

Diet and cancer: What Americans eat

In recent years, research groups have issued numerous dietary guidelines for reducing the risk of cancer. They include, for example, recommendations for daily consumption of fruits and vegetables (especially cruciferous ones such as cabbage and greens), whole grains and foods high in vitamins A and C and fiber. They also recommend minimizing consumption of fat, red meats and salt-cured, nitrite-cured, smoked or pickled foods — including bacon and lunch meats. How well do these guidelines reflect what the U.S. population typically eats? Not very well, according to a new study by researchers at the National Cancer Institute in Bethesda, Md.

As part of the second National Health and Nutrition Examination Survey (NHANES II), conducted from 1976 to 1980, a statistically representative sampling of 11,658 black and white adults in the United States was asked to recall everything they ate or drank during the previous 24 hours. The study did not measure quantity, only the type of food eaten. Results, published in the March *AMERICAN JOURNAL OF PUBLIC HEALTH*, show that the typical diet “fell short” on fruits, vegetables and whole grains.

And, report Blossom H. Patterson and Gladys Block, a lack “was particularly apparent for those food groups potentially the most beneficial.” For example, only 16 percent of those surveyed ate high-fiber cereals or whole-grain breads on the day recalled, just 18 percent had at least one cruciferous vegetable and only about 20 percent consumed any fibrous vegetables. Similarly, only 28 percent ate a fruit or vegetable high in vitamin C, and 20 percent consumed one rich in vitamin A. Meanwhile, 55 percent of surveyed adults had red meat, and 49 percent of males and 37 percent of females ate at least one serving of a breakfast meat or lunch meat.

The researchers also identified some demographic trends. For instance, consumption of produce, high-fiber cereals and red meat increased with income; Southerners ate the least high-fiber cereals and red meat; and young white males were least likely to eat foods rich in vitamins A or C.

The results, according to the researchers, can be used to target and tailor educational campaigns. After all, they say, touting the virtues of foods people don't like is not likely to change eating habits dramatically.

Need calcium? Try tofu and tortillas . . .

With an eye toward preventing or postponing osteoporosis — calcium loss that can embrittle bones — many people have been trying to increase the level of calcium in their diet. While drinking plenty of skim milk would seem to be an obvious solution, many don't like its taste or can't digest the lactose most dairy products contain. Many who could eat cheese are reluctant to make it their primary calcium source because of the calories, cholesterol and fat it contains. But two alternatives that might warrant consideration include tofu and lime-treated corn tortillas, according to new animal research at the University of Illinois in Urbana-Champaign.

The tortilla's main calcium source is the lime — $\text{Ca}(\text{OH})_2$ — an alkaline compound added to soften the corn as it's boiled. Not only is the tortilla's calcium “highly bioavailable” — about equivalent to that in milk — but the lime treatment enhances protein quality, according to Angela Poneros/Schneider and John Erdman. Their measurements, made from the ashed leg bones of rats sacrificed after 27 days of feeding, show that tortillas can provide up to almost 300 milligrams of calcium per 100 grams (3.5 ounces). The adult recommended daily allowance (RDA) of calcium for humans is 800 mg.

More unexpected, the authors write in the January/February *JOURNAL OF FOOD SCIENCE*, is a finding that the calcium in the soybean-based tofu they studied was 12.6 percent more

bioavailable than that in nonfat milk. It had generally been assumed, they note, that milk products provide a more bioavailable source of this important mineral than do plant products. However, all tofu is not alike. The type the Illinois scientists studied, which uses calcium sulfate (CaSO_4) to coagulate soybean “milk” during processing, provides roughly 128 mg of the mineral per 100 grams. Tofu made with magnesium chloride instead of CaSO_4 offers only about a tenth as much calcium.

Finally, their study appears to solve a nagging question: whether vitamin C enhances the availability of calcium in the body. In experiments involving nonfat dry milk, mozzarella cheese, tortillas and tofu, the Illinois researchers found no increased calcium bioavailability from adding vitamin C.

. . . or a spoonful of sugar

A sweeter solution to the calcium problem may be to eat 10 grams of glucose — a simple sugar — along with the calcium source of your choice. In human studies using radioactively tagged calcium, Richard J. Wood at the Agriculture Department's Human Nutrition Research Center on Aging in Boston showed that this sugar — whether pure or in polymer supplements available at drug stores — can increase the bioavailability of at least one form of the mineral (calcium chloride) by nearly 25 percent. Wood believes this may prove particularly useful for the elderly, who have trouble absorbing calcium efficiently. And if you're not afraid of the extra calories, his data indicate that consuming 40 grams of glucose (160 calories) can increase calcium bioavailability by almost 50 percent.

. . . but maybe you should watch the tea

Many studies have shown that drinking tea can inhibit absorption of important dietary minerals such as iron. Now researchers at the University of Wisconsin in Madison have begun identifying chemical clues to what might be happening, as well as possible ways to temper tea's adverse effects on nutrition.

They focused on the solubility of iron and calcium in brews of black, green, oolong and instant (black) teas. The reason, explains Lauren Jackson, one of the researchers, is because “in general, any mineral is going to be more bioavailable if it's soluble.” The data she and colleague Ken Lee report in the January/February *JOURNAL OF FOOD SCIENCE* show that iron was totally soluble in instant tea, but only 85 percent soluble in green and oolong, and just 69 percent soluble in regular black tea. Tea's effects on calcium were even more pronounced. Calcium was most soluble — 88 percent — in oolong, 66 percent soluble in black, 46 percent soluble in green and only 35 percent soluble in instant teas.

In an effort to identify what might be happening, the pair added either the enzyme tannase or lemon juice to each of the brews. Tannase, which had an effect on only black tea, increased iron solubility 17 percent and calcium solubility 11 percent. This suggests, Jackson says, that one reason for the minerals' initial insolubility was their binding to some of the large polyphenolic molecules that tannase eventually broke down. Lemon juice increased calcium's solubility even more in two of the teas — 24 percent in black and 15 percent in green tea. It also increased iron's solubility 7 percent in black tea. The researchers speculate that one or more of the juice's organic acids are responsible.

Jackson and Lee believe their findings suggest the prospect of reducing some teas' detrimental effects on mineral bioavailability, perhaps with something like a tannase pretreatment. And for the calcium-conscious tea drinker, a wedge of lemon perhaps?