

NIH News in Health

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Inside News: 3 Noise-Related Hearing Loss... 4 Experimental Ebola Vaccine... Glaucoma... Rethinking Drinking

Osteoporosis in Aging Protect Your Bones with Exercise

Bones feel solid, but the inside of a bone is actually filled with holes like a honeycomb. Bone tissues are broken down and rebuilt all the time. While some cells build new bone tissue, others dissolve bone and release the minerals inside.

As we get older, we begin to lose more bone than we build. The tiny holes within bones get bigger, and the solid outer layer becomes thinner. In other words, our bones get less dense. Hard bones turn spongy, and spongy bones turn spongier. If this loss of bone density goes too far, it's called osteoporosis. Over 10 million people nationwide are estimated to have osteoporosis.

It's normal for bones to break in bad accidents. But if your bones are dense enough, they should be able to stand up to most falls. Bones weakened by osteoporosis, though, are more likely to break.

"It's just like any other engineering material," says Dr. Joan McGowan, an NIH expert on osteoporosis. If you fall and slam your weight onto a fragile bone, "it reaches a point where the structures aren't adequate to support the weight you're putting on them." If the bone breaks, it's a major hint that an older person has osteoporosis.

Broken bones can lead to serious problems for seniors. The hip

is a common site for osteoporosis, and hip fractures can lead to a downward spiral of disability and loss of independence. Osteoporosis is also common in the wrist and the spine.

The **hormone** estrogen helps to make and rebuild bones. A woman's estrogen levels drop after menopause, and bone loss speeds up. That's why osteoporosis is most common among older women. But men get osteoporosis, too.

"A third of all hip fractures occur in men, yet the problem of osteoporosis in men is frequently downplayed or ignored," says Dr. Eric Orwoll, a physician-researcher who studies osteoporosis at Oregon Health and Science University. Men tend to do worse than women after a hip fracture, Orwoll says.

Experts suggest that women start getting screened for osteoporosis at age 65. Women younger than age 65 who are at high risk for fractures should also be screened. Men should discuss screening recommendations with their health care providers.

Screening is done with a bone mineral density test at the hip and spine. The most common test is known as DXA, for dual-energy X-ray absorptiometry. It's painless, like having an X-ray. Your results are often reported as a T-score, which compares your bone density to that of a healthy



young woman. A T-score of -2.5 or lower indicates osteoporosis.

There's a lot you can do to lower your risk of osteoporosis. Getting plenty of calcium, vitamin D, and exercise is a good start, Orwoll says.

Calcium is a mineral that helps bones stay strong. It can come from the foods you eat—including milk and milk products, dark green leafy vegetables like kale and collard greens—or from dietary supplements. Women over age 50 need 1,200 mg of calcium a day. Men need 1,000 mg a day from ages 51 to 70 and 1,200 mg a day after that.

Vitamin D helps your body absorb calcium. As you grow older, your body needs more vitamin D, which

continued on page 2



Definitions

Hormone

Substance sent through the bloodstream to signal another part of the body to grow or react a certain way.

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continued from page 1

is made by your skin when you're in the sun. You can also get vitamin D from dietary supplements and from certain foods, such as milk, eggs, fatty fish, and fortified cereals. Talk with your health care provider to make sure you're getting a healthy amount of vitamin D. Problems can arise if you're getting too little or too much.

Exercise, especially weight-bearing exercise, helps bones, too. Weight-

bearing exercises include jogging, walking, tennis, and dancing. The pull of muscles is a reminder to the cells in your bones that they need to keep the tissue dense.

Smoking, in contrast, weakens bones. Heavy drinking does too—and makes people more likely to fall. Certain drugs may also increase the risk of osteoporosis. Having family members with osteoporosis can raise your risk for the condition as well.

The good news is, even if you already have osteoporosis, it's not too late to start taking care of your bones. Since your bones are rebuilding themselves all the time, you can help push the balance toward more bone growth by giving them exercise, calcium, and vitamin D.

Several medications can also help fight bone loss. The most widely used are bisphosphonates. These drugs are generally prescribed to people diagnosed with osteoporosis after a DXA test, or to those who've had a fracture that suggests their bones are too weak. Bisphosphonates have been tested more thoroughly in women, but are approved for men too.

Researchers are trying to develop drugs that increase bone growth. For now, there's only one available: parathyroid hormone. It's effective at building bone and is approved for women and men with osteoporosis who are at high risk for having a fracture.

Another important way to avoid broken bones is to prevent falling and occasions for fracture in the first place. Unfortunately, more than



Web Links

For more information about osteoporosis, click the "Links" tab at:
<http://newsinhealth.nih.gov/issue/Jan2015/Feature1>

2 million so-called fragility fractures (which wouldn't have happened if the bones had been stronger) occur nationwide each year. "To reduce the societal burden of fracture, it's going to take a combined approach of not only focusing on the skeleton but focusing on fall prevention," says Dr. Kristine Ensrud, a physician-researcher who studies aging-related disorders at the University of Minnesota and Minneapolis VA Health Care System.

Many things can affect the risk for a fall, such as how good a person's balance is and how many trip hazards are in the environment. The kind of fall matters, too. Wrist fractures often occur when a person falls forward or backward. "It's the active older person who trips and puts her hand out," McGowan says. Hip fractures often arise when a person falls to the side. Your hip may be strong enough to handle weight that goes up and down, but not an impact from another direction.

"That's why exercise that builds balance and confidence is very good at preventing fractures," McGowan says. For example, she says, tai chi won't provide the loads needed to build bone mass, but it can increase balance and coordination—and make you more likely to catch yourself before you topple.

NIH-funded researchers are looking for better ways to tell how strong your bones are, and how high your chances are of breaking a bone. For now, though, the DXA test is the best measure, and many seniors, even older women, don't get it, Ensrud says. If you're concerned about your bone health, she adds, "Ask your health care provider about the possibility of a bone density test." ■



Wise Choices Prevent Falls To Protect Bones

To prevent falls at home:

- Keep rooms free of clutter, especially on floors.
- Don't walk in socks, stockings, or slippers.
- Be sure rugs have skid-proof backs or are tacked to the floor.
- Keep a flashlight next to your bed to guide you in the dark.

Exercises to improve balance:

- Stand on one leg at a time for a minute. Slowly increase the time. Try to balance with your eyes closed or without holding on.
- Stand on your toes for a count of 10, and then rock back on your heels for a count of 10.
- Move your hips in a big circle to the left, and then to the right. Do not move your shoulders or feet. Repeat 5 times.

NIH News in Health

ISSN 2375-6993 (Print)

ISSN 1556-3898 (Online)

National Institutes of Health

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Listen Up!

Noises Can Damage Your Hearing

Sounds surround us. We enjoy many of them—like music, birdsong, and conversations with friends. But loud or long-lasting noises—from motors, power tools, and even headphones—can permanently damage your hearing. Take steps to protect your ears from harmful noises.

Loud noise is one of the most common causes of hearing loss. An estimated 26 million Americans between the ages of 20 and 69 already have irreversible hearing loss caused by loud sounds. And up to 16% of teens have hearing loss that may have been caused by loud noise.

“Noise damage can begin at any age, and it tends to accumulate over time. That’s why avoiding excess noise is so critical,” says Dr. Gordon Hughes, a clinical trials director and ear, nose, and throat specialist at NIH. “Hearing loss caused by noise is completely preventable.”

For adolescents, music players with headphones are a common source of noise exposure. “With adults it may be power tools, lawn mowers,

snow blowers, and other sources of that type,” Hughes says. “Workplace noise—like farm machinery, construction, and noises associated with military service—may also cause problems.”

Noise-related hearing loss can arise from extremely loud bursts of sound, such as gunshots or explosions, which can rupture the eardrum or damage the bones in the middle ear. This kind of hearing loss can be immediate and permanent.

But most noise-related hearing problems develop slowly over time, with ongoing exposure to loud sounds. Loud noises can injure the delicate sensory cells—known as hair cells—in the inner ear. “These cells have little hair-like tufts on one side,” Hughes says.

Hair cells help to convert sound vibrations into electrical signals that travel along nerves from the ear to the brain. These cells allow us to detect sounds. But when hair cells are damaged and then destroyed by too much noise, they don’t grow back. So hearing is permanently harmed.

Sometimes loud noises can cause tinnitus—ringing in the ears that lasts anywhere from a brief period to a lifetime. Loud noises can also cause temporary hearing loss that goes away within hours or a couple of days. “But some research suggests that even though the symptoms disappear, there may be molecular or chemical abnormalities that build up and cause potential for long-term damage to hearing,” Hughes says.

It’s best to avoid loud noises when possible. But how loud is too loud?

Sound is measured in units called decibels (dB). Sounds less than 75 dB are unlikely to harm hearing. Normal conversation, for instance, measures about 60 dB. A typical hair blow dryer has an intensity of about 85 dB, but if they’re used for just brief periods, they’re unlikely to damage hearing.

However, long or repeated exposure to sounds at or above 85 dB



can cause problems. The louder the sound, the quicker the damage.

“At maximum volume, an audio player with ear buds might produce 105 dB. There’s potential for noise damage to occur at barely 30 minutes of exposure,” Hughes says. A siren may be 120 dB, a rock concert 110 dB, a motorcycle 95 dB, and a lawn mower 90 dB. All these have the potential to harm hearing over time.

“Wear ear protection such as ear plugs if the sound can’t be avoided. Or just get away from the sound, or reduce it, like turning down the volume on an audio player,” Hughes says. Foam insert earplugs can keep some sound intensity from reaching the eardrum, as can protective earmuffs, available at hardware and sport stores. For better ear protection, talk with a hearing specialist about getting a custom-fitted ear mold.

Finally, don’t forget to protect the ears of children who are too young to protect their own. And get a hearing test if you think you or a loved one might have hearing loss. ■



Wise Choices

It’s a Noisy Planet: Protect Your Hearing

Your ears can be your warning system. Noise is too loud when:

- You have to raise your voice to be understood by someone standing nearby.
- The noise hurts your ears.
- You’ve got a buzzing or ringing in your ears, even temporarily.
- You don’t hear as well as you normally do until several hours after you get away from the noise.

If you’re around noises at this level:

- Turn down the sound.
- Avoid the noise (walk away).
- Block the noise (wear earplugs or earmuffs).



Web Links

For more about noise-related hearing loss, click the “Links” tab at:

<http://newsinhealth.nih.gov/issue/Jan2015/Feature2>

Health Capsules

For links to more information, see these stories online:
<http://newsinhealth.nih.gov/issue/Jan2015/Capsule1>

Ebola Vaccine Prompts Immune Response

An experimental vaccine to prevent Ebola virus disease was well-tolerated and produced **immune system** responses in all 20 healthy adults who received it. Based on these results, researchers are planning further studies to assess the safety and effectiveness of the vaccine.

The Ebola virus spreads through direct contact with body fluids from an infected person. The 2014 Ebola outbreak in West Africa is the largest Ebola outbreak in history. As of early

December, more than 17,000 cases and 6,000 deaths have been reported. There are no approved drugs, but early care can improve survival.

Beginning in 2003, NIH developed and supported human testing of 3 experimental Ebola vaccines. The vaccine assessed in the new study was developed by scientists at NIH and at the pharmaceutical company Glaxo-SmithKline based on knowledge gained from the earlier research.

Twenty volunteers between the ages of 18 and 50 participated in the clinical trial, which took place at the NIH Clinical Center in Bethesda, Maryland. Ten received lower dose and 10 received higher dose vaccines.

All 20 volunteers produced anti-Ebola antibodies within 4 weeks

of receiving the vaccine. Antibody levels were higher in those who received the higher dose vaccine.

The vaccine also prompted creation of protective immune cells called CD8 T cells. Four weeks after vaccination, CD8 T cells were detected in 2 volunteers who had received the lower dose and 7 who had received the higher dose vaccine.

No serious side effects were seen in any of the volunteers. This and other Ebola vaccine candidates continue to be evaluated by international research teams. ■

Definitions

Immune System

Protects your body from invading viruses and other threats.

Detect Glaucoma Early To Protect Vision

Glaucoma is a group of diseases that damage the eye's optic nerve, which carries visual signals from the eye to the brain. If left untreated, glaucoma can lead to vision loss or blindness. But many people with early-stage glaucoma have no symptoms. By the time they're diagnosed, they may have already noticed changes to their side, or peripheral, vision.

"Studies show that at least half of all people with glaucoma don't know they have this potentially blinding eye disease," says Dr. Paul Sieving, director of NIH's National Eye Institute. "The good news is that glaucoma can be detected in its early stages through a comprehensive dilated eye exam."

With early detection, glaucoma can be controlled through medications or surgery. Early treatment can protect the eyes against serious vision loss.

Anyone can get glaucoma, but some people are at increased risk. At-risk groups include African Americans ages 40 and older; everyone over age 60, especially Hispanics/Latinos; and people who have a family history of the disease.

If you're at increased risk, be sure to get a comprehensive dilated eye exam every 1 to 2 years. And encourage family members to do the same.

For more information, tips for finding an eye care provider, or financial assistance for eye care, visit www.nei.nih.gov/glaucoma. ■

Featured Website Rethinking Drinking

<http://rethinkingdrinking.niaaa.nih.gov>

Have you taken a look at your drinking habits and how they may affect your health? Some people have symptoms of an alcohol use disorder without recognizing them. Others don't know where to find help to cut back or quit. This site offers research-based information about how alcohol affects your health and tips for making changes.



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