are female, likely because women typically have smaller, thinner bones and because production of estrogen—a female hormone that protects against bone loss—drops off sharply at menopause.) The hard truth is that by the time you hit

the age when your skeleton becomes more brittle, it's much more challenging (though not impossible) to build protective bone mass. Which is why the best time to focus on increasing your bone mass reservoir is *now*, says Loren Fishman, MD, a Columbia University physiatrist specializing in rehabilitative medicine who studied under B.K.S. Iyengar.

Ready to be more proactive about protecting your bones? Our three-part plan reveals which yoga poses may be particularly beneficial, regardless of your age,

as well as new thinking behind the role of nutrition and high-impact, weight-bearing exercises on bone health. Read on for the latest research-backed ways to strengthen your lovely bones.

Story by Leslie Goldman
Photography by Paul Miller

GREAT NEWS: As a yogi, you're already protecting your frame in a few major ways. For starters, each time you practice a pose, you're potentially building new bone. "When you hold a pose like Supta Padangusthasana (Reclining Hand-to-Big-Toe Pose) or a twist, you're opposing one group of muscles against another, like the quadriceps against the hamstrings or the gluteal muscles against the shoulder muscles, respectively," says Fishman. That opposition creates a force that physically stimulates osteoblasts, bone-making cells that initially live on the outside of the bone and turn into osteocytes, which are cells that become embedded within your bone. "You're actually laying down new bone," he says.

Yoga may also help reverse or stall the bone-weakening effects that come with age—which is relatively new thinking in the medical world. Doctors used to believe that women's ability to accrue new bone basically ended once they entered menopause and their levels of bone-protective estrogen and progesterone plummeted. "The new research shows that yoga can outweigh the hormonal effects of age," Fishman says. His 2015 study, published in *Topics in Geriatric Rehabilitation*, found that 80 percent of older participants, most of whom had osteoporosis or its precursor, osteopenia, who practiced 12 yoga poses (often modified) a day showed improved bone density in their spine and femurs (see "Poses to boost bone health" below).

Poses to boost bone health

Practice poses from Loren Fishman's bone-health research using the instructions at right from Terry Roth Schaff, C-IAYT, who collaborated with Fishman on the study. The sequence takes at least 12 minutes to complete and can be incorporated into your regular home practice or practiced on its own. Breathe slowly as you hold each pose for about 30 seconds per side.



VRKSASANA Tree Pose

Stand in Tadasana. Bend your right knee and rotate your right thigh outward without turning your pelvis. Lift your right foot and place it above the ankle or knee of your left leg (but not against the knee itself). Bring palms in front of your chest.



UTTHITA TRIKONASANA

Extended Triangle Pose

From a wide stance, rotate your left leg so your foot and knee turn out 90 degrees. Lengthen your torso over your left leg. Place your left hand on your left shin, the floor, or a block. Stretch your right arm up.



SETU BANDHA

SARVANGASANA Bridge Pose

Lie on your back with knees bent, heels in line with your knees. Press into your feet as you lift your hips and torso. With your arms extended, interlace your fingers and come onto your outer shoulders.



SUPTA PADANGUSTHASANA I

Reclining Hand-to-Big-Toe Pose I

Lie on your back. Hook a strap around the ball of your left foot; hold an end of the strap in each hand. Straighten your left leg, drawing it up toward the ceiling without lifting your left sitting bone.

These findings apply to younger women with healthy skeletons, too. “There is strong evidence that young osteoblasts do respond pretty vigorously to the forces generated by muscles, which is likely to put off osteopenia and osteoporosis until later in life—if it were to appear at all,” Fishman says.

Finally, there’s the vital role yoga plays in preventing fractures by building stability and agility. “Yoga improves your physical balance and flexibility, which means you’re less likely to fall and break something—and if you do start to fall, your agility may help you catch yourself,” says Lori Rubenstein Fazzio, DPT, C-IAYT, clinical director of the Yoga Therapy Rx Practicum at Loyola Marymount University (LMU) and part-time faculty in LMU’s Master of Arts in Yoga Studies. Equally important, yoga enhances your *mental* balance, too. “It makes you more present and focused,” Rubenstein Fazzio says, and alert people are less likely to slip on an ice patch or trip on a staircase. More surprisingly, yoga’s calming qualities help lower levels of cortisol, a stress hormone that breaks down bone when it’s chronically elevated, says Lani

Simpson, DC, a certified clinical (bone) densitometrist and host of the PBS show *Stronger Bones, Longer Life*. In this way, even passive poses like Savasana and Sukhasana can play a role in preventing bone loss.

Whatever your physical practice, slow and steady win the race for strength. “Strength builds as you hold each pose, which you should do for as long as you comfortably can,” says Rubenstein Fazzio. Aim to hold each pose between 12 and 72 seconds, when possible, because that’s the range needed to stimulate osteocytes, says Fishman. But don’t do it at the risk of form—good alignment is key. In Vrksasana (Tree Pose), for instance, make sure your pelvis is level and your standing leg’s knee is facing forward. “If your hip is jutting out or your standing knee is collapsing inward, you’re probably just hanging on your ligaments and joints and not using your muscles,” Rubenstein Fazzio notes, and if your muscles aren’t pulling on that hip bone, no meaningful bone-strengthening will occur. “You want to feel your muscles tensing; that’s how you know you’re engaging—and building—them. And when you build muscle, you build bone.”



3 VIRABHADRASANA II

Warrior Pose II

From a wide stance, rotate your left leg so that your foot and knee turn out 90 degrees. Bend your left knee over your left heel. Reach your arms actively out to your sides at shoulder height.



4 UTTHITA PARSVAKONASANA

Extended Side Angle Pose

From Warrior II, lengthen your torso and lower your left forearm onto your left thigh. Reach your right arm up and over your right ear. Stretch from your right outer heel through your fingertips.



5 SALABHASANA Locust Pose

Lie face-down on your mat with your arms alongside your torso. Lift your chest forward and up as you raise your legs and stretch them out behind you. Lift your upper body and legs without straining, streaming your arms along your torso.



8 SUPTA PADANGUSTHASANA II

Reclining Hand-to-Big-Toe Pose II

From Supta Padangusthasana I, hold both ends of the strap in your right hand. Keep the left side of your body grounded as you extend your right leg out to the right side and lower it toward the floor.



9 SAVASANA Corpse Pose

Lie on your back with legs hip-distance apart, heels under your knees. Press your shoulder blades into the floor. Rest your hands on your lower belly. Stretch each leg out in front and let each foot fall open. Open each arm, palms turned up.

BONUS MOVES

Twists like Parivrtta Trikonasana (Revolved Triangle Pose), Marichyasana III, and Ardha Matsyendrasana (Half Lord of the Fishes Pose)—the three remaining poses from Fishman’s study—help stimulate bone growth by gently tugging on your spine and hip bones. But if you have osteoporosis or are new to yoga, start by practicing seated twists in a chair to avoid overdoing it, advises Schaff. Sit in a chair with your heels under your knees and maintain length in your torso as you gently twist to the right, starting from your low back and moving up your spine. Keep both sides of your chest open and twist only to the point where you can maintain length in your spine (don’t round your back). Repeat on other side. Then, practice the same twist with your legs crossed.

CARDIO & STRENGTH TRAINING

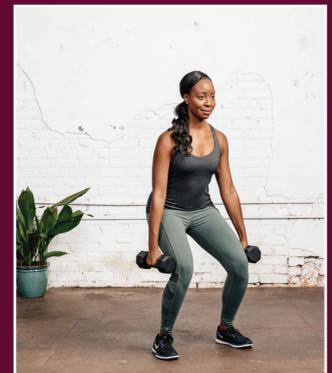
YOGA IS AMAZING, but it's not enough if you want to give your bones the best fighting chance against loss and damage—for that, you'll need to add some weight-bearing cardiovascular fitness to your routine (think jumping, running, walking, dancing, hiking, and aerobics). "It has to do with the impact of your feet on the ground and how that impact radiates up through your body," says Simpson. "Bones are dynamic and alive. When you jog or jump, it puts pressure on the bone, which sends a message to the osteoblasts: 'We need to get these bones stronger.'" That's one reason astronauts lose an average of 1 to 2 percent of their bone mass per month while in outer space: No gravity equals no bone-building impact. Rubenstein Fazzio recommends adding three 30-minute sessions of high-impact cardio to your weekly workout routine, including brief bursts of vigorous effort. Running and aerobics are especially good, plus they're heart-pumping moves, so you'll enjoy the cardioprotective effects, too.

If 30 minutes is too much of a commitment, short spurts of jumping or jogging count, too. (Note: If you have osteoporosis, avoid jumping.) Research from Brigham Young University in Provo, Utah, showed that when women ages 25 to 50 jumped as high as possible 10 times, twice a day, for 16 weeks, their hip bone density increased by 0.5 percent on average. This may sound negligible, but the women who didn't jump *lost* about 1.3 percent of their bone density on average during the same period. Study author Larry Tucker, PhD, recommends jumping as high as possible 10 to 20 times—resting for 30 seconds between jumps—twice a day, and spacing out the two sets by about eight hours to prevent your bones from becoming desensitized to the impact.

The final fitness key to bone fortification: strength training. Hoisting dumbbells or doing lunges or squats places a higher load on your skeleton, and bones respond by growing stronger. When choosing weights, don't go too easy on yourself. "Pick a challenging weight that you can safely manage without strain, and do fewer repetitions," advises Rubenstein Fazzio; that added stress is what sets bone-forming cells into action. Aim for two to three sets of 8 to 12 reps per body area, twice a week. To make it super simple, slip some of Rubenstein Fazzio's favorite strength-training moves into your regular yoga practice (see "Pump up your practice").

Pump up your practice

For efficient bone building (and fun!), add these exercises from Lori Rubenstein Fazzio, DPT, C-IAYT, into your yoga practice.



DUMBBELL SQUATS

Stand with your feet hip-distance apart and hold a 2- to 10-pound dumbbell in each hand, arms by your sides and inner wrists facing your hips. Gently squeeze your shoulder blades together to activate the muscles of your upper back. Maintain this as you exhale and bend your knees into a squat position, keeping your upper back mostly vertical and your knees tracking directly over the middle of your feet. Hold for 1–5 breaths. Straighten your knees and return to standing. (As your endurance builds, you can raise your arms out to your sides or in front of you as you lower into the squat). Repeat 2–3 times.



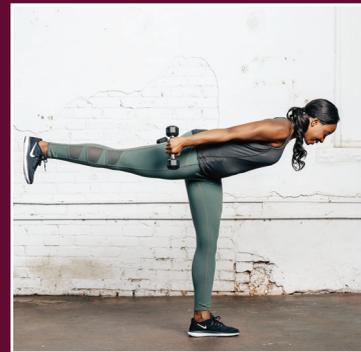
BICEP CURLS

Stand with your feet hip-distance apart and hold a 2- to 10-pound dumbbell in each hand, arms by your sides. Gently squeeze your shoulder blades together to activate the muscles of your upper back. Slowly bend your elbows, rotating your palms upward as you bring the dumbbells in front of your chest. Slowly bend your elbows to lower your arms to your sides. Repeat for 8–12 reps.



DYNAMIC WARRIOR III

Stand with your feet shoulder-distance apart, holding a 2- to 10-pound dumbbell in your right hand. Step your right foot back into a High Lunge, bending your left knee until it's directly over your left ankle. Squeeze your shoulder blades together as you hinge forward at your hips and begin to raise your right leg behind you. Lean forward until your trunk is parallel to the floor and your right leg is aligned directly behind you. Maintain a slight bend in your standing knee. Hold here and lift the weight in a rowing motion until it's directly under your armpit. Slowly lower the weight toward the floor. Repeat for 10 reps. Return to High Lunge. Switch sides; complete 1–2 sets of 10 reps on each side.



WARRIOR III TRICEP EXTENSIONS

With a 2- to 10-pound dumbbell in each hand, move into Warrior III (see instructions above). Bend your elbows 45 degrees, then reach toward the wall behind you with your palms facing your body. (If you struggle to maintain balance or feel strain, try the extensions from High Lunge, hinged slightly forward, instead.) Repeat for 2 sets of 10–15 reps.



PLANK POSE WITH DUMBBELLS

Come onto your hands and knees and grip 5- to 10-pound dumbbells. Your wrists should be neutral with no creases on either side—this enables your wrist extensors and flexors to contract, which helps strengthen your forearms more evenly and may put less pressure on your carpal tunnels. Stack your shoulders over your wrists. Either lift your knees a few inches off the floor or come into a full Plank Pose; hold for several breaths.



BRIDGE POSE WITH LEG EXTENSIONS

Lie on your back with your knees bent and feet on the floor. Gently press the backs of your upper arms into the floor. Isometrically pull your knees toward one another to activate the inner-thigh muscles, and then isometrically push your feet apart to activate your outer-thigh muscles. Continue pressing your upper arms against the floor as you lift your hips. Gently contract your abdominals and buttocks, and maintain a level pelvis as you exhale and lift one foot off the floor and straighten your knee. Repeat with the opposite leg, alternating 5 times per leg.

NUTRITION

ALL THE YOGA AND WEIGHT-BEARING activity in the world will be for naught if you're not bathing those new bone cells in the right nutrients. Calcium has long been considered king, of course, and the Academy of Nutrition and Dietetics recommends that adults between the ages of 19 and 50 consume 1,000 mg per day; it's advised that women over 50 and men over 70 get 1,200 mg. (Individuals with osteoporosis may require more.) Dairy products are typically the easiest way to meet these goals: A cup of milk or yogurt, or an ounce of cheese, provides about 300 mg.

But calcium isn't the whole story, says Amy Joy Lanou, PhD, professor of health and wellness for the University of North Carolina–Asheville and co-author of *Building Bone Vitality*. "There are at least 17 other nutrients that are important to bone health, including magnesium, potassium, zinc, and vitamins C, D, and K," she says. All of these nutrients work together in various ways to support bone health. Vitamin D, for example, helps move calcium from the blood into the bone, and vitamin C helps create the collagen matrix of bone. (Collagen fibers twist around each other to create a type of inner scaffolding on which bone minerals get deposited.) Getting all 17 nutrients can seem complicated, but following a few simple guidelines can make it easy.

First, focus on a plant-based diet rich in leafy greens and beans, says Lanou; both are loaded with calcium, magnesium, vitamin C, and other key nutrients. (Exceptions include spinach and chard: They hold on to their calcium so tenaciously that it's not easily absorbable.) Keep in mind that produce is not as high in calcium as dairy—a half-cup of cooked broccoli contains only 40 mg compared to 150 mg in the same amount of milk—so you'll need more of it; aim for six to nine servings a day.

As for vitamin D, only a few foods provide it—mainly oily fish like salmon, certain brands of UV-B-light-boosted

mushrooms (like Monterey), eggs, and fortified dairy or juice—and you'll need magnesium to access it. "Magnesium helps convert the vitamin D we get from food into its active form," says Rebecca Scritchfield, RD, author of *Body Kindness*. Good magnesium sources include pumpkin seeds (about 190 mg per ¼ cup), halibut (121 mg per 4 oz), and navy and soy beans (120 mg and 147 mg per cup, respectively). Lanou suggests asking your health care provider for a vitamin D blood test; if your results are lower than 50 mg/mL, you may want to discuss a supplement. One pill-free way to boost your D levels: Practice the bone-building sequence (on pages 46–47) outdoors when weather permits; exposing your bare skin (without sunscreen) to sunlight for about 10 to 15 minutes a few times a week is your body's most efficient way of producing vitamin D, according to Harvard Medical School.

A few more tips: Limit your sodium intake, which pulls calcium out of bone—the maximum daily value is 2,400 mg per day, but lower is better. Also, avoid calcium supplements. They can easily push you past the recommended 1,000 mg a day, which has been linked with increased heart attack risk. And follow a Mediterranean diet that's heavy on produce, nuts, beans, whole grains, olive oil, and fish, and light on meat and dairy. A 2016 *JAMA Internal Medicine* study found that postmenopausal women who closely adhered to this diet were less likely to experience hip fractures than those who were more lax.

That's a lot to remember, we know, but it's not as hard to hit the dietary mark as it might seem. Need some dinner inspiration? Try the delicious, bone-healthy recipe at right.

Leslie Goldman is a Chicago-based writer specializing in health, parenting, and women's issues. Model Lesley Pace is a yoga teacher in Denver who focuses on creating inclusive spaces for students.

crunchy sesame-cabbage salad with salmon

SERVES 4

This Mediterranean-inspired meal from chef Jennifer Iserloh supplies almost half your daily calcium and is a rich source of bone-supporting vitamin D (salmon) and magnesium (navy beans).

- olive-oil cooking spray
- 16 oz wild-caught salmon, sliced into 4 fillets
- 6 dried apricots, chopped
- 2 garlic cloves, minced
- 1 orange, zest and juice
- 8 cups baby kale
- 4 cups broccoli florets
- 4 cups red cabbage, thinly sliced
- 1 cup canned, unsalted navy beans, rinsed and drained
- 2 tbsp sesame oil
- 1 tbsp Dijon mustard
- ½ tsp garlic salt
- ¼ cup almonds, chopped or slivered
- 2 tsp sesame seeds

Heat oven to 400°.

Coat an 8-by-11-inch baking dish with cooking spray and place salmon in dish, skin-side down. In a bowl, combine apricots, garlic, and zest. Spoon mixture over salmon and bake until apricots brown and salmon flakes when pressed with a fork, 12–15 minutes.

In a second bowl, combine baby kale, broccoli, red cabbage, and navy beans. In a third bowl, whisk together orange juice, sesame oil, mustard, and garlic salt; pour sesame dressing over vegetables and stir until evenly coated. Divide vegetables among four plates. Remove skin from salmon and place fish over vegetables. Garnish with almonds and sesame seeds; serve immediately. ■

NUTRITIONAL INFO 517 calories per serving, 22 g fat (3 g saturated), 47 g carbs, 14 g fiber, 37 g protein, 404 mg sodium

