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THE REAL
POWER OF

Vitamins

New research shows
they may help fight

CANCER,
HEART DISEASE
and the ravages
of **AGING**

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COVER STORY

The New Scoop On Vitamins

They may be much more important than doctors thought in warding off cancer, heart disease and the ravages of aging—and, no, you may not be getting enough of these crucial nutrients in your diet

By ANASTASIA TOUFEXIS

It's raining. Flooding, to be precise. But business is as brisk as ever at Mrs. Gooch's natural-foods market in West Los Angeles. As usual, traffic is backed up along Palms Boulevard as drivers wait for a spot in the store's parking lot. Inside, crowds jam the supplement section, which gleams with row upon row of small, white-capped vials. Here the true believers in the gospel of vitamins linger over labels, comparing brand names and dosages, trading health sermons and nutritional arcana. They discuss the relative merits of Buffered C and Lysine, as opposed to Bio-C Plus Rose Hips, or perhaps Bio-Absorbate Vitamin C Complex capsules. There are no fewer than 10 types and dosages of vitamin C to choose from, not to mention eight of vitamin E.

Maryanne Latimer is among the faithful. A middle-age massage therapist, she has been plagued by chronic fatigue syndrome and has therefore expanded her usual menu of vitamins and minerals. She shops at Mrs. Gooch's about once a week, in addition to other vitamin shops. "I take tons of vitamin C and E," she admits, plus calcium and a daily vitamin-mineral complex. Recently she added to her regimen three tablets a day of pantothenic acid (a lesser-known vitamin) "to help me wake up." Basically, says Latimer, "I'm looking for anything to make me feel better."

But for every true believer in the power of vitamins—and the U.S. has more devotees than any other country—there is an agnostic, a skeptic who insists that vitamins are the opiate of the people. Among

the doubters are many doctors. They have been persuaded by decades of public-health pronouncements, endorsed by the U.S. National Academy of Sciences and the National Institutes of Health, that claim people can get every nutrient they need from the food they eat. Popping vitamins "doesn't do you any good," sniffs Dr. Victor Herbert, a professor of medicine at New York City's Mount Sinai medical school. "We get all the vitamins we need in our diets. Taking supplements just gives you expensive urine."

Wavering in confusion between these two schools of thought are the vast majority of Americans, wondering whom to believe. They have heard the gospel of vitamin C as preached by the great chemist Linus Pauling, but they have also heard him ridiculed by health authorities. They may feed their children chewable vitamin tablets, but they question whether the pills are worth the high price. "I'd be thrilled to know what's right and to have someone tell me what to do," says Jane Traulsen, a mother of two who lives in White Plains, N.Y. "But all the information is so contradictory. It's like trying to make your way through a fog."

But now, thanks to new research, the haze is beginning to lift. And it unveils a surprise: more and more scientists are starting to suspect that traditional medical views of vitamins and minerals have been too limited. While researchers may not endorse the expansive claims of hard-core vitamin enthusiasts, evidence suggests that the nutrients play a much more complex role in assuring vitality and optimal health than was previously thought. Vita-

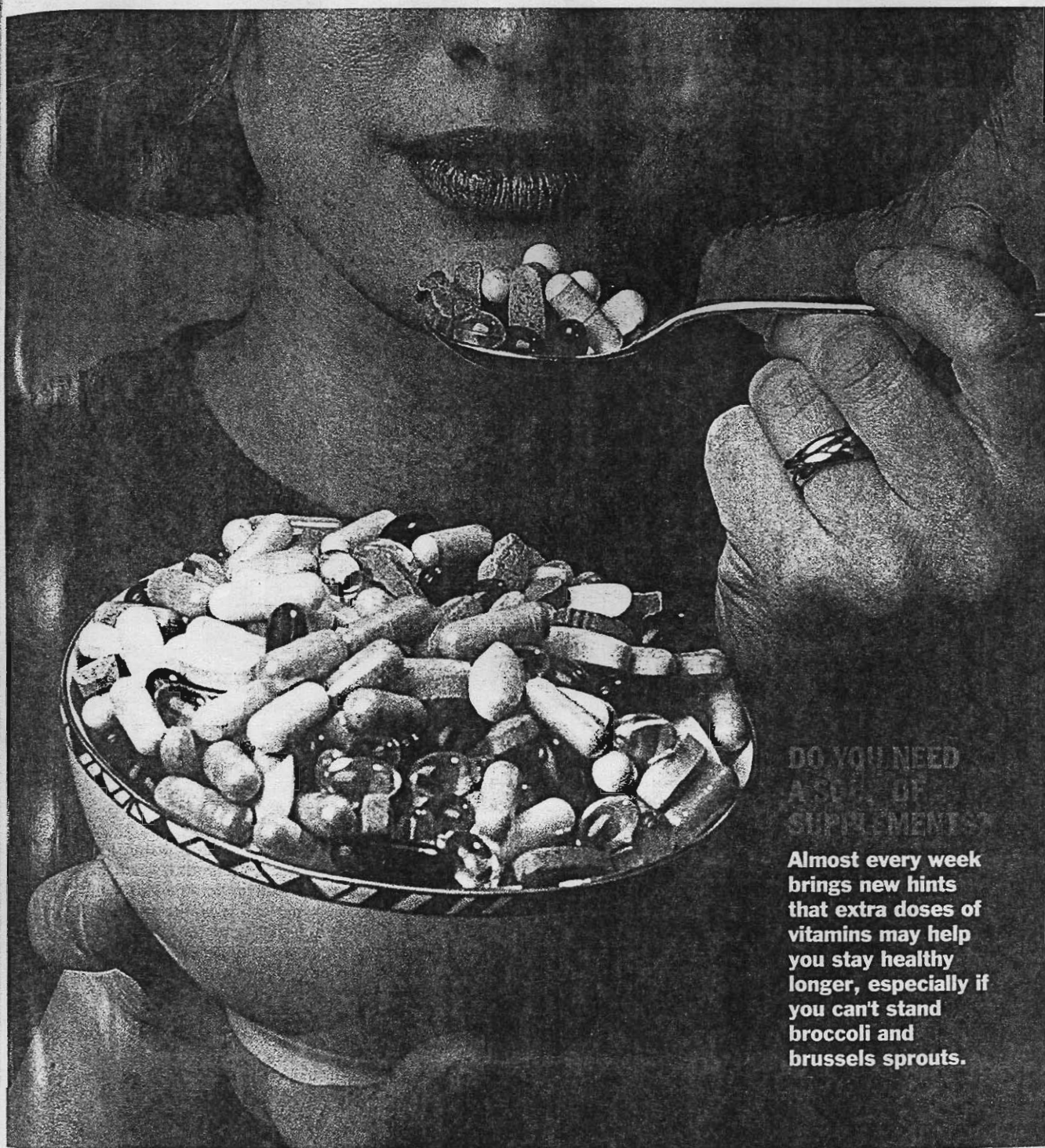
mins—often in doses much higher than those usually recommended—may protect against a host of ills ranging from birth defects and cataracts to heart disease and cancer. Even more provocative are glimmerings that vitamins can stave off the normal ravages of aging.

"The field is currently undergoing a paradigm shift," says Catherine Woteki, director of the food and nutrition board at the Institute of Medicine of the National Academy of Sciences. "We are now entering the second wave of vitamin research," explains Jeffrey Blumberg, associate director of the Human Nutrition Research Center on Aging at Tufts University. "The first wave was the discovery of vitamins and their role in combatting nutritional deficiencies such as rickets and beriberi. That occurred in the first half of the century. Now we're on the second wave. You don't need to take vitamin C to prevent scurvy in this country today. But you could need it for optimal health and the prevention of some chronic disease."

Scientists have so far identified 13 organic substances that are commonly labeled vitamins. In the human body, they play a vital role in helping regulate the chemical reactions that protect cells and convert food into energy and living tissue. Some vitamins are produced within the body. Vitamin D, for example, is manufactured in the skin during exposure to sunlight, and three other vitamins (K, biotin and pantothenic acid) are made inside the human gut by resident bacteria. But most vitamins must be ingested.

Mystique and faddish lore have long surrounded these essential biochemical

compounds. "Somebody claim you can't live without vitamins," points out the experimenter. Food and vitamins have been given a bad rap in the certain mon cold, the Vitamin E four decades to enhance studies in



DO YOU NEED
A SPOON OF
SUPPLEMENT?

**Almost every week
brings new hints
that extra doses of
vitamins may help
you stay healthy
longer, especially if
you can't stand
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compounds. Consider vitamins C and E. "Somebody has made practically every claim you could dream of about these vitamins," points out John Hathcock, chief of the experimental-nutrition branch of the Food and Drug Administration. People have been gobbling vitamin C for 20 years in the certainty that it can cure the common cold, though evidence is still lacking. Vitamin E has been wildly popular for four decades because of its putative power to enhance sexual performance. In fact, studies indicate only that it is neces-

sary for normal fertility in lab animals. More recently, B₆ has won favor as a relief for premenstrual syndrome. Vitamin A is touted as a rejuvenator by people who mistakenly believe that it, like its synthetic relative Retin-A, can give wrinkled, mottled skin that youthful rosy glow. "We never know what next year's fad is going to be," says Hathcock. It is just this whiff of quackery that made vitamins a research backwater for years. Most reputable scientists steered clear, viewing the field as fringe medicine

awash with kooks and fanatics. A researcher who showed interest in respect and funding. Certain-ly lost much of his back in 1980 when he began from a compar-ting subs-ies, since a tamin chert domain and But attitud

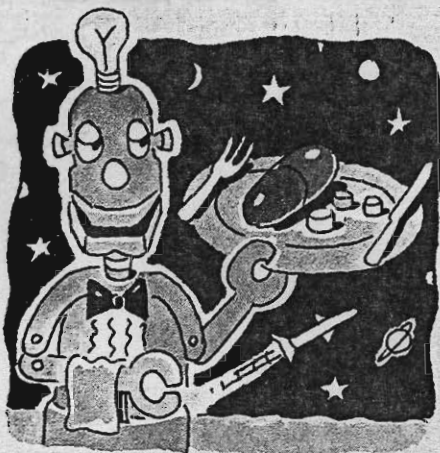
Health

CAN YOU SURVIVE BY PILLS ALONE?

Call it the Jetson diet: a futuristic feast of prefab pellets containing all the nourishment any 21st century citizen would want. It makes for a nice cartoon fantasy, but could people really eat this way? Not a chance. Real food is here to stay.

Multiple-vitamin pills do not contain the fiber, carbohydrates and proteins necessary for maintaining the body and giving it energy. Such nutrients can be put into pills, but they would have to be taken in such large quantities that they would be an impractical—not to mention tasteless—substitute for real food.

Food also contains a myriad of obscure nutrients, such as phenols, flavones and lutein, that scientists cannot yet fully understand, much less put into a safe, effective pill form. And many vital nutrients have undoubtedly not been identified at all. But even if a full-service nutrient pill were formulated, it probably could not satisfy some basic human desires: hunger and the joy of savoring good food.



the past few decades. Despite all the sneering, Pauling's speculations did get more scientists thinking about vitamins' impressive powers. As a class of compounds, they are known to produce hugely dramatic effects when missing from the diet: scurvy, pernicious anemia, rickets. What other exciting properties might they—or related compounds—have?

Another driving force in the U.S. is the new "demographic imperative." With a rapidly aging population, America has moved its medical focus from treating acute illness to caring for chronic maladies like heart disease and cancer—a shift that has sent health-care costs skyward. "There's a growing appreciation of the need to find the most economical way to treat and prevent chronic disease," notes Dr. Charles Butterworth Jr. of the Uni-

versity of Alabama. "Food and vitamins are not that expensive." Calculates Tufts' Blumberg: "We could save billions of dollars if we could delay the onset of chronic diseases by as little as 10 years."

Overriding all else, however, is the impact of scientific studies. Beginning in the 1970s, population surveys worldwide started to uncover a consistent link between diet and health. A diet rich in fruits and vegetables, for instance, became associated with a lowered incidence of cancer and heart disease. Researchers then turned to examining the data nutrient by nutrient, looking at minerals as well as vitamins, to see which are tied most closely with specific ailments. Low vitamin C intake appears to be associated with a higher risk of cancer, low levels of folic acid with a greater chance of birth defects,

and high calcium consumption with a decreased danger of osteoporosis.

Intrigued by such clues, the National Institutes of Health, universities and other research organizations began funding laboratory and clinical investigations. By the late '80s, research exploring vitamins' potential in protecting against disease was on its way to respectability. Though the evidence is still preliminary, scientists are excited about several nutrients.

One vitamin attracting attention is folic acid, also known as folate, which was first isolated from spinach. This B vitamin appears to guard against two of the most common and devastating neurological defects afflicting newborns in the U.S.: spina bifida, in which there is incomplete closure of the spine, and

anencephaly, in which the brain fails to develop fully. British researchers found that when women who had already given birth to a malformed child received folic acid supplements during a subsequent pregnancy, the chances of a second tragic birth fell sharply.

Another enticing finding reported last January established a link between folic acid and prevention of cervical cancer. According to a study at the University of Alabama's medical school, women who have been exposed to a virus that causes this cancer are five times as likely to develop precancerous lesions if they have low blood levels of folic acid. The discovery may help explain why cervical cancer is more common among the poor. Indigent women usually eat few vegetables and fruits, which are prime sources of folate.

Says Butterworth, head of the research team: "It looks like many cases of cervical dysplasia [a precancerous condition] could be prevented with a healthy diet."

Vitamin K, long known to promote blood clotting, appears to help bones retain calcium. Rapid calcium loss is a major plague among postmenopausal women, giving rise to the fragile-bones syndrome called osteoporosis. A recent Dutch study of 1,500 women ages 45 to 80 found that calcium loss (as measured in urine samples) could be halved with daily supplements of vitamin K.

Most of the excitement, however, is being generated by a group of vitamins—C, E and beta carotene, the chemical parent of vitamin A—that are known as

ARE PILLS AS GOOD A SOURCE AS FOOD?

A pill cannot deliver the same range of nutrients as food, but what if you want a megadose of a particular vitamin? Will a supplement do the trick, or would it be better to eat bushels of broccoli? In theory, pills can provide dependable doses of genuine vitamins and minerals. "Vitamin C is a molecule, whether nature synthesizes it or man does," observes Gladys Block, a nutrition professor at the University of California, Berkeley.

But that assumes the pill is properly made—which is not always true. In 1989, for instance, a study found that more than half of calcium carbonate supplements on the U.S. market could not be easily digested. Pills with thick coatings are suspect, while gel caps present the fewest problems. If well made, however, a pill is no worse than a vegetable at delivering selected nutrients to the body, and may work better for those who refuse to eat their greens.



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Where found

Established benefit


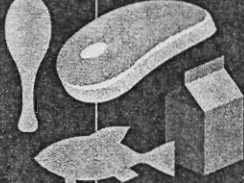
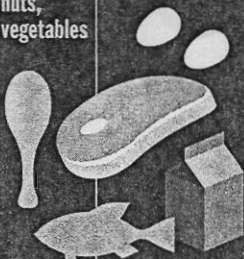
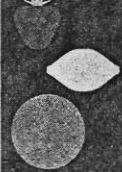





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THE VITAMIN ALPHABET

	A/BETA CAROTENE	B₆	B₁₂	C	D	E	FOLIC ACID	K	NIACIN
Where found	A: liver, egg yolks, whole milk, butter BETA CAROTENE*: dark green leafy vegetables, yellow and orange vegetables and fruits 	Meats, poultry, fish, fruits, nuts, vegetables 	Meats, milk products, eggs, liver, fish 	Citrus fruit, green peppers, strawberries, raw cabbage, green leafy vegetables 	Liver, butter, fatty fish, egg yolks, fortified milk. Also produced when skin is exposed to sunlight 	Nuts, seeds, whole grains, vegetable and fish-liver oils 	Green leafy vegetables, liver 	Leafy vegetables, corn and soybean oils, liver, cereals, dairy products, meats, fruits 	Grains, meats, nuts 
Established benefit	Prevents night blindness and xerophthalmia (a common cause of blindness among children in poor countries)	Helps prevent anemia, skin lesions, nerve damage	Helps prevent pernicious anemia	Prevents scurvy, loose teeth, fights hemorrhage	Prevents rickets (bone malformation)	Helps prevent retrolental fibroplasia (an eye disorder in premature infants), anemia	Helps protect against cervical dysplasia (precancerous changes in cells of the uterine cervix)	Helps prevent hemorrhage	Prevents pellagra
Possible benefit	May reduce the risk of breast, lung, colon, prostate and cervical cancer; heart disease and stroke; may retard macular degeneration (a common cause of blindness among the elderly)	May protect against neural-tube defects in fetuses	May protect against heart disease and nerve damage. Possibly prevents neural-tube defects in fetuses during the first six weeks of pregnancy	May help reduce the risk of cancer and heart disease; retards macular degeneration in the eyes of the elderly	May help prevent osteoporosis and kidney disease	May reduce risk of angina and heart attack; may slow macular degeneration; may prevent spinal-cord damage in patients with cystic fibrosis	May help protect against heart disease, nerve damage, neural-tube defects	Possible role in cancer prevention	Possible cancer inhibitor

antioxidants. These nutrients appear to be able to defuse the volatile toxic molecules, known as oxygen-free radicals, that are a byproduct of normal metabolism in cells. These molecules are also created in the body by exposure to sunlight, X rays, ozone, tobacco smoke, car exhaust and other environmental pollutants.

Free radicals are cellular renegades; they wreak havoc by damaging DNA, altering biochemical compounds, corroding cell membranes and killing cells outright. Such molecular mayhem, scientists increasingly believe, plays a major role in the development of ailments like cancer, heart or lung disease and cataracts. Many researchers are convinced that the cumulative effects of free radicals also underlie the gradual deterioration that is the hallmark of aging in all individuals, healthy as well as sick. Antioxidants, studies suggest, might help stem the damage by neutralizing free radicals. In effect they perform as cellular sheriffs, collaring the radicals and hauling them away.

Supporters of this theory speculate that antioxidants may one day revolutionize health care. Biochemist William Pryor,

director of the Biodynamics Institute at Louisiana State University, foresees screening people through a simple urine, blood or breath test to assess how much damage free radicals have done to tissue, much as patients today are screened for high cholesterol. "If you can predict who is most susceptible to oxidative stress," notes Pryor, "you can treat them with antioxidants more effectively." Ultimately, says biochemist Bruce Ames at the University of California, Berkeley, "we're going to be able to get people to live a lot longer than anyone thinks."

In that brave new world, people might pop vitamins C and E to deter the development of cataracts, the clouding of the lens in the eye that afflicts 20% of Americans over 65. Patients taking high doses of both vitamins appear to reduce the risk of cataracts by at least 50%, according to a Canadian study. Vitamin C may be especially efficient because it concentrates in the eye. Scientists at the National Eye Institute estimate that if cataract development could be delayed by 10 years, about half of cataract surgery could be eliminated.

Vitamin E may be particularly helpful in preventing free radicals from injuring the heart. Doctors speculate that giving the vitamin to patients during or shortly after a heart attack might help preserve heart muscle. One clue from a study at Toronto General Hospital: rabbits injected with vitamin E within two hours of a heart attack showed 78% less damage to heart tissue than was expected. The vitamin appears to speed recovery in patients who have had coronary-bypass operations, suggesting that nutrient supplements may one day become part of standard pre-op procedure.

Chugging vitamin E seems to boost the immune system in healthy old people, raising the possibility that supplements could help thwart life-threatening infections. The nutrient may also turn out to be a potent lung saver, warding off the depredations of cigarette smoke, car exhaust and other pollutants. "The effects of air pollution are chronic," says Dr. Daniel Menzel of the University of California at Irvine. "Over a lifetime people develop serious diseases like bronchitis and emphysema. We have fed animals in our labs

DO OLDER PEOPLE HAVE DIFFERENT VITAMIN NEEDS?

Don't assume Grandma and Grandpa can get by on fewer nutrients just because they are not as active as they once were. That widely held belief is being challenged by new research suggesting that the elderly need even more of some vitamins than the young. A Tufts University study indicated that people over 60 may need about a third more vitamin B₆ than young adults do to maintain good nutrition. Vitamin D consumption apparently should increase with age as well.

The elderly may not be able to process and synthesize vital nutrients as efficiently as younger people. Moreover, medications commonly prescribed for seniors, such as anti-inflammatory agents or diuretics, can hinder vitamin absorption. And because powers of taste diminish with age, old folks sometimes have flagging appetites and thus are in danger of not getting enough vitamins from their diets.



vitamin E and have found that they have fewer lung lesions and that they live longer." Menzel suggests that priming children with doses of antioxidants could protect them against lung disease as adults, much the way fluoridated water protects them against tooth decay.

For patients found to have Parkinson's disease, vitamin E may hold special promise. The nutrient seems to delay the appearance of tremors, rigidity and loss of balance, thus postponing the need for therapy with dopamine. The vitamin also appears to alleviate some of the unpleasant side effects of antipsychotic drugs, such as twitchy hands, face and feet.

Holding center stage in antioxidant circles, however, is beta carotene, a complex deep orange compound that is naturally abundant in sweet potatoes, carrots and cantaloupes. Beta carotene is turned into vitamin A by the body as needed. That makes it impossible to overdose on beta carotene, even though taking too

much vitamin A can lead to liver damage and other effects.

Doctors at Harvard Medical School, who have been following 22,000 male physicians as part of a 10-year health study, have made a stunning discovery about beta carotene. They found that men with a history of cardiac disease who were given beta carotene supplements of 50 mg every other day suffered half as many heart attacks, strokes and deaths as those popping placebo pills. No heart attacks occurred among those in this group who received aspirin along with the beta carotene capsules. The Harvard researchers have begun a trial in 45,000 postmenopausal women to see if a similar effect occurs in women. Scientists speculate that the antioxidant helps prevent those nasty oxygen-free radicals from transforming LDL, the bad form of cholesterol, into an even more menacing artery clogger.

Beta carotene may prove powerful in combatting cancer as well. In countries

such as Japan and Norway, where diets are rich in beta carotene, the populations have a low incidence of lung, colon, prostate, cervical and breast cancer. And a study at the University of Arizona Cancer Center found that three to six months of daily beta carotene pills dramatically reduced precancerous mouth lesions in 70% of patients. Pharmaceutical giant Hoffmann-La Roche is so enamored with beta carotene that it plans to open a Freeport, Texas, plant next year that will churn out 350 tons of the nutrient annually, or enough to supply a daily 6 mg capsule to virtually every American adult.

As vitamin research surges, confusion swirls around two basic questions: How much of these nutrients is needed, and what's the best way to get them—in food or in supplements? For half a century, Americans' vitamin intake has been guided by the Recommended Daily Allowances, or RDAs. Introduced during World War II as a way to ensure that military recruits did not suffer from

malnutrition, the levels quickly became a standard for the general population. Technically the National Academy of Sciences sets different RDAs for people of different ages and sexes, but to simplify matters, the FDA has since 1968 taken the highest RDAs—those appropriate for teenage boys—and endorsed them as the national standard. These are the numbers that appear on cereal boxes.

Two years ago, the FDA announced plans to change this policy. Instead of endorsing an allotment appropriate to ravenous, fast-growing teenage males, it would simply average the

DOES IT MATTER WHICH BRAND YOU BUY?

Buying vitamins can be a befuddling experience. Even if you can figure out the best formulation (with zinc or without?), quantity and dose, you probably don't know what to make of other scientific-sounding claims like "proven release" or "high absorbency." Pricing too can seem as arbitrary as the color of the pill.

Most advertising claims are just hype, but studies conducted in the U.S. several years ago showed significant brand differences in such characteristics as how fast a pill will dissolve in the body. Unfortunately, those surveys are out of date. "For now, we have to buy our vitamins on faith," concedes Dr. Ralph Shangraw, a leading expert on food supplements at the University of Maryland. While U.S. officials intend to set up stricter standards for vitamins next year, few other countries have similar controls. Shoppers would do well to stick to brands sold by reputable stores and keep in mind that the highest priced pill is not necessarily the best.



CAN YOU OVERDOSE?

Too much of a good thing can have unexpected consequences. Just ask people who have gulped gallons of carrot juice, which is rich in beta carotene, only to find that the palms of their hands and the soles of their feet turned a dull yellow orange.

The carrot-juice syndrome is generally thought to be harmless and reversible, but overdosing on some other vitamins and minerals can have serious side effects:

Vitamin A: Gorging on this compound in doses of more than 25,000 IUs (five times the RDA) can lead to liver damage, hair loss, blurred vision and headaches.

Vitamin B₆: Ingesting more than 400 mg a day (200 times the RDA) can cause numbness in the mouth and hands and difficulty in walking.

Vitamin C: It was once believed to cause kidney stones, but experts now say there is no solid evidence of dangerous side



effects from vitamin C. High doses can produce stomachaches and diarrhea.

Vitamin D: In daily doses of 50,000 IUs (125 times the U.S. RDA), the sunshine vitamin can cause the buildup of calcium deposits that can interfere with the functioning of muscles, including heart tissue. While sunbathing will never create an overdose, taking too many supplements can.

Niacin: Doctors prescribe doses of 2,000 mg (100 times the RDA) to help lower cholesterol. But patients who take that much should be monitored for possible symptoms of jaundice and liver damage.

Iron: Those who want to bolster their red-blood-cell count, especially elderly people and menstruating women, have been taking iron supplements for years. Daily doses higher than 100 mg (six times the RDA) could interfere with absorption of zinc, a mineral that speeds wound healing and helps regulate the immune system.

RDAs for different age groups. The new figures are considerably lower and, says the agency, are a better barometer of the typical American's nutritional needs. Essentially they reflect the requirements of adult women. The agency has proposed slashing the RDAs for many vitamins, including A, B, C and E, as well as nutrients such as iron, by 10% to 80%. The RDA would also acquire a new name: the Reference Daily Intake, or RDI. (On food labels the RDI would be listed as the Daily Value, or DV.) "By using the old RDAs, you're trying to make the entire population consume more nutrients than it needs," explains John Vanderveen, director of the FDA's nutrition division. "Young males need more nutrients than women, children and the elderly."

But the move to slash RDAs, scheduled to go into effect next year, flies in the face of research that suggests benefits from higher doses of vitamins. The current RDA for vitamin C, for example, is 60 mg. But to get a protective effect against cataracts or cancer may require as much as 100 mg. Similarly, vitamin E may need a boost from the RDA of 10 mg to 100 mg. (There is no RDA for beta carotene, but scientists speculate that 25 mg or more a day could be needed.)

Already many people consider the old RDAs, with their focus on preventing scurvy and other rare deficiency problems, to be irrelevant to real health needs. "Our clientele generally thinks of the RDA as a kind of joke," says Sandy Gooch, owner of the chain of seven Mrs. Gooch's markets in Southern California. What's actually needed, vitamin advocates suggest, is guidelines for optimal consumption. That amount may very well depend upon age, sex and life-style habits.

Do people have to take supplements

to get enough vitamins? Nutritionists and doctors agree that everyone's basic needs could be met by eating a diet rich in vegetables and fruits. The U.S. government's 1990 dietary guidelines urge an ambitiously varied meal plan: three to five servings daily of vegetables, two to four of fruit, as well as six to 11 of breads, rice, pasta and grains and two to three of meat, eggs, poultry and dried beans.

As far as America is concerned, most people don't even come close. A mere 9% of adults manage to consume five servings of fruits and vegetables each day, according to the National Center for Health Statistics. By and large, Americans simply don't like vegetables. The most prominent example: President Bush, who once admitted he detested broccoli, now has taken to deriding carrots as "orange broccoli."

Nonetheless, failing to match daily dietary guidelines is no reason to go running for the vitamin bottle. "What you do one day or one week isn't the whole story," stresses Jeanne Goldberg, assistant professor of nutrition at Tufts. "It's what your general eating patterns are." Blitzing on junk food for a day or two is no problem if over the long haul a diet regularly contains fruits and veggies. If it does not, popping pills is a good insurance policy, especially important for those who reject greens outright. Supplements are also useful to people with special conditions, including shut-ins, alcoholics and those on very restrictive diets, who tend to be poorly nourished.

Virtually all experts agree that a daily multivitamin won't hurt anybody. Opinion is divided, however, about whether people should be taking high

doses of vitamins to prevent chronic disease or delay aging. Some argue that enough evidence is in to justify taking moderately high amounts of antioxidants. Several researchers admit they are already doing so.

Others believe it is too soon to be making recommendations to the public. The long-term effects of high-dose supplements are still unknown, and doctors warn of dangers even in the short term. Too much vitamin D, for example, can cause damaging calcium deposits in muscle tissue, including the heart.

Last February the FDA rejected as premature applications by vitamin makers to promote folic acid as a means of preventing neural-tube birth defects, antioxidants as a hedge against cancer, and zinc as a booster of aging immune systems. Both federal and state regulatory agencies have been cracking down on nutrient health claims. The FDA says it will hold label claims to standards similar to those applied to drugs. Advises Dr. Walter Willett of the Harvard School of Public Health: "At this time I say don't take megadoses, but I'm not ruling out that in two or three years we might change our mind."

The wisest strategy right now may be to redouble those efforts to eat more broccoli and carrots, spinach and squash. And to follow the familiar exhortations: get up and get moving, cut down fat and cut out smoking. No matter how powerful antioxidants and the other nutrients turn out to be, they will never be a substitute for salutary habits. But stay tuned. Vitamins promise to continue to unfold as one of the great and hopeful health stories of our day. —Reported by Janice M. Horowitz/New York, Elaine Lafferty/Los Angeles and Dick Thompson/Washington