

# Harvard Health Letter

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## Injury Prevention Keeping Old Bones Whole

Although ice skaters and gymnasts practice falling safely so that they won't be hurt if they slip, rehearsing falls is not an option for most seniors. Instead, scientists are studying exercises that may prevent falls and developing special kinds of gear to protect older people when they do take a spill.

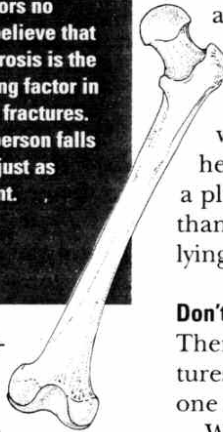
The stakes are high: among people who lived independently before a hip fracture, 15-25% are still in long-term care institutions a year after the injury.

Bone is a remarkable material: although it is one of the hardest of human tissues, it is flexible and light enough to enable people to run, jump, bend, and twist. But when osteoporosis sets in, bones may become so weak that they can barely support the body's weight. Low bone density, structural deterioration of the tissue, and increased susceptibility to fractures characterize this disease, which affects 25 million Americans, 80% of them women.

Women usually have smaller, thinner bones than men and lose mass more rapidly after menopause. Nevertheless, five million American men are affected by osteoporosis and one out of eight over age 50 will develop fractures. Factors that increase the risk for developing osteoporosis include a family history of the disease, an early hysterectomy, a diet low in calcium and vitamin D, thin build, Caucasian or Asian race, an inactive lifestyle, cigarette smoking, and having more than two alcoholic drinks a day.

People are often unaware that they have osteoporosis until their bones become so weak that a sudden bump or fall causes a hip fracture or the collapse of a vertebra. The good news is that specialized x-rays can detect osteoporosis before a break occurs,

Doctors no longer believe that osteoporosis is the overriding factor in late-life fractures. How a person falls may be just as important.



to determine the rate of bone loss, and track the effects of treatment.

In the past, physicians thought osteoporosis was the overriding factor in late-life fractures. But recent research has shown that several other predictors are equally as important. Both a person's body weight and the characteristics of the fall—the location, direction, and force exerted on the bone—influence the chance of fracture.

A high-risk incident, for example, is one in which a standing person falls sideways so that her hip lands on a hard surface. When this occurs, a plump person is less likely to be seriously injured than a thin one, possibly because soft tissue overlying the hip acts as a shock absorber.

### Don't fall prey

There are three basic approaches to preventing fractures: averting the fall, decreasing the severity when one occurs, and keeping bones strong.

Ways to avoid falls include: getting rid of throw rugs, making sure electric cords are kept away from traveled areas, avoiding high-heeled shoes, and staying away from poorly lit stairs. People whose eyeglass prescriptions are up-to-date are more likely to see household hazards. It may also be a good idea to review current medications with a physician and eliminate those that can cause hypotension, confusion, or impaired balance. If the doctor recommends a cane or a walker, by all means use one.

Another promising way to prevent falls is exercise to improve balance, flexibility, muscle strength, and reaction time. A study in the May 1996 issue of the *Journal of the American Geriatrics Society* showed that Tai Chi—an ancient Chinese martial art that employs slow, precise movements—helped improve balance and strength among seniors. Those who underwent Tai Chi training

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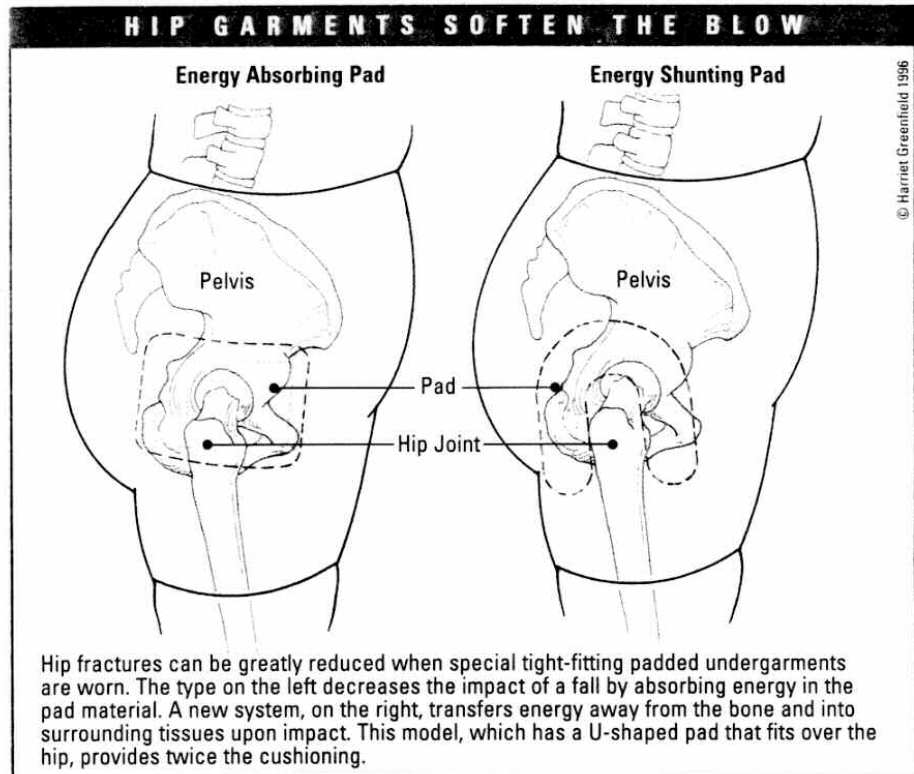
for 15 weeks reduced their risk of falling by 47.5% compared with those who didn't take classes. Another major benefit was a decreased fear of falling—a worry that often prevents older people from being as active as they'd like.

### Extra padding

At least 90% of hip fractures are associated with a fall, so the next best thing to remaining upright is to reduce a fall's severity. Here scientists have taken some tips about protective gear from sports. In 1993, Danish researchers showed that wearing hip pads provided a 53% reduction in hip fracture incidence among older people.

There are several padding systems under development; only a few are available to the general public. The pads are built into a tight-fitting undergarment that looks like a giridle or a pair of bicycle shorts. Although most reduce the impact of a fall by absorbing energy, a newer system designed at Beth Israel Hospital in Boston transfers energy away from the bone and into surrounding tissues. One recent study found that this approach reduced the amount of force absorbed by the hip by 65%, providing twice the cushioning of conventional protective garments.

The energy-shunting model is filled with a gel-like substance that comfortably conforms to the body during normal activities but stiffens rapidly on impact, deflecting force away from the hip bone. (See illustration.) Further testing is needed before it becomes available commercially.



### Back to basics

In the end, increasing or maintaining bone density is the staple of fracture prevention. Regular weight-bearing exercise increases bone mass, and proper nutrition—especially calcium and vitamin D intake—is essential for protecting bone.

For women, estrogen replacement therapy effectively prevents postmenopausal bone loss. Medications such as calcitonin and fluoride and the bisphosphonates—alendronate sodium (Fosamax) and etidronate (Didronel)—can help both women and men preserve bone.

Though the statistics are sobering—over 300,000 hip fractures, 500,000 vertebral fractures, and 200,000 wrist fractures a year—broken bones do not have to be an inevitable consequence of aging. The bottom line is that taking preventive steps can help seniors stay on their feet.

— By Elizabeth R. Myers, Ph.D. and Gabrielle I. Weiner

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