

AgePage

Life Extension: Science Fact or Science Fiction?

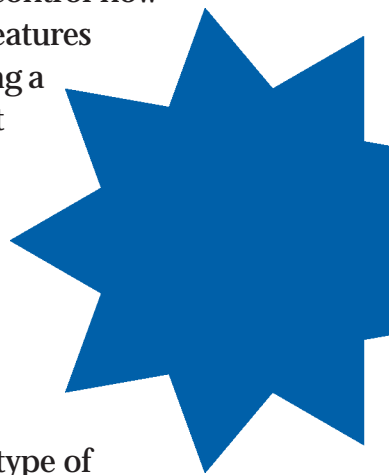
Bill just died of a heart attack at age 67. His brother, Jim, twelve years older, still enjoys playing golf once a week. Why is Jim living so much longer? Does he take after their mother's family who all lived into their eighties? Or, does he just have a healthier lifestyle?


What makes people grow old? How can we live longer? Why do members of some families seem to live longer than others? Can people live to 150 years old? Would *you* want to? These questions have fascinated people for centuries. Now scientists who study aging, called gerontologists, are trying to answer them.

Genes now being studied may one day answer some of these questions. Genes might be considered little packets of information found in each cell in our bodies. These packets contain instructions that tell our bodies how to grow and work. For example, they control whether we get our grandmother's blue eyes or our father's crooked little finger. For some people genes may affect how long they live.

Areas of Research


Several "longevity genes" have been found in some living organisms. Scientists studying certain worms and fruit flies have found several genes that seem to control how long these creatures live. By making a change in just one of these genes, they have almost doubled the average lifespan of both fruit flies and one type of





worm. Others looking at longevity genes have shown that the gene already shown to control how fast yeast cells age may do the same thing in mice. This gene is also present in humans. As interesting as this work is, it is unlikely that changing genes will be tried in humans in the near future as a way to help them live longer.


Genes alone, however, are only a part of the reason that some people live a long time. How people live, their lifestyle, may be more important. For example, does someone smoke? Do they exercise? Are they under a lot of stress? What do they eat? Some scientists think what people eat and how much they eat can lead to a longer life. Caloric restriction is one area of research on aging. A calorie-restricted diet has 30 to 40 percent fewer calories than a normal diet, but it has all the needed nutrients. This diet seems to extend the life of almost every animal type in which it is studied. It has worked in protozoa (very small, one-celled organisms), fruit flies, mice, and rats. Recent studies in primates, such as monkeys,



are not complete. They do, however, show a slowing in some measures of the aging process in primates on this diet. Primates are our closest animal relatives.

This diet has not been tested in humans. We do not know whether it will have the same life-extending effect in people. Conducting such a study in people is not practical because people would have trouble following such a diet.

How does caloric restriction work? We do not know. Some scientists think that eating fewer calories lowers body temperature and changes metabolism, the breakdown of substances so that the body can easily use them. This, in turn, lessens damage to cells and slows certain other cell-damaging activities. In fact, caloric restriction seems to slow the whole process of growing older. Animals that have been on restricted diets since their youth reach adulthood later than others not on these diets. Not only do these animals seem to live longer, they also have less illness. Although we don't know how this works in people, scientists do know



the flipside—that people who are overweight are more likely to develop certain age-related diseases such as heart and blood vessel disease, high blood pressure, arthritis, cancer, and diabetes.

Is there is a link between the so-called longevity genes and our body's use of food? The single gene in fruit flies that was changed to lengthen their lifespan is related to the way that the fruit fly stores and uses energy, usually gotten from food. Other scientists studying genes in yeast cells recently found a chemical that seems to work with a longevity gene to increase the yeast cell's lifespan. This chemical is also part of the yeast cell's processing of energy.


Experts in aging do not expect ever to recommend such caloric restriction for people. But these studies will help them understand aging. They may also teach us how to prevent or delay diseases that seem to come with growing older. Understanding how caloric restriction works might also help scientists develop

chemicals that could imitate its effects on the aging process.

Looking for a Youth Pill

Many people hope research will point the way to a fountain of youth. Or, perhaps a modern-day magic potion to slow the aging process and keep people younger longer. But, before scientists can hope to do this, they must first learn how and why we age.

Investigators have begun to find certain chemicals such as hormones in our bodies that change as we age. Levels of some substances fall as we grow older. It's easy to see how some people might think that if we replace these chemicals, we could slow, stop, or even reverse aging. Some stores, catalogs, and Internet websites now sell products that are similar to these chemicals. However, the advertising claims that these products can extend life or make you feel younger are not proven.



Antioxidants

Antioxidants are natural substances in foods. They may help protect you from disease by preventing the harmful effects of *oxygen free radicals* on your body. Oxygen free radicals are formed as cells in your body combine with oxygen to make energy. Free radicals also come from smoking or being exposed to things in the environment like radiation or sunlight. As we age, this damage may build up. According to one theory of aging, in time this build-up harms cells, tissues, and organs.

Your body's own antioxidant defense system stops most free-radical damage, but not all.

Antioxidants may prevent cataracts and heart disease, protect against damage from smoking, or boost immunity to illness.

Some antioxidants, such as the enzyme SOD (superoxide dismutase), are only useful when produced in the body. SOD *pills* have no effect on the body. They are broken up into different substances during digestion.

Other antioxidants that come from food include:

- ◆ beta-carotene, present in deep-colored fruits and vegetables,
- ◆ selenium, found in seafood, liver, meat, and grains
- ◆ vitamin C, from citrus fruits, peppers, tomatoes, and berries, and
- ◆ vitamin E, present in wheat germ, nuts, sesame seeds, and canola, olive, and peanut oils.

How much of these antioxidants should you use, if at all? The National Academy of Sciences is a nongovernmental group of experts involved in scientific research. They recommend what vitamins and minerals you need in your diet and how much of each. They say that there is no proof that large doses of antioxidants will prevent chronic diseases such as heart disease, diabetes, or cataracts. They did set guidelines for the safe use of some of them:

- ◆ Selenium—at least 55 micrograms (mcg) per day but not more than 400 mcg per day.

- ◆ Vitamin C—at least 75 milligrams (mg) per day for women and 90 mg for men, although smokers need more. No one should have more than 2,000 mg per day.
- ◆ Vitamin E—at least 15 mg per day from food and not more than 1,000 mg per day.

DHEA

DHEA is short for dehydroepiandrosterone. This is a hormone that has modified some age-related changes in animals. When given to mice, it boosted some components of

the immune system and helped prevent some kinds of cancer. Several studies in older people have shown that DHEA helps build muscle,

but other studies have not agreed. Some people hope DHEA will improve energy and immunity, increase muscles, and decrease body fat, but there is not enough research to support these claims

or even to show that taking DHEA is safe.

DHEA travels through the bloodstream in a special form called DHEA sulfate. It turns into DHEA when it enters a cell. Levels of DHEA sulfate are high in younger people but tend to go down with age. The body changes DHEA into two other strong hormones: estrogen and testosterone. Taking DHEA supplements can cause some people's bodies to make large amounts of these two hormones. This could be dangerous. High levels of naturally made testosterone in men and estrogen in women may play a role in prostate cancer in men and breast cancer in women. Experts do not know if supplements of DHEA will increase your chance of developing these cancers.

Growth Hormone

Similar claims of more energy and muscle strength and less body fat are also made for human growth hormone (hGH) supplements. This hormone is made naturally by the pituitary gland. Children need hGH to grow

normally. It also helps keep our tissues and organs healthy. Our bodies make less hGH as we age.

The only approved use for hGH is a shot given to children whose bodies do not make enough growth hormone. Only doctors may prescribe and give hGH shots. Despite this, some people spend thousands of dollars a year on these shots because they hope to slow down their bodies' aging. Others, who cannot afford the injections, buy over-the-counter "hGH releasers." Claims that these releasers will make the body "release" more hGH are unproven.

What scientists do know is that in recent studies injections of growth hormone for a *short* time seemed to boost the size and strength of muscles and to lessen body fat in a small group of older men and women. Adding testosterone increased these benefits in men. Using estrogen did not bring about further muscle and body fat

changes in women. *Longer* studies with larger numbers of older people are needed to find out if hGH can prevent weakness and frailty in older people without causing dangerous side effects.

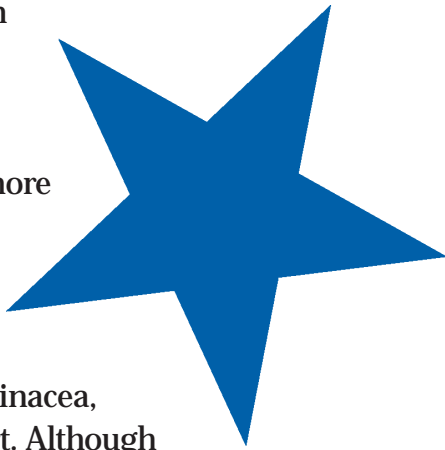
What harm might using hGH for longer periods of time do? Some experts believe that such hGH treatment can lead to diabetes, the collection of fluid in body tissues, and carpal tunnel syndrome. Some of these side effects may be very serious in older adults. If the body makes too much growth hormone during adulthood, certain tissues, such as bones, may grow more than they are supposed to. This condition is called acromegaly. Scientists do not know if too much supplementation with growth hormone in adults could cause a similar problem.

Dietary Supplements

Dietary supplements are now sold in almost every shopping mall, grocery store, drug store, and convenience store, as well as on the Web. Each year people

spend billions of dollars on these vitamins, minerals, herbs, and hormones. They are hoping for more energy, stronger muscles, better memory, protection from disease, and maybe even a longer life. The Food and Drug Administration (FDA) does not oversee most of these products. So you can't be sure that a supplement's health claims are true or that they are safe to take for a long period of time. You cannot even be sure that the preparations are pure or consistent from bottle to bottle, or manufacturer to manufacturer.

Some of the more common dietary supplements include ginkgo biloba, ginseng, saw palmetto, echinacea, and St. John's wort. Although there may be a lot of word-of-mouth talk about these supplements, we don't know the truth. Several of these herbal remedies offer hope for treating health problems in the elderly. However, more research



in older people needs to be done before experts can recommend any products. There are still a lot of questions about consumer safety.

The Bottom Line

It may be that the basic question is “how can I stay healthy and independent as I grow older?” Right now there are no treatments, drugs, or pills known to slow aging or extend human life. Check with your doctor before buying pills or anything else that promises to do such things or to make a big change in the way you look or feel. These purchases might be unsafe or a waste of money. They might even interfere with other treatments you are already receiving.

Ten Tips for Healthy Aging

No substance can extend life, but the chances of staying healthy and living longer can be improved if you:

- ◆ Eat a balanced diet, including five helpings of fruits and vegetables a day.

- ◆ Exercise regularly (check with a doctor before starting an exercise program if you have any chronic illnesses).
- ◆ Get regular health check-ups.
- ◆ Stop smoking (it's never too late to quit).
- ◆ Practice safety habits at home to prevent falls and fractures. Always wear your seatbelt in a car.
- ◆ Stay in contact with family and friends. Stay active through work, play, and community.
- ◆ Avoid overexposure to the sun and the cold.
- ◆ Use moderation if you drink alcohol. When you drink, let someone else drive.
- ◆ Keep personal and financial records in order to simplify budgeting and investing. Plan long-term housing and money needs.
- ◆ Keep a positive attitude toward life. Do things that make you happy.

Resources

The **National Institute on Aging** offers a publication, *Pills, Patches, and Shots: Can Hormones Prevent Aging?*, which discusses the question of replacing hormones which naturally decline with age. The Institute also has other free information on health and aging. Write or call:

NIA Information Center

P.O. Box 8057
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 1-800-222-2225
 1-800-222-4225 (TTY)
<http://www.nih.gov/nia>



National Institute on Aging

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