the story on calcium

Terrified about arriving at old age with hips that will snap like a twig, many women have been emptying their wallets at health-food stores or swallowing antacids formerly reserved for grandmothers with sensitive stomachs. It's true that we all need calcium. Almost 99 percent of the body's supply is in our bones—the other one percent circulates in the bloodstream playing various essential roles in the cellular activity of the heart, brain, and muscles. Those bones reach peak density in the teens and twenties; thereafter, women lose not only critical bone mass but also the ability to absorb dietary calcium. The question is how can we get enough. Even when we attempt to be diligent about getting it in the form of real food, we're faced with conflicting and confusing information from sources with various axes to grind: The dairy industry wants us all to keep drinking milk. Hard-line vegans swear that the protein in milk prevents the calcium from being properly absorbed into the bloodstream and suggest that there is more calcium in broccoli than in anything produced

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by Elsie the cow. There are some calcium-rich foods that offend no one, but, quite perversely, they may contain substances that prohibit the mineral's "bioavailability," or absorption into your blood, which is the only way it will benefit your bones. Some supplements may course right through your gastrointestinal tract and come out (how to put this delicately?) at the other end, intact and utterly useless for bone building.

Experts from many scientific corridors agree that dairy products are the best dietary source of calcium. But the vegetarians' gripes were reinforced with the release of recent information from the ongoing Harvard Nurses' Health Study on women's health. Contrary to expectations, those women who drank two or more glasses of milk daily had a modest increase of hip and arm fractures.

But the Harvard results do not show a clear cause and effect between milk and osteoporosis because of the way the study was conducted: Researchers did not control the subjects' milk drinking; they only asked about it.

An excess of protein does contribute to calcium loss, says Bess Dawson-Hughes, M.D., chief of the Calcium and Bone Metabolism Lab at Tufts University in Boston, "but insufficient protein is associated with higher bone loss. You need to stay at the recommended intake." Such mega-protein diets as Atkins or The Zone, she says, are unlikely to be "calcium-friendly."

"I like a vegetarian diet myself," says Robert P. Heaney, M.D., a member of the Osteoporosis Research Center at Creighton University in Omaha. "I'd be happy with little meat. But go back to primitive human situations, where the hunter-gatherers all had high protein intake. The skeletons of these people have been preserved, and we know that they had good bones."

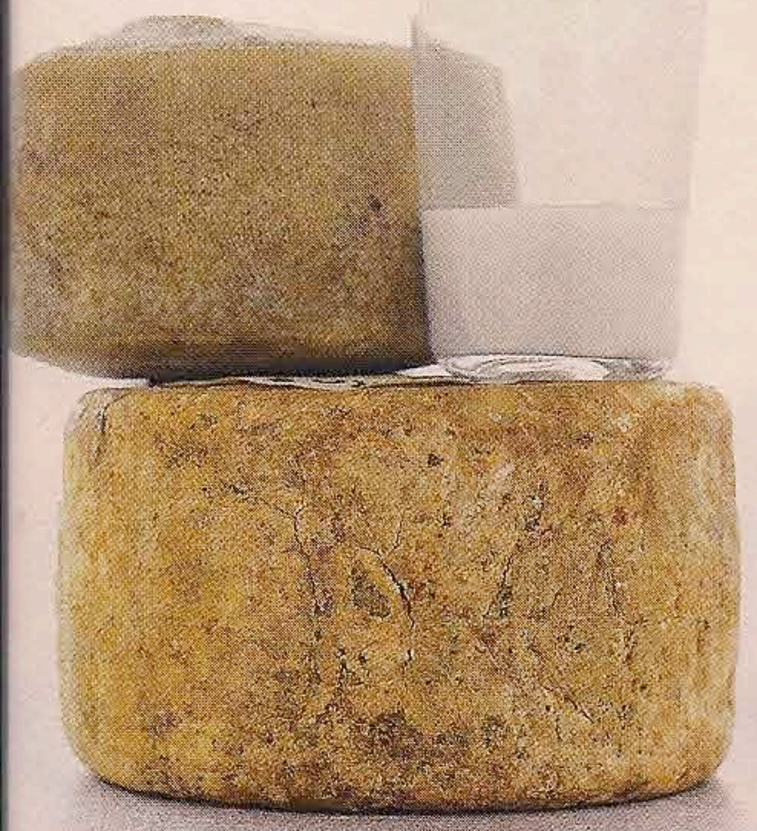
Vegetarians who depend on tofu for protein might want to inquire into its provenance. "To make tofu, you must cause it to curd," says Dr. Heaney. "You can use one of two salts: magnesium sulfate, which is the same thing as the Epsom salts that you put in a bath, or calcium sulfate, which is the stuff in plasterboard. Using the latter is like fortifying it with calcium."

Some animal-rights groups have cited China as a culture that gets little calcium from dairy but has a low incidence of debilitating bone disease. "Nobody really knows how much osteoporosis the Chinese have because there hasn't been a good public health system that keeps accurate records," says Dr. Heaney. "Hong Kong has better statistics, and when you adjust for body size, their calcium intake is actually higher than ours, possibly because they eat leafy greens. Bok choy has the highest calcium density of any food you'll find in the grocery store. **Most of what we think of as Chinese vegetables are members of the mustard family, all good sources of calcium, and the beauty part is that they're low in calories."**

Yes, but how much bok choy have you eaten today? "Kale is another green in which calcium is bioavailable," says Dr. Dawson-Hughes, "but the concentration is such that you have to eat platesful of it to make a dent." Collards, broccoli, and chard are all fairly painless ways to up the calcium in your diet, but there's one exception to the leafy green rule: When your mother suggested that eating spinach would make you grow strong like Popeye, she was talking about its iron content. Spinach is high in calcium, but it contains an organic acid called oxalate that binds to the calcium in an insoluble form. Only 5 percent of the calcium is actually absorbed.

Many other delicious things are excellent sources of calcium: Besides milk (whole or skim) and those leafy greens, there's ricotta and parmesan, frozen yogurt, dried figs, Great Northern white beans, dry-roasted soybeans, blackstrap molasses, poppy and sesame seeds, tahini, and almonds. Canned sardines are about as good a source as you can get, but you have to swallow the bones—gulp.

What you ingest with the calcium can sometimes affect your total intake. Too much sodium increases the amount of calcium lost in the urine, and too much alcohol blocks bone formation (as if you needed further reasons to give up potato chips and margaritas). Caffeine slightly decreases the absorption



how much calcium you need

CURRENT GUIDELINES ABOUT THE RECOMMENDED DAILY ALLOWANCE (RDA) FOR CALCIUM WERE ESTABLISHED BY THE NATIONAL INSTITUTES OF HEALTH AT A 1994 CONSENSUS CONFERENCE:

Birth to 6 months	400 mg a day
Infants ages 6 months to 1 year	600 mg a day
Children ages 1 to 5	800 mg a day
Children ages 6 to 10	800 to 1,200 mg a day
Adolescents and young adults ages 11 to 24	1,200 to 1,500 mg a day
Women ages 25 to 49	1,000 mg a day
Pregnant and nursing women	1,200 to 1,500 mg a day
Women ages 50 to 65 on estrogen replacement	1,000 mg a day
Women ages 50 to 65 not on estrogen replacement	1,500 mg a day
Men ages 25 to 65	1,000 mg a day
Men and women over age 65	1,500 mg a day

of calcium, a loss that can be countered by putting a few tablespoons of milk in your coffee. Or go easy on yourself, says Dr. Heaney, "and have a latte." What it all comes down to, he says, is that **"the old standards of moderation, variety, and balance still apply."**

The outer hulls of wheat fiber contain phytic acids (also present in dried peas and beans) that bind with calcium to form an insoluble complex that decreases absorption—information that could make you crazy if you're trying to eat a healthful breakfast of, say, cottage cheese and a bran muffin. But fiber has such a salutary effect in the prevention and treatment of heart disease and cancer that nobody's suggesting you cut back unless you're eating truckloads of shredded wheat. "It's a mistake to get people worked up about doing things separately," says Dr. Dawson-Hughes, who is president-elect of the National Osteoporosis Foundation. "The nutrient-by-nutrient approach is not necessary and not good." Which leads to the question:

How much is too much calcium? If you pop supplements like M&M's, you might develop kidney problems (not to mention constipation), but that's unlikely. "Two years ago the National Academy of Sciences provided safe upper limits," says Dr. Dawson-Hughes. "The maximum is 2,500 milligrams."

Calcium supplements come in an astonishing and unpronounceable range—carbonate, citrate, aspartate, lysinate, gluconate, hydroxyapatite, fumarate, succinate, and alpha keto glutarate. Pure calcium is a soft metal, unstable on its own, hence the variety of compounds. "They're all good, with a couple of caveats," says Dr. Dawson-Hughes. "How many pills are you going to take? The more absorbable forms have less calcium per pill." In other words, only 400 milligrams of a 1,000-milligram calcium carbonate bone builder is calcium—the rest is carbon dioxide and oxygen. Forty percent is high: With calcium citrate, only 21 percent is calcium—the rest is an organic acid—so you'll have to take a lot more of it, but your body absorbs more of what you swallow. Labels should state clearly the amount of elemental calcium, not just the total weight. And supplements are absorbed most efficiently when you divide your daily dose: no more than 500 milligrams of elemental calcium at one time. **The only form that is better digested with food is calcium carbonate,** which is what eggshells are made of—the other compounds needn't be taken at mealtime. You also need 10 to 15 minutes of direct sun every day for your skin to manufacture enough vitamin D to stimulate production of a substance that "escorts" calcium through the intestinal wall. In the gloom of winter in northern climates, you could get your D from a multivitamin or fortified calcium (although vitamin and mineral need not be in your stomach at the same time).

No matter how assiduously you avoid artificial ingredients in your life, natural may not be the way to go with calcium supplements: Oyster shell and dolomite (which is ground limestone, like chalk) are far more likely to be contaminated with heavy metal content. "One advantage of synthetics is that you can control the impurities," says V. Srini Srinivasan, Ph.D., director of the Dietary Supplements Division of the United States Pharmacopeia (USP). "We don't have control over Mother Nature, and manufacturers may have to spend quite a bit of money to remove impurities like lead." All pills are made with binders, otherwise they'd fall apart long before they reached your local drugstore, but some binders are almost like superglue—and are likely to pass through your system like bird shot. "If you buy the cheapest kind of calcium, you want to do a disintegration test," says Dr. Dawson-Hughes. This is the simple procedure developed by the USP to ensure that a supplement is actually getting into your system: If you drop a tablet into a glass of vinegar, it should dissolve within 30 minutes.

If all this talk of chalk, oyster shells, ground limestone, and binders makes you gag, consider the words of Dr. Heaney, who's considered one of the leading experts in the world of calcium science: "The simple answer to calcium is food. The human race would never have gotten where it is if we didn't get enough calcium from food."

In a nutshell

1 **Calcium is essential for good health, especially for women, who lose bone mass and the ability to absorb calcium as they age.**

2 Dairy products are a good source of calcium, as are leafy greens, tofu that's processed with calcium sulfate, white beans, dried figs, soybeans, poppy and sesame seeds, blackstrap molasses, almonds, and tahini.

3 **Not all sources of calcium are easily absorbed, or bioavailable. Too much protein, caffeine, and even fiber can hinder the body's absorption of calcium. While the protein in milk does affect some of the calcium's bioavailability, it's too minimal to worry about.**

4 The amount of calcium the body needs varies greatly. Check government RDAs. In general the body can absorb twice the RDA amounts.

5 **Calcium supplements differ in their bioavailability. Check labels for "elemental calcium" and look for synthetics because some natural calcium sources contain hard-to-eliminate impurities. Divide your daily dose for the most efficient absorption.**

6 Food is the best source of calcium. Moderation, variety, and balance apply with calcium as with most nutrition rules.

good sources of calcium

YOGURT, PLAIN, NONFAT	8 OZ	452 MG
MILK, DRY, NONFAT	¼ CUP	377 MG
CANNED SARDINES	3 OZ, W/ BONES	372 MG
RICOTTA, PART SKIM	½ CUP	337 MG
PARMESAN	1 OZ	336 MG
MILK, SKIM	1 CUP	302 MG
FORTIFIED SOY MILK	1 CUP	300 MG
MILK, WHOLE	1 CUP	291 MG
SOYBEANS, DRY-ROASTED	½ CUP	232 MG
COLLARD GREENS	½ CUP, COOKED	180 MG
BLACKSTRAP MOLASSES	1 TBSP	170 MG
CANNED SALMON	3 OZ, W/ BONES	167 MG
BOK CHOY	½ CUP	158 MG
FORTIFIED TOFU	½ CUP, RAW	145 MG
DRIED FIGS	5	135 MG
POPPY SEEDS	1 TBSP	127 MG
COTTAGE CHEESE, 2%	1 CUP	126 MG
TAHINI	1 OZ	120 MG
BLACK-EYED PEAS	½ CUP	106 MG
KALE	½ CUP, COOKED	90 MG
BROCCOLI	½ CUP, COOKED	89 MG
ALMONDS	1 OZ	66 MG