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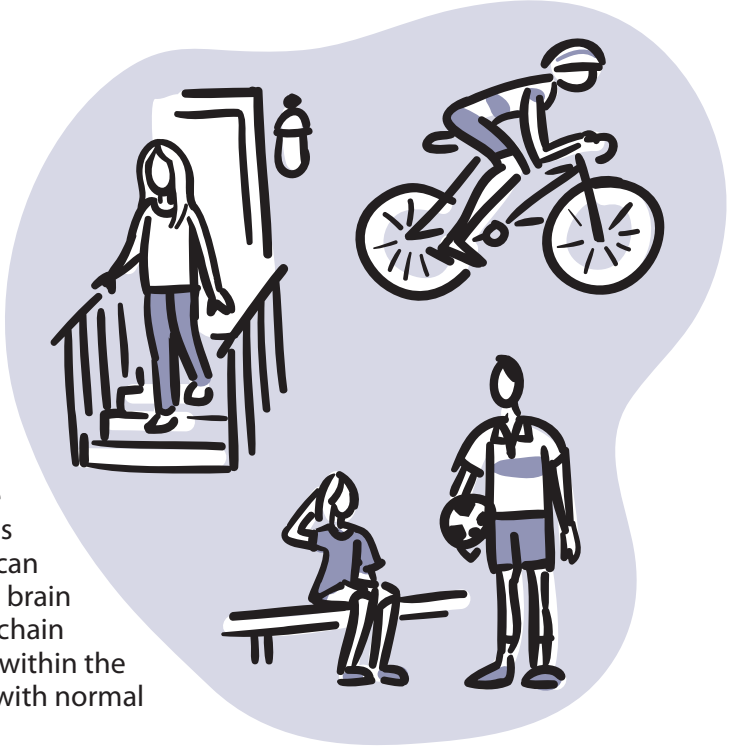
A Bang to the Brain

What We Know About Concussions



Your brain is your body's command center. Its soft, sensitive tissues float in a cushioning fluid within the hard and sturdy skull. But a swift blow to the head or violent shaking can override these protections and lead to a mild type of brain injury known as a concussion.

More than 1 million mild traumatic brain injuries occur nationwide each year. These injuries can be caused by falls, car crashes or recreational activities like bike riding, skateboarding, skiing or even playing at the playground. More than half of concussions occur in children—often when playing organized sports such as football and soccer.

"Although concussions are considered to be a mild brain injury, they need to be taken seriously. They should not be treated as minor injuries that quickly resolve," says Dr. Beth Ansel, an expert on rehabilitation research at NIH. With proper care, most people recover fully from a concussion. "But in some cases, a concussion can have a lasting effect on thinking, attention, learning and memory," Ansel adds.

A single concussion is also known to raise your risk for having another concussion—and a second concussion may be more severe. It's important to learn to recognize the causes and symptoms of concussion so you can take steps to prevent or treat these head injuries.

"The skull is designed to prevent most traumas to the brain, but it doesn't really prevent the brain from moving around inside the skull," says Dr. Frederick Rivara, a specialist in pediatric injuries and prevention at the University of Washington in Seattle. "A concussion can arise from the brain moving either rapidly back and forth or banging against the side of the skull." This sudden movement can stretch and damage brain tissue and trigger a chain of harmful changes within the brain that interfere with normal brain activities.

More serious brain injuries that involve skull fracture, bleeding in the brain or swelling of the brain can be detected with X-rays or other imaging methods. But concussions can be more difficult to identify.

"A concussion isn't visible from the outside, and you can't see it with standard imaging tools like MRI and CAT scans," says Dr. Christopher Giza, a pediatric brain specialist at the University of California, Los Angeles. "Instead we look for the signs and symptoms of abnormal brain function to make a diagnosis."

Common symptoms include nausea, headache, confusion, dizziness and memory problems. Loss of consciousness occurs in about 1 in 10 concussions. A person with a concussion might have trouble answering basic questions and move in an awkward, clumsy way.

"Symptoms can arise quickly, or they can be delayed and appear over the next day or two," Rivara adds.

For about 9 in 10 people with concussions, symptoms disappear within 7 to 10 days. Scientists have been working to learn more about those who take longer to recover. In one NIH-funded study, Dr. Keith Yeates of Ohio State University looked at 8- to 15-year-olds treated in an emergency room for mild traumatic brain injury.

"We found that the majority of these kids recovered quite quickly or showed no increase in symptoms at all," Yeates says. "But a subgroup of kids, about 10% or 20%, showed a dramatic onset of symptoms after

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their injury and persistent symptoms that in some cases remained even 12 months after the injury."

Body-related symptoms, such as headache and dizziness, tended to fade fairly quickly, the researchers found. But thinking-related symptoms, including problems with memory and paying attention, tended to linger in some kids throughout the year-long study. Children who had lost consciousness or had some additional abnormality that showed up on MRI scans after the injury had an increased risk for lasting problems.

"These kids were also more likely to have what looked like significant reductions in overall quality of life. And there was some evidence they were more likely to have academic problems than the kids without persistent symptoms," Yeates says.

Yeates and others continue to explore ways to predict a person's response to concussion. Much remains unknown about the underlying biology and outcomes of mild head injuries. Some NIH-funded researchers are looking at how injury and recovery processes differ in immature and adult brains. Other scientists are examining the problems that can arise from repeated injuries to the brain.

Researchers know that immediately after a concussion, the brain is especially vulnerable to having a second, more serious injury. But it's not clear why—or how long that vulnerable period lasts. Giza and his colleagues have found that a single mild injury reduces the brain's use of the sugar glucose as a fuel, at least in rats. A second mild injury 24 hours later leads to an even steeper drop in glucose use and memory problems that last longer. But when the brain has several days to recover, and the use of glucose returns to normal, a second mild brain injury seems to be no worse than the first.

"The finding suggests that when you superimpose 2 injuries on top of each other, the consequences can be greater," Giza says. The brain's use of glucose might be a way to assess risk and recovery time. "But we don't yet have a clear understanding of what happens in the human brain after first and second injuries," Giza adds.

Studies have found that the risk for a second injury is greatest in the 10 days following an initial concussion. If you suspect that someone has a concussion, make sure they stop whatever activity they're doing, especially if they're involved in a sport. Their brain dysfunction might not only cloud their thinking. It can also slow reaction times and affect their balance so they become more likely to have another injury.

"If someone has symptoms of concussion, they shouldn't try to finish the quarter or finish the game. They need to be taken out of play right away and be seen by a health care provider," Rivara says. "The current recommendations are to avoid physical activity for a period of time until all the symptoms have resolved, and then have a gradual return to play."

Take steps to avoid concussions. "Wear helmets when appropriate, such as if you're bicycling, skateboarding or riding a horse," says Rivara. Athletes can decrease their risk of concussion by wearing proper headgear and following the rules of good sportsmanship. Make living areas safer for seniors by removing tripping hazards such as throw rugs and clutter in walkways, and install handrails on both sides of stairways.

"The bottom line is that we still need to determine the best ways to prevent, accurately diagnose, treat and assess outcomes after mild traumatic brain injury," says Ansel.

While this research continues, do what you can to prevent concussions. Learn to recognize the symptoms. And make sure that people with signs of concussion stop their activities and seek medical attention. ■

Wise Choices
Symptoms of Concussion

Stop activity if you have these symptoms. Athletes should not return to play until evaluated by a health care provider.

- Headache or "pressure" in head
- Nausea or vomiting
- Balance problems or dizziness
- Double or blurry vision
- Sensitivity to light or noise
- Feeling sluggish or groggy
- Concentration or memory problems
- Confusion
- Feeling "down" or "not right"
- Changes to sleep patterns

Adapted from the U.S. Centers for Disease Control and Prevention

Web Links

For more information about concussion, click the "Links" tab at:
http://newsinhealth.nih.gov/issue/May2013/Feature1

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On Sound Footing

The Health of Your Feet

Your feet are pretty small, considering they have to support the entire height and weight of your body. But they can cause big problems. So pay some attention to your feet.

"Feet don't get any respect," says Dr. Marian T. Hannan, who studies foot disorders at the Institute for Aging Research at Hebrew SeniorLife. "They're sort of the Rodney Dangerfield of the human body."

Each step you take involves a remarkably intricate network of bones, muscles, tendons and ligaments. That complexity—combined with all the weight they carry—accounts for why feet can be so prone to problems, including bone fractures, arthritis and plantar fasciitis, a swelling of the thick band of tissue that runs along the bottom of the foot.

If left untreated, foot problems may worsen. Eventually, the pain could interfere with your ability to do even the most basic things like walking up stairs or down the street. If pain alters the way you walk, it can lead to pain in your knees, hips and back as well. These problems can multiply, limiting your activity and affecting your quality of life.

Several things can contribute to foot pain or numbness. Sports and physical activity can cause your feet to hurt or become numb. Going too far, too fast or not warming up properly before exercise can set you up for painful or numbing injuries.

Excess weight puts extra stress on your feet. Poorly fitting shoes and other footwear are common causes of foot problems as well.

Health problems can also affect the feet. Lack of feeling in your feet could be a sign of a serious illness, such as diabetes or a nerve disorder. See your health care provider if you have unusual numbness in your feet or foot pain that is severe, comes on suddenly, or doesn't improve with simple measures such as rest or over-the-counter pain medications.

"The good news is that most foot disorders are either treatable or modifiable," Hannan says. "The first thing that you can do is notice and keep track of it to see if there's a pattern to it." Once you figure out when you feel pain or numbness, she explains, talk to an expert who can help.

How you walk and move affects your feet. Part of that is inherited. "Not only do our feet look like our parents' but we also walk like our parents," Hannan says. But you can modify your gait—either with training or by changing shoes or using shoe inserts or pads.

You can help keep your feet healthy by wearing comfortable, well-fitting shoes. Wash your feet regularly (especially between your toes), wear clean socks and try to rotate your shoes to give them time to air out.

"The more you exercise your feet, the better the blood flow is to the feet, and that's important for general foot health," Hannan says.

Walking is a great way to exercise your feet. You can also try specific foot exercises. Sit down and rotate your ankles in one direction, then the other. In bare feet, sit in a chair and curl your toes, then spread them out. This helps stretch and strengthen your feet to help you balance.

Seeing what someone's foot looks like is incredibly informative, Hannan says. "I think we're going to be seeing a lot more health care providers paying attention to the feet," she predicts. ■

Wise Choices
Foot Health Tips

- Use appropriate, well-fitting footwear.
- Wear clean socks.
- Keep your feet clean.
- Exercise your feet.
- If you're overweight, try to lose weight.
- Avoid standing long hours.
- When exercising or playing in sports, build up gradually.
- If you have diabetes, examine your feet regularly for problems like cuts, bruises, blisters, sores or swelling.

Web Links

For more about healthy feet, click the "Links" tab at:
http://newsinhealth.nih.gov/issue/May2013/Feature2

Health Capsules

For links to more information, see these stories online:
http://newsinhealth.nih.gov/issue/May2013/Capsule1

Ex-Smokers Gain Health Benefits Despite Added Pounds

Quitting smoking can improve your heart health even if you gain a little weight, a new study suggests. The findings underscore the importance of putting a stop to smoking.

Cigarette smoking causes about 1 in 5 deaths nationwide each year. Smoking can harm nearly every organ in your body, including the heart, lungs, eyes and digestive organs. **Cardiovascular** and other health risks drop dramatically when smokers quit. But quitting can also lead to weight gain, and obesity is a risk factor for cardiovascular disease, including heart attack, stroke and heart failure. So health professionals wondered whether the weight gain might counteract the health benefits of quitting.

To learn more, NIH scientists and their colleagues analyzed data from more than 3,000 adults. People without diabetes who quit smoking had about half the risk of cardiovascular problems as those who smoked. A similar benefit was seen among people with diabetes. But the study didn't have enough participants with diabetes to determine if this finding was due to chance.

Recent quitters gained about 6 pounds over a 4-year period. A smaller weight gain, about 2 pounds, was seen in smokers, nonsmokers and smokers who'd quit more than 4 years before. The researchers found that, despite gaining weight, participants who stopped smoking maintained their lower risk of cardiovascular disease.

"Our findings suggest that a modest weight gain, around 5 to 10 pounds, has a negligible effect on the net benefit of quitting smoking," says study co-author Dr. Caroline S. Fox of NIH. The researchers plan to conduct follow-up studies to determine whether this finding holds among people with diabetes. ■

Definitions

Cardiovascular
The system of heart and vessels that circulates blood through the body.

Allergies and Complementary Medicine

When trees, flowers and grasses start to bloom each year, you might find yourself feeling awful if you suffer from seasonal allergies, or "hay fever." It's caused by a reaction to the pollens released by many plants in the spring, summer or fall. Symptoms can include runny nose, scratchy throat, nasal congestion, sneezing, and itchy, red or watery eyes.

Many people manage their seasonal allergy symptoms by taking medications, such as antihistamines or decongestants. But some people try complementary health approaches, such as saline nasal irrigation, butterbur, honey, acupuncture and other practices.

If you're considering any of these complementary methods for the relief of seasonal allergy symptoms, be sure to learn what the science says. Get details at http://nccam.nih.gov/health/allergies.

This new NIH web page can help you learn about specific complementary practices. Get an overview of the current evidence on effectiveness and safety. And always remember to talk to your health care provider about the best ways to manage your seasonal allergy symptoms. ■

Featured Website
NIH BRAIN Initiative

http://www.nih.gov/science/brain/

The NIH BRAIN Initiative aims to revolutionize our understanding of the human brain. Learn more about wide-ranging research efforts to uncover the complexities of this mysterious organ. Find videos, fact sheets and more.

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