AARP
ANDRUS
FOUNDATION

Is there an "anti-aging" medicine ?

ILC

INTERNATIONAL
LONGEVITY
CENTER-USA

Is there an "anti-aging" medicine? is a collaborative effort of the AARP Andrus Foundation and the International Longevity Center-USA. It is based upon the following International Longevity Center workshop reports:

Prescription for Longevity: Fads and Reality

Maintaining Healthy Lifestyles: A Lifetime of Choices

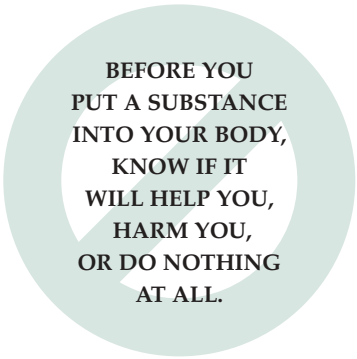
Is There An "Anti-aging" Medicine?

These reports, and the consensus workshops upon which they are based, were made possible through the generous support of Canyon Ranch Health Resorts. Other workshop sponsors include the Kronos Longevity Research Institute and the International Life Sciences Institute.

What is "anti-aging" medicine?

Throughout the ages, people have searched for magical potions to reverse the aging process. Alchemists in the Middle Ages spent much of their time trying to change the "lead" of the human body into the "gold of immortality." Ponce de León was searching for the Fountain of Youth when he discovered Florida. And the 19th century was rife with anti-aging potions. In 1889, for instance, a highly respected French scientist named Charles Edouard Brown-Séquard claimed that drinking an extract of crushed dog testicle could restore youth and vigor to old men. (*For more extraordinary anti-aging elixirs, see page 15.*) The point is, over the centuries people have spent fortunes on treatments that promise to control, reverse, or even eliminate the aging process– for a price!

False claims and bogus remedies for treating old age as if it were a disease continue to bombard us today. Anti-aging medicine is a multibillion dollar business that claims to have the "cure" for growing old. This industry markets and sells everything from live cell injections and magnetic contraptions to herbal concoctions, hormonal therapies, vitamin supplements, and fad diets.



We've all seen these products sold in supermarkets, health food stores, and over the Internet; they are advertised on television, radio, and in direct-mail brochures. Anti-aging remedies range from traditionally recognized nutrients, such as vitamins or minerals, to substances that have no scientifically recognized role in nutrition, such as high-potency free amino acids, herbal remedies, enzymes, animal extracts, and bioflavanoids. They are sold as tablets, capsules, tinctures, poultices, teas, and lotions.

There is so much we don't know about so-called anti-aging medicine, but there is one thing we do know for sure. As we grow older, we have special reasons to think twice before putting these substances in our bodies. For starters, we are often more sensitive to drugs than when we were younger. A younger adult metabolizes and eliminates a drug faster than we do. The dose we take needs to be adjusted to account for the time it takes to metabolize and eliminate a particular substance. *And these substances are not tested by the FDA.*

FDA approval

As one of the nation's oldest public health agencies, the Food and Drug Administration (FDA) is charged with protecting the American consumer. FDA approval is considered the litmus test for safety for almost everything we ingest.

But anti-aging remedies are not well tested– if they are tested at all. In 1994, the Dietary Supplement Health and Education Act designated that these substances were "dietary supplements" and not under the jurisdiction of the Food and Drug Administration. As a result, the FDA does not test vitamins, minerals, herbal remedies, or weight-control substances to ensure they are safe before being sold in the marketplace.

The manufacturers themselves are the only ones responsible for ensuring the safety and effectiveness of their products. They are not required to register with the FDA or get FDA approval before producing or selling their "medicines." Nor does the FDA exercise control over the product label to make sure the information is truthful and is not misleading.

Once a remedy reaches the market, the FDA has the authority to take action if it can prove that the product is unsafe or that the claims are false and misleading. And it often does act in response to complaints.

The Federal Trade Commission (FTC), General Accounting Office (GAO), as well as the U.S. Senate Special Committee on Aging are also beginning to address this issue.

But it is up to us to be well-informed consumers.

Life span is the genetically determined absolute life of a specific animal species under the best of environmental circumstances.

Life expectancy, on the other hand, is the average number of years that a human population of a given age and sex can expect to live under current conditions. Life expectancy increased during the first half of the 20th century because of better sanitation and the widespread use of vaccines. In the 1940s, antibiotics further helped people to live longer. Since the 1970s and 1980s, improvements in longevity have arisen primarily from advances in the medical treatment of people with hypertension, cardiovascular diseases, and stroke. However, while there is no evidence that these developments have actually extended the human life span, they have increased life expectancy.

Hormones

As we grow older our bodies often produce lower hormone levels. It's tempting to believe that if we take substances that raise these levels, we will become young again. It all sounds so simple–replace hormones, such as human growth hormone, DHEA, and melatonin, and find that Fountain of Youth.

But scientific research gives us reason to be skeptical of these claims.

The growth hormone paradox

Growth hormone has a number of functions. It helps develop the long bones in legs and arms. It also helps the body use fat as an energy source. The pituitary gland secretes growth hormone, and as we grow older less hormone is produced.

In 1990, researchers reported that 12 older men who had received injections of growth hormone three times a week over a period of six months became lean and muscular, and their bones became stronger.

However, there have been troubling findings as well. Adults whose pituitary glands over-produce growth hormone have premature heart and lung failure as well as abnormal growth of

other organs and tissues. And laboratory mice who were bred to overproduce growth hormone grew malignant tumors and died younger than mice who had lower-than-normal hormone levels.

In fact, experiments with laboratory animals suggest that decreased growth hormone activity leads to increased life expectancy. Lower growth hormone levels may possibly be an indicator of health.

THERE IS NO HORMONE OR VITAMIN COCKTAIL THAT CAN SLOW DOWN AGING. DON'T BELIEVE ANYONE WHO TELLS YOU OTHERWISE.

So, although research with hormone replacement has resulted in some positive short-term results, it is clear that negative side effects also may occur in the form of increased risk for cancer, cardiovascular disease, and behavior changes. Necessarily, more studies are warranted before hormone replacement can be considered safe and effective.

Estrogen replacement therapy

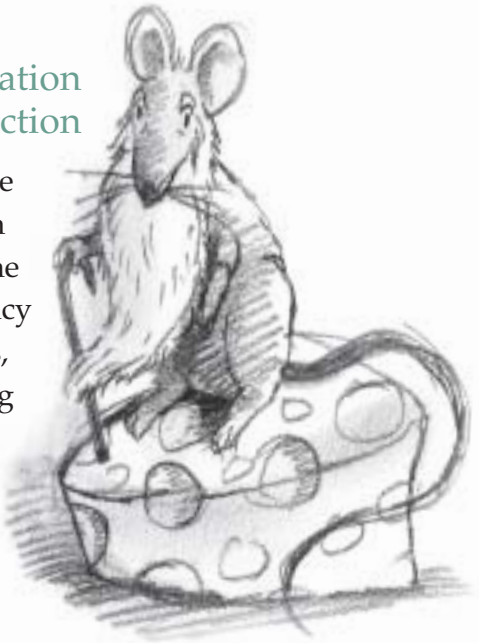
Estrogen is the female hormone produced mainly by the ovaries. Estrogen replacement therapy (or ERT) is used for the treatment of menopausal symptoms and for the prevention of the long-term effects of menopause, such as osteoporosis (thinning of the bones). It may also reduce the risk of dementia in older women.

ERT has had a long history of use by women and has been effective in increasing their quality of life. Until recently researchers believed it also protected women from cardiovascular diseases. But recent studies have raised "red flags" with regard to the usefulness of estrogen for treating or preventing coronary heart disease. The American Heart Association has withdrawn its endorsement for hormone replacement therapy as protection for women against heart disease. And although estrogen may not cause breast cancer, it may promote the growth of existing tumors.

While ERT therapy does have some successful history behind it, we have seen that it can also have harmful side effects. Therefore it is up to every woman, in consultation with her physician, to decide whether it is the right drug for her.

Genetic manipulation and caloric restriction

Scientists have succeeded in increasing the life expectancy of laboratory animals (fruit flies, mice, and worms) by identifying "longevity genes." They have also discovered that an animal lives longer when its genes are programmed to produce less growth hormone.



As far back as 1935, researchers conducted experiments on laboratory animals to determine if caloric intake affects longevity. The results have shown that laboratory animals live longer and age more slowly when they are fed healthy, very low calorie diets that contain essential nutrients. Animals that began the near-starvation diet in early adulthood extended their lives by 30% to 40%. Scientists observed that this diet delayed the occurrence of age-dependent diseases and disabilities, such as cancers, loss of muscle strength, and cataracts. Since humans are more complicated than lower animals and fruit flies, scientists obviously don't recommend a starvation diet.

What we've learned from these studies–and what translates into healthy old age–is that a low-fat diet rich in grains, fruits, and vegetables lowers our risk for many age-related conditions like cardiovascular disease, high blood pressure, and diabetes. Even more startling, it can cut our risk for a variety of cancers by 50%.

A preliminary study on caloric restrictions in humans is underway at the National Institutes of Health.

Herbal remedies

Herbal remedies include the bark, leaves, flowers, fruits, and stems of a plant. They are available to consumers as teas, powders, tablets, capsules, and as extracts that need to be diluted with water. Herbals are sold in their pure form or in combination with other substances. Very little is known about many of these drugs. While some herbs and botanicals have proven to be safe and effective, here we are concerned with herbs that have not been adequately tested and that may present a health hazard. Several have been associated with serious illness. Check with your physician before taking any of these drugs.

The following list appears in a seminal FDA report entitled *Unsubstantiated Claims and Documented Health Hazards in the Dietary Supplement Marketplace. (See 7 in References.)*

Herb	Potential negative consequences
St. John's wort	*Interferes with the effectiveness of many prescription drugs used for the treatment of heart disease, seizures, HIV-AIDS. Interferes with medications to prevent transplant rejection and with oral contraceptives.*
Chaparral	*Liver damage.*
Comfrey	*In humans: liver damage. In laboratory animals: cancer, pulmonary, kidney, and gastrointestinal illness. Restricted availability in the United Kingdom, Australia, Canada, and Germany.*
Yohimbe	*Renal failure, seizures, and death.*
Lobelia	*Bronchial dilation; increased respiratory rate; hypotension; has caused coma and death in doses as low as 50 mg.*
Germander	*Liver damage. Sale forbidden in France and restricted in other countries.*
Germanium	*Renal failure.*
Willow bark	*Marketed as an aspirin-free alternative for people who are allergic to aspirin. Contains the same chemical makeup as aspirin and is extremely dangerous for people with aspirin allergy.*

Some Chinese herbal remedies to avoid:

The following herbs are present in products marketed as weight-loss aids and energy boosters:

Stephania / Magnolia	*Kidney failure.*
Ma huang	*Hypertension, rapid heart rate, stroke, nerve damage, muscle injury, memory loss.*

Vitamins, minerals, and herbs

Vitamin and mineral dietary supplements are considered safe for the general population when taken in doses that don't exceed the recommended dietary allowances (RDAs). Some vitamins and minerals are toxic in high doses. Each vitamin and mineral has its own RDA, and the difference between a safe dose and a toxic dose varies from substance to substance. When in doubt, follow the RDA.

As you consider using an herbal remedy ask yourself these questions:

 *Do you know if the substance has side effects?*

 *Do you know how the substance will react with drugs you are already taking?*

 *Do you know if you have a medical condition or health risk factor that makes it inadvisable for you to take the substance?*

 *Do you know if the substance is pure? Are you sure it doesn't contain other substances that may be harmful to your health?*

 *Do you know if you're taking the right dose?*

 *Do you know the antidote to this drug if you should have a bad reaction?*

Serious research vs. scam

A clinical drug trial is research that uses volunteers to test the safety and effectiveness of a drug. It includes men and women from a variety of ethnic and age groups, who are carefully screened to eliminate those with physical conditions that could influence the outcome of the trial. Volunteers in a reputable trial are all given the same dose unless the trial is set up specifically to test a variety of doses. Careful records must be kept and an oversight committee established to ensure that corners are not cut. The drug being tested must come from the same source and be free of other substances that could influence the outcome of the trial. Volunteers in legitimate trials are closely monitored for side effects. *Almost no anti-aging remedy is tested in a clinical drug trial.*

Selling anti-aging medicine on the Internet

Most of us have seen the way marketers use the Internet to peddle products that promise quick and dramatic cures for serious diseases. Illegal websites not only sell prescription drugs but unproven anti-aging remedies as well.

Beware of "anti-aging" websites

That offer a new cure or a quick cure for a wide range of ailments;

That claim there is a conspiracy by the government, the medical profession, or research scientists to hide information about a wonder drug;

That use stories of amazing cures and personal testimonials;

That make exaggerated or unrealistic claims. If they sound nonsensical, they probably are.

The Federal Trade Commission is cracking down on charlatans on the Internet through its program "Operation Cure All." Meanwhile, it is up to us to exercise caution. Buying an unproven remedy through a website puts us at risk. We may receive a contaminated product or one that contains dangerous substances. At best, we're probably throwing away our money. At worst, we may be endangering our lives.

Five common fallacies about complementary remedies

1 "It couldn't hurt to try it."

Oh, yes, it could! All substances can be toxic if consumed in high enough amounts over a long enough period of time.

2 "I can trust the product label to tell me if I need to exercise caution."

Once again, there is no law that requires manufacturers to include warnings on their labels about potential adverse effects.

3 "It's got to be good for me–it's natural."

Watch out! Just because a substance is found in nature doesn't make it safe. Remember– arsenic is a "natural" substance. Many weight-loss products claim to be "natural" or "herbal," but their ingredients may interact with other drugs, or they may be dangerous for some people.

4 "I trust this product because it has evidence to back its claim."

Some manufacturers print undocumented reports or graphs and charts that can be mistaken for serious research findings. Some research is conducted for only a short time period, so a product's long-term effects are not known.

5 "If the dietary supplement is recalled because it's harmful, I'm guaranteed that it isn't being sold."

The recall of dietary supplements is voluntary. Manufacturers may do their best to comply, but there is no guarantee that all products will be removed.

Just a few of the miracle "cures" that have been peddled throughout the ages:

White Eagle Indian Rattlesnake Oil:
Will cure any kind of pain.

Fatoff Obesity Cream: *Just rub it on.*

Dr. Mixer's Cancer and Scrofula Syrup:
The world-renowned blood purifier for cancer, tumors, erysipelas, abscesses, ulcers, fever sores, goiter, catarrh, rheumatism, piles, and all blood diseases.

Cerralgine Food of the Brain:
A safe cure for headache, neuralgia, insomnia, etc.

Dr. Bonker's Celebrated Egyptian Oil:
For cramps in the stomach and bowels, and cholera, take 20 drops in molasses or sugar every half hour and at the same time apply externally. For colic and cramps in horses and cattle, give 1 tablespoon in sweet oil.

Dr. Lindley's Epilepsy Remedy:
For epilepsy fits, spasms, convulsions, and St. Vitus' Dance, 1 teaspoon after meals and at bedtime.

Anglo-American Heart Remedy:
For weak hearts, weak blood, weak nerves.

Dr. Shreve's Anti-Gall-Stone Remedy:
For the treatment of stones in the kidney and bladder.

(Source: Food and Drug Administration website. See www.fda.gov.)

The secret to healthy aging

The older we get, the more vulnerable we become to some diseases. But these age-related ailments are not inevitable. So far we've talked about unproven anti-aging remedies. The information presented is based largely on conclusions reached at two scientific workshops held at Canyon Ranch Health Resorts. The results appear in reports entitled *Prescription for Longevity: Fads and Reality* and *Is There An "Anti-aging" Medicine?* (Both are available online at *www.ilcusa.org*.) Now that we know what *not* to do, let's look at what we *can* do to help us age well.

The experts agree: The secret to healthy aging is a healthy diet and moderate exercise. Together with smoke cessation and a low alcohol intake, they offer powerful and proven physical and emotional benefits.

At a third Canyon Ranch Scientific Workshop, leaders in medicine, behavorial, and social sciences were brought together to answer a number of important questions: What have researchers found works best for women and men who want to live a healthy lifestyle? What environments are most conducive to healthy lifestyles? What are the best ways for us to achieve and maintain our health goals? What are the most effective kinds of support we can get from the community and society? What areas need further research?

The following is a summary of their report, entitled *Maintaining Healthy Lifestyles: A Lifetime of Choices.* The full report can be downloaded from *www.ilcusa.org.*

Madame Jeanne Calment, who died in 1997 at the age of 122, has the longest documented life span. For most of us though, the average set of human genes appears capable of getting us to at least our mid-eighties, with the majority of that time spent in good health. It has been estimated that about 30% of longevity is determined by genes – the rest is up to us.

Environment

Where we live and the people with whom we have daily contact have a powerful impact on our health.

Friends and co-workers

We're all influenced by the attitudes and habits of the people around us. Example: *If a woman smokes but her co-workers, friends, and family members don't, she is more likely to have a stronger motivation to quit than if she is surrounded by other smokers.*

Availability of resources

Community resources, like exercise facilities, parks, and programs that target specific health habits, can motivate us to adopt healthier lifestyles by providing safe, supportive, and convenient environments. Example: *A school with an adult physical education program, a local YMCA, a park, or a community anti-smoking program can support healthier lifestyles.*

Family patterns

Families that have healthy lifestyles provide strong motivation for their family members to establish healthy habits. Example: *A man who joins a gym and begins to show positive results is an automatic role model for his wife and children. Likewise, a woman who quits smoking is a role model for her husband and children.*

Ethos of an ethnic group regarding specific healthy habits

Our ethnic identity influences who we are in many ways. People who come from an ethnic community that frowns upon (or simply ignores) exercise, healthy diet, or moderate alcohol intake have to work harder to break old habits. Example: *People who come from a culture whose cuisine emphasizes fried foods will need to seek tasty alternatives to the foods with which they may be most familiar.*

Getting motivated

What motivates us to start a healthy habit and stick with it? Researchers tell us there are many incentives. Among them, vanity, pride, and fear rank high.

Vanity: *Who among us hasn't cringed at the thought of attending a class reunion. We look at ourselves in the mirror and mutter: "If I don't lose weight, my old friends won't recognize me. If I don't lose weight, I won't want my old friends to recognize me!"*

Pride: *Do you really want your kids or grandkids to see you smoking? Is that the kind of role model you want to be?*

Fear: *Never underestimate its motivating power. A critical period in life, whether it's the threat of illness, a life transition, the development of a chronic condition, or the physical decline of a loved one, can be a powerful force for change.*

The key to success

The experts have found that people are more likely to succeed if they're really ready to make a change and if they have a positive attitude. Men and women who maintain an optimistic outlook are far more likely to attain their health goals than people who believe they will fail before they begin.

Bring a friend. In fact, bring a crowd.

Exercise goes faster when you have a friend or group of friends along. Exercise buddies can motivate each other to show up, keep a spirit of friendly competition going while they exercise, and socialize afterwards.

Set a goal

Setting a goal is the first step to making a positive life change. A doctor or fitness trainer can help, but it's important to remember that, ultimately, we are responsible for our bodies and our health. When women and men participate fully in setting their own goals, they're more likely to be motivated to change their health habits than if they accept goals made by another person.

For example, if a man begins a weight-loss program just because his doctor tells him to, the odds are he'll have less success in the long run than if he believes it will benefit him in a way that has personal meaning. He might want to lose weight so he can run a mile without getting winded, because he wants the confidence to find a better job, or because his clothes feel tight.

Make a contract

Before we start out on a new health regimen, we need to ask ourselves: What big goal do I want to achieve? What small goals do I need to achieve so I can reach my big goal? When can I realistically expect to reach my goal? Experts in the field advise us to make a contract with ourselves and to write it down.

Half the population of the U.S. is overweight, 20% is obese, and only 15% of people over the age of 65 exercise regularly. Our diets and lifestyles are overwhelmingly conducive to the development of coronary artery disease. If we could make major headway in eliminating these and other negative health-related lifestyles, we should be able to gain at least a 10-year increase in life expectancy.

For example, a woman may decide to lose 20 pounds over the course of 12 months. She writes a contract committing herself to a goal of significant weight loss, and dates and signs the document. It is her big goal, but she also has smaller short-term goals along the way that serve as guideposts, and she writes these down as well. She may decide that her first goal is finding the time to work out at a gym for one hour three times a week and losing five pounds for her daughter's birthday in three months.

After three months she will have made significant strides in reaching her big goal. She will then revise the contract to reflect a new goal.

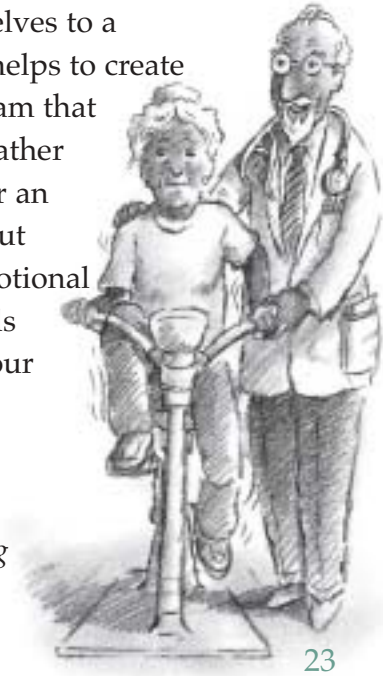
She may aim to cut out doughnuts and lose 10 pounds in six months. Her final goal of losing five pounds in three months will be the last step in attaining her big goal, which was to lose 20 pounds. At the end of the year she will have lost the weight and established some important healthy habits.

If she doesn't reach a goal, she will revise her next goal to reflect the situation. For example, if she fell short of her goal to lose 10 pounds and only lost five, her next goal might be to lose another five, and her final goal of losing 20 pounds in 12 months might be changed to 15 months. *Whatever your goals, it's best to keep them modest and attainable.*

Finally, researchers have found no proof that people who work at reaching several health goals at the same time are more successful than people who focus on one goal at a time. In fact, a new national research effort is currently being conducted at the National Institutes of Health to examine the best ways to introduce and reinforce several behavioral changes at the same time.

Create a personal plan of action

When we commit ourselves to a healthier lifestyle, it helps to create a personalized program that reflects who we are rather than a fantasy program designed for an Olympic star. We need to think about where we live, our physical and emotional makeup, where we work, our friends and family, and the way we spend our free time. Consider the following:



What serious health problems must I address?
Always see a physician before beginning a serious workout program.

What activities do I enjoy?
If you absolutely hate jogging, making ambitious plans to run at the local track may not be the best idea.

What activities can I get to easily from where I work or live?
Swimming is fun, but if the indoor pool is half an hour away and always crowded you may soon tire of the effort it takes.

What kind of activities can I afford?
Are the fees for the tennis court within your budget?

When can I find time?
What days and times are most convenient?
What alterations can you make in your schedule?

The neighborhood

Our communities may be the best support we have for a new health program. City hall and almost any local paper offer readily available community resources. These include gymnasiums, walking clubs, and programs to quit smoking or lose weight.

The workplace

There is a growing body of evidence to suggest that a healthy lifestyle program in the workplace can be very beneficial. For instance, many companies now have effective smoking-cessation programs. Here are some other suggestions to help you begin or stick with a health program.

Establish a routine that is based on a modest modification of everyday work activities:

❑ *Walk up the stairs instead of taking the elevator.*

❑ *Snack on fruits and raw vegetables instead of snacking at the candy machine.*

❑ *Use a break to do stretching exercises in the office or outside in a public park instead of lighting up a cigarette.*

❑ *Consider biking or walking to work.*

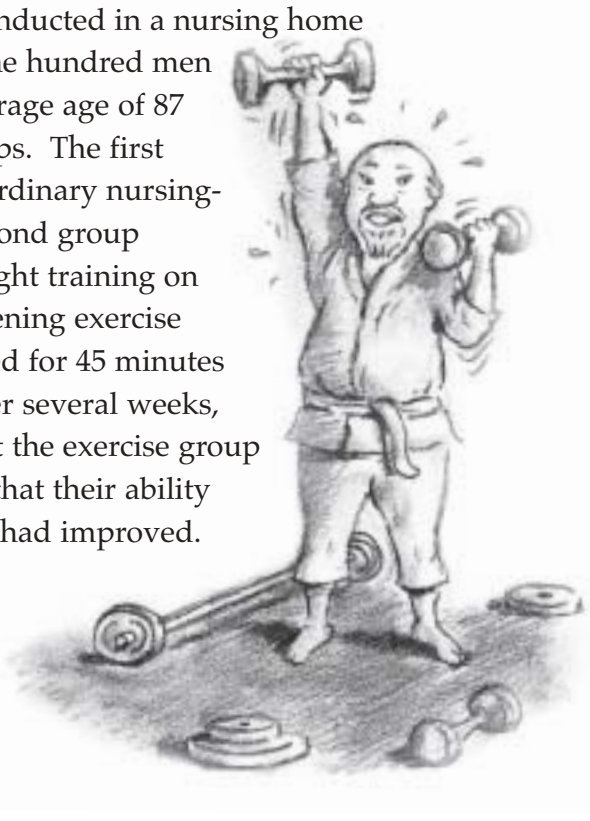
❑ *Take advantage of low-fat, lower-calorie alternatives that are now available in many company cafeterias.*

When is exercise really exercise?

In recent years, there has been a shift away from an exclusive emphasis on intensive aerobic exercise, and today health professionals encourage a wide range of physical activities. We can ride bikes, run, walk, and take dance classes for aerobic fitness. In addition, many find that yoga, tai chi, and other classes that emphasize stretching or upper-body strength are beneficial.

Weight training

Weight training that is done in moderation can be beneficial for women and men of all ages. One very important study conducted in a nursing home illustrates this point. One hundred men and women with an average age of 87 were split into two groups. The first group continued to do ordinary nursing-home activities. The second group received supervised weight training on thigh and knee strengthening exercise machines. They exercised for 45 minutes three times a week. After several weeks, researchers reported that the exercise group was less depressed and that their ability to walk and climb stairs had improved. (*See 6 in References.*)



Staying motivated

We've set our goals, signed a contract with ourselves, and embarked on our journey to health. But then it rains. Or we get too busy to work out. Or we go out to dinner with friends and eat much too much. How do we get back on track? How do we stay motivated? Here's what the experts suggest:

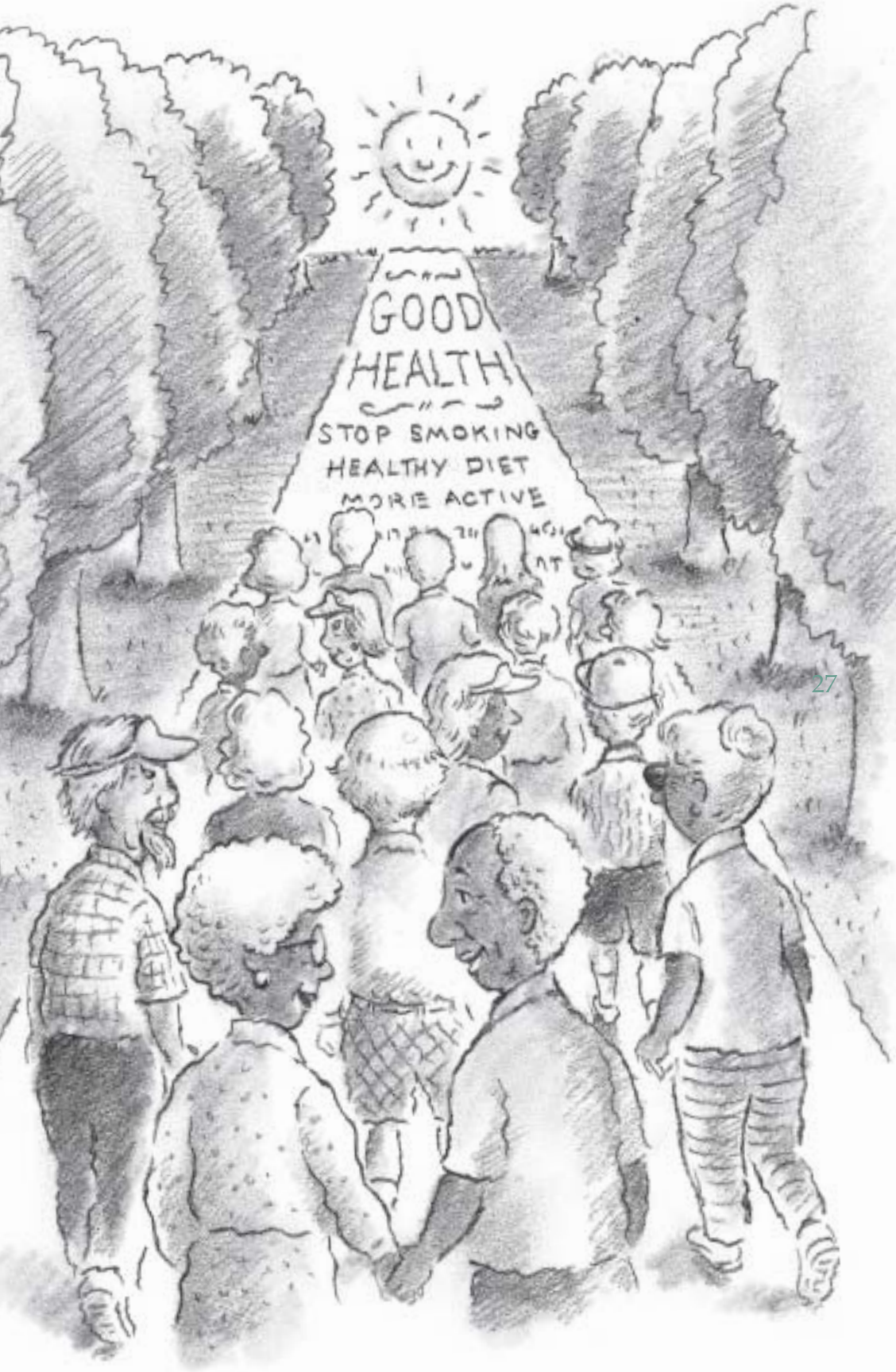
Keep a record of your progress. For example, note how far you walk or run each day by wearing a pedometer, which is an inexpensive electronic clip-on device that monitors movement.

Write down what you eat every day in a journal.

Visit your doctor six months after you begin your program. The results, in terms of weight loss, lower blood pressure, and general well-being, will almost certainly be evident, even if you've experienced a setback.

Overcoming setbacks

Setbacks are part of the normal process of any changes we make in our lifestyle. A relapse is not a failure, and a setback can be used to strengthen our resolve. It can motivate us to take steps to avoid falling into the same trap in the future. The speed with which we reach our ultimate goal is less important than the direction we're heading. *Remember, it's never too late to start, and it's always too soon to quit!*


GOOD
HEALTH
STOP SMOKING
HEALTHY DIET
MORE ACTIVE

References

1. American College of Sports Medicine. 1998. ACSM position stand on exercise and physical activity for older adults. *Medical Science of Sports and Exercise* 30:992–1008.
2. Anisomov, V.N. 2001. Life span extension and cancer risk: myths and reality. *Exp. Gerontol.* 36:1101–1136.
3. Birkhauser, M.H. 2000. Indications for hormone replacement therapy. *Ther. Umsch.* 57:635–642.
4. Butler, R.N., et al. 2000. Anti-aging medicine: what makes it different from geriatrics? *Geriatrics* 55:36–43.
5. Centers for Disease Control and Prevention. 1996. *U.S. Surgeon General's report of physical activity and health.* Washington, D.C.: U.S. Department of Health and Human Services.
6. Fiatarone, M.A., et al. 1994. Exercise training and nutritional supplementation for physical frailty in very elderly people. *N. Eng. J. Med.* 330:1769–1775.
7. Food and Drug Administration. 1993. *Unsubstantiated claims and documented health hazards in the dietary supplement marketplace.* Center for Food Safety and Applied Nutrition. Washington, D.C. See *http://vm.cfsan.fda.gov.*
8. Fraser, G.E., and D.J. Shavlik. 2001. Ten years of life: is it a matter of choice? *Arch. Intern. Med.* 161:1645–1652.
9. Goldstein, M.G., et al. 1998. A population-based survey of physician smoking cessation counseling practices. *Preventive Medicine* 27(5 pt 1):720–729.
10. Grodstein, F., et al. 1997. Postmenopausal hormone therapy and mortality. *N. Engl. J. Med.* 336:1769–1775.
11. The Heart Outcomes Prevention Evaluation (HOPE) Study Investigators. 2000. Vitamin E supplementation and cardiovascular events in high-risk patients. *N. Engl. J. Med.* 342:154–160.
12. Hitt, R., Y. Young-Xu, and T. Perls. 1999. Centenarians: the older you get, the healthier you've been. *Lancet:* 354:652.
13. International Longevity Center-USA. 1998. *Prescription for longevity: fads and reality.* A workshop co-sponsored by Canyon Ranch Health Resorts. New York: International Longevity Center-USA.
14. ———. 2000. *Maintaining healthy lifestyles: a lifetime of choices.* A workshop co-sponsored by Canyon Ranch Health Resorts. New York: International Longevity Center-USA.
15. ———. 2001. *Biomarkers of aging: from primitive organisms to man.* A workshop co-sponsored by Canyon Ranch Health Resorts. New York: International Longevity Center-USA.
16. ———. 2001. *Is there an "anti-aging" medicine?* A workshop co-sponsored by Canyon Ranch Health Resorts. New York: International Longevity Center-USA.
17. Jette, A., et al. 1999. Exercise—it's never too late: the strong-for-life program. *Am. J. Pub. Health* 89(1):66–72.
18. Kushi, L.H., et al. 1996. Dietary antioxidant vitamins and death from coronary heart disease in postmenopausal women. *N. Engl. J. Med.* 334:1156–1162.
19. LeBlanc, E.S., et al. 2001. Hormone replacement therapy and cognition—systematic review and meta-analysis. *J. Am. Med. Assoc.* 285:1489–1499.
20. Manson, J.E., and K. Martin. 2001. Postmenopausal hormone-replacement therapy. *N. Engl. J. Med.* 345:34–40.
21. National Institutes of Health. *Innovative approaches to disease prevention through behavior change.* Overview of Behavior Change Consortium. Bethesda, Md.: Office of Behavioral and Social Research. See *http://www 1.od.nih.gov/behaviorchange/index.htm.*
22. Okie, Susan. 2001. Hormones don't protect women from heart disease, study says. *Washington Post,* July 24.

23. Olshansky, S.J., B.A. Carnes, and C. Cassel. 1990. In search of Methuselah: estimating the upper limits to human longevity. *Science* 250:634–640.

24. Olshansky, S.J., and B.A. Carnes. 2001. *The quest for immortality.* New York: W.W. Norton & Co.

25. Olshansky, S.J., L. Hayflick, and B.A. Carnes. 2002. No truth to the fountain of youth. *Scientific American,* June.

26. Perls, T. 1995. The oldest old. *Scientific American* 272:70–75.

27. Perls, T., J. Laverman, and M.H. Silver. 1999. *Living to 100: lessons in maximizing your potential at any age.* New York: Basic Books.

28. Province, M.A., et al. 1995. Assessing the effects of exercise on falls and injuries in the frail elderly–a pre-planned meta-analysis of the FICSIT trials. *J. Am. Med. Assoc.* 273 (17): 1341–1347.

29. Rosenthal, N. 2001. High hopes for the heart. *N. Engl. J. Med.* 344:1785–1787.

30. Rudman, D., et al. 1990. Effects of growth hormone in men over 60 years old. *N. Engl. J. Med.* 323:1–6.

31. U.S. General Accounting Office. 2001. *"Anti-aging" products pose potential for physical and economic harm.* Report to Chairman, Special Committee on Aging, U.S. Senate. Washington, D.C.: GAO-01-1129.

32. Vita, A.J., et al. 1998. Aging health risks and cumulative disability. *N. Engl. J. Med.* 338:1035–1041.

33. Willcox, B.J., C. Willcox, and M. Suzuki. 2001. *The Okinawa program: how the world's longest-lived people achieve everlasting health, and how you can too.* New York: Crown.

34. Zuckerman, M. 1999. *Living younger, longer.* Presented at Canyon Ranch Health Resorts, Tucson, Ariz. March.

Websites to explore

AARP
www.aarp.org

AARP Andrus Foundation
www.andrus.org

Alliance for Aging Research
www.agingresearch.org

International Longevity Center–USA
www.ilcusa.org

The National Council on the Aging
www.ncoa.org

National Institutes of Health
www.nih.gov

Federal Drug Administration
www.fda.gov

National Center for Complementary and Alternative Medicine, NIH
www.nccam.nih.gov

Credits

Writer:
Judith Estrine

Editor:
Joe Cummins

Copy Editor:
Lisa DeLisle

Designer:
Herbert Reade

Illustrator:
Larry Ross

AARP
ANDRUS
FOUNDATION

601 E STREET, NW
WASHINGTON, DC 20049
TEL: 1-800-775-6776
www.andrus.org

The AARP Andrus Foundation provides knowledge and education through research that helps the growing population concerned with aging find solutions to the challenges of aging and approaches to retaining independence and dignity throughout life. Established in 1968 as a memorial to Dr. Ethel Percy Andrus, the Foundation is a 501(c)(3) charitable and educational organization affiliated with AARP.

INTERNATIONAL LONGEVITY CENTER-USA
60 EAST 86TH STREET, NEW YORK, NY 10028
TEL: 212-288-1468 FAX: 212-288-3132
www.ilcusa.org

The International Longevity Center-USA (ILC-USA) is a not-for-profit, nonpartisan research, policy, and education organization whose mission is to help societies address the issues of population aging and longevity in positive and productive ways and to highlight older people's productivity and contributions to their families and society as a whole. The ILC-USA is an independent affiliate of Mount Sinai School of Medicine and is incorporated as a tax-exempt 501(c)(3) entity.

D17692