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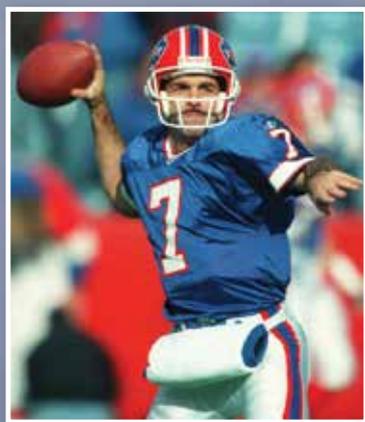
# NIIH MedlinePlus

SUMMER 2015

the magazine



Therapy Dogs  
Inside...



## DOUG FLUTIE

Star College and Pro Quarterback

*"I had two concussions with  
memory loss."*

## Sports and

# Concussion

### Worried Sick?

Millions of Americans suffer from long-term anxiety disorders. Learn ways to deal with anxiety.

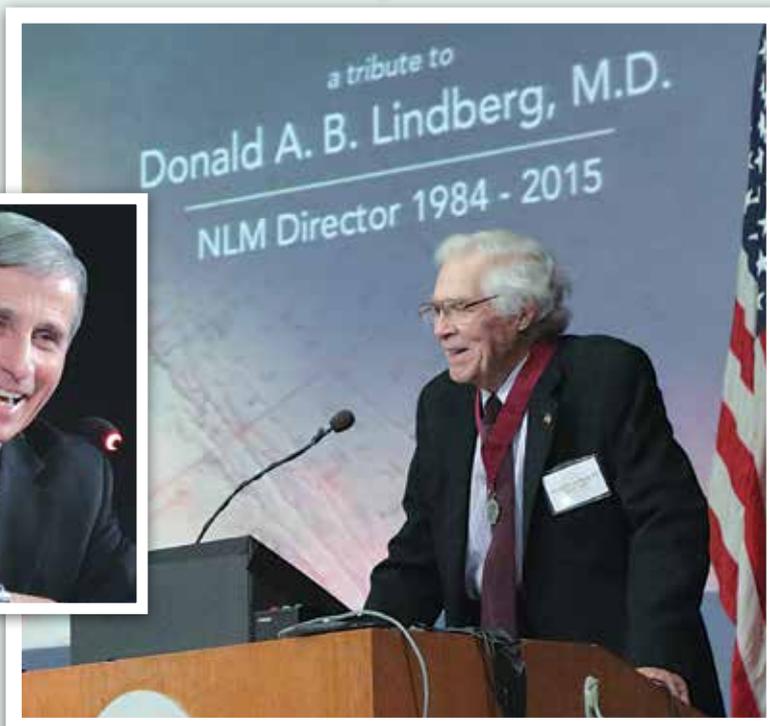
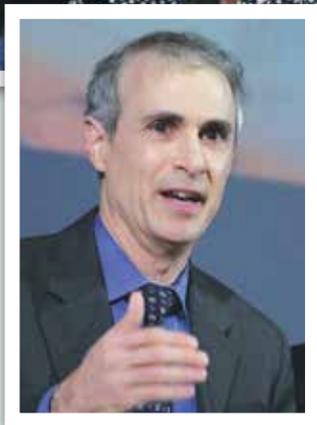
### Healthy Sleep

Is it hard to fall asleep or stay asleep? Do you wake up feeling tired? Tips for getting a healthy good night's sleep.

### Vaccinations for Adults

Did you know adults need vaccines, too? Without them you're not protected against a number of serious diseases.

## Colleagues Pay Tribute to Dr. Donald A.B. Lindberg, Retiring After Three Decades of NLM Leadership



Dr. Vivian Pinn (upper left), Peter Reinecke (lower left), Dr. Anthony Fauci (center), outgoing NLM Director Dr. Donald A.B. Lindberg (above right).

Photos: Ernie Branson, NIH

On March 30, 2015, the Friends of the National Library of Medicine joined with leaders from across the National Institutes of Health and across the library, informatics, and related arenas to honor Donald A.B. Lindberg, MD, as he retired as NLM's director after 30-plus years of outstanding leadership and service. The tributes reflect the range of Don's influence and inspiration.

NIH Director Francis Collins, MD, PhD, kicked off the accolades by praising Don's vision and his passion for transforming access to medical information. "He's been committed all along to delivering high quality health information to all," Collins said.

Don accomplished that by weaving together medical information and computer technology in ways that might have once been considered unrealistic. Along the way, he shaped the entire field of medical informatics and helped establish the National Center for Biotechnology Information (NCBI), a course-changing development that could not have happened without significant support from Congress.

Peter Reinecke, former staffer to Congressman Claude Pepper, remembered the impact Don made when he came to Capitol Hill to brief Pepper on his vision for NCBI. "Dr. Lindberg immediately captivated Congressman Pepper with his explanation of why the Center was so important; why it needed to be at the National Library of Medicine; and the impact it could have," Reinecke said. With Pepper's support, Don changed the path of NLM and of biomedical research.

Vivian Pinn, MD, former Director of the Office of Research on Women's Health, commended Don for his collaborative work on

ClinicalTrials.gov, which helped involve more women and minorities in clinical studies. "Establishing ClinicalTrials.gov really made a difference for us, our outreach, and our purpose," she said.

Anthony Fauci, MD, Director of the National Institute of Allergies and Infectious Diseases agreed. "The kind of capabilities you put at our fingertips made what we do possible."

On that score, we're all in agreement, and I join Dr. Collins in being amazed at how Don understood what capabilities we would need years before the rest of us.

They say that hindsight is 20/20, but Don Lindberg showed that foresight can, at times, be just as accurate. He envisioned a captivating, expansive future and brought it to fruition. NLM, NIH, bioinformatics, librarianship, and so many other areas owe so much of their present success and future accomplishments to Don's vision and his leadership. We have all been exceedingly fortunate to have had him at the NLM helm all these years.

*"The kind of capabilities you put at our fingertips made what we do possible."*

*—Anthony Fauci, MD, Director of the National Institute of Allergy and Infectious Diseases.*

Glen P. Campbell, Chairman  
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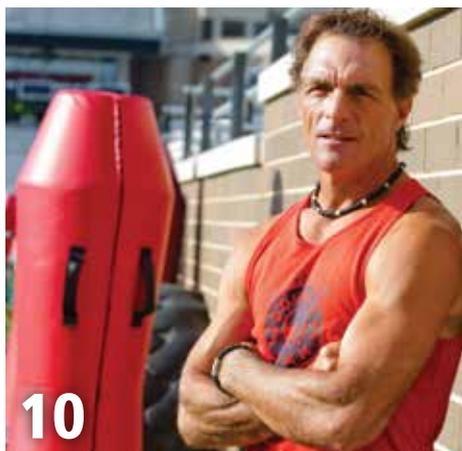
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Photos: (Cover and Inset) Doug Flutie, (Top) iStock, (Center) iStock, (Bottom) Ernie Branson, NIH.

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**Donald A.B. Lindberg, MD**  
Pioneering Leader for Medicine and  
Computers Retires as Director of the  
National Library of Medicine

# Charting A New Course...

*Remarks by NIH Director  
Francis S. Collins, MD, PhD*



► In 1989, enthusiastic NLM and NIH supporter Claude Pepper, the former US Senator and Representative (D-FL), talks with Dr. Lindberg and National Center for Biotechnology Information Director Dr. David Lipman (center) at a Capitol Hill reception following the passage of Pepper's bill creating NCBI.



It is my honor to recognize and congratulate one of the longest-serving leaders at NIH and a pioneer in applying computer and communications technology to biomedical research, health care, and the delivery of health information wherever it is needed.

Donald A.B. Lindberg, MD, who has been director of the National Library of Medicine for more than 30 years, has recently retired. I want to thank Don for his outstanding service to NIH, to the global biomedical research community, and to health professionals, patients, and the public.

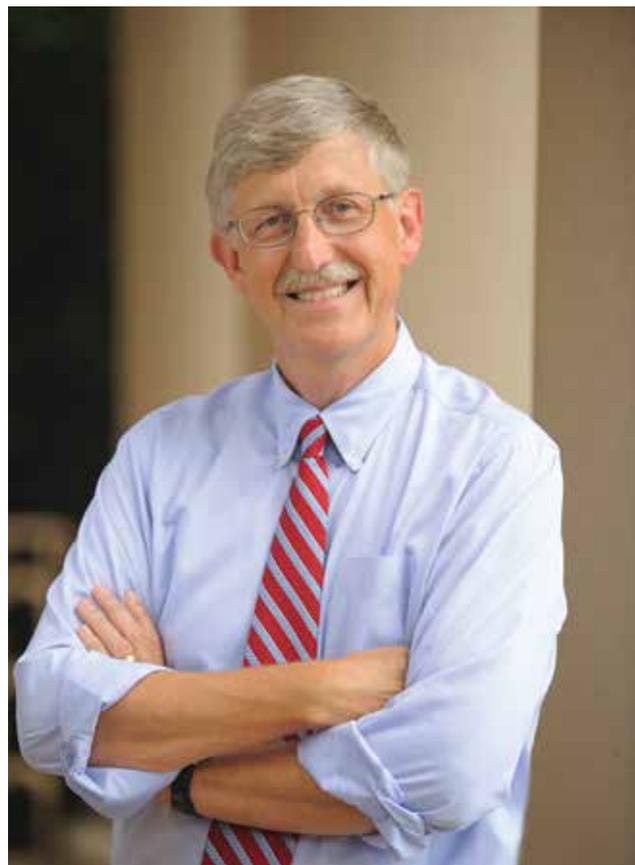
Trained as a pathologist, Don re-invented himself as an expert and groundbreaking innovator in the world of information technology, artificial intelligence, computer-aided medical diagnosis, and electronic health records. As the first President of the American Medical Informatics Association, Don is considered by many to be the country's senior statesman for medicine and computers.

Don has created programs that changed fundamentally the way biomedical information is collected, shared, and analyzed. Think about it—when Don began, NLM had no electronic journals in its collection, few people owned personal computers, and even fewer had access to the Internet. He introduced numerous landmark projects, such as free Internet access to MEDLINE via PubMed, MedlinePlus for the general public, the Visible Human Project, ClinicalTrials.gov, the Unified Medical Language System, and more.

Don also created the National Center for Biotechnology Information (NCBI). NCBI has been a focal point for “Big Data” in biomedicine for decades, providing rapid access to the data generated by the Human Genome Project and now to massive amounts of genetic sequence data generated from evolving high-throughput sequencing technologies. GenBank, PubMed Central, and dbGaP are just some of the many NCBI databases that support and enable access to the results of research funded by NIH and many other organizations.

While serving as NLM's director, Don was drafted to lead important interagency programs. He was the founding Director of the National Coordination Office for High Performance Computing and Communications in the President's Office of Science and Technology Policy and was named by the HHS Secretary to be the U.S. National Coordinator for the G-7 Global Healthcare Applications Project. He has always been ahead of the curve in taking advantage of new developments in computing and networking, ensuring that the NLM computer center has the reliability, security, and high-speed connections necessary to keep pace with rapidly rising demands.

Don has been equally concerned with delivering high-quality health information to everyone, including health professionals and the public in disadvantaged rural areas and inner cities. He established NLM's important outreach initiatives, expanding the scope of the National Network of Libraries of Medicine and entering into longstanding and successful partnerships with minority serving institutions, tribal and community-based organizations, and the public health community. Don is not a self-promoter, so sometimes these trailblazing efforts seem to appear magically. Those of us who know better, however, under-



▲ NIH Director Francis S. Collins, MD, PhD

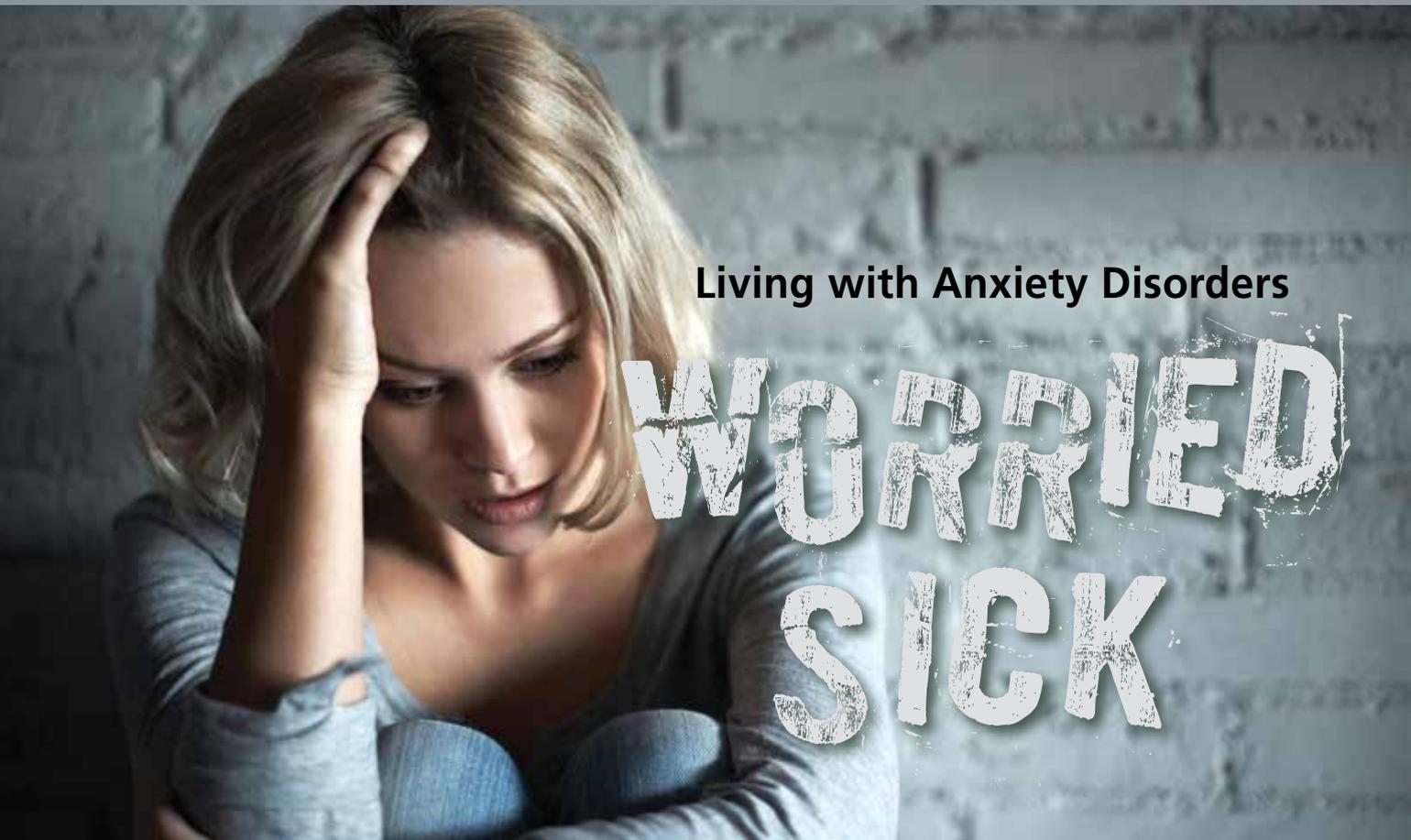
“Don has been equally concerned with delivering high-quality health information to everyone, including health professionals and the public in disadvantaged rural areas and inner cities.”

—NIH Director  
Francis S. Collins, MD, PhD

stand they came about because of Don's tireless energy, scientific acumen, and unwavering focus and determination.

We will miss Don as a preeminent leader at NIH, who brought NLM into the modern age of biomedical information. We also, however, will continue to benefit from his wisdom, drive, and accomplishments. Please join me in congratulating Don on a job extraordinarily well done and wishing him the best in his future pursuits.

Francis S. Collins, MD, PhD  
Director, National Institutes of Health



## Living with Anxiety Disorders

**WORRIED  
SICK**

If you have an anxiety disorder, you're not alone. Each year, tens of millions of Americans of all ages suffer from long-term anxiety. Among children, anxiety disorders are the most common form of mental illness—one they may carry into adulthood.

**A**nxiety is an uneasy feeling that something may harm you or a loved one. This feeling can be normal and sometimes even helpful. If you're starting a new job or taking a test, it might make you more alert and ready for action. But sometimes anxiety can linger or become overwhelming. When it gets in the way of good health and peace of mind, it's called an anxiety disorder.

"Everybody has anxiety," says Dr. Daniel Pine, a psychiatrist and an NIH neuroscientist. "The tricky part is how to tell the difference between normal and abnormal anxiety."

For those with anxiety disorders, fears, worries, and anxieties can cause so much distress that they interfere with daily life. The anxiety grows out of proportion to the stressful situation or occurs when there is no real danger.

Anxiety activates the body's stress response. Nearly all the cells, tissues, and organs in your body go on high alert. This stress response can wear your body down over time. People with chronic (long-term) anxiety have a higher risk of both physical and mental health problems. Some people visit their doctors because of head-

aches, racing heart, or other physical complaints without realizing that these symptoms may be connected to how anxious they feel.

NIH-funded researchers are working to learn more about anxiety disorders. They have discovered that these conditions are caused by some combination of your genes and your environment. However, the precise events that lead to anxiety disorders are still unknown. Scientists are also searching for better ways to diagnose, prevent, and treat these conditions.

Treatment for anxiety disorders usually includes both medication and cognitive behavioral therapy (CBT). CBT is a form of talk therapy. It helps people change both the thinking patterns that support their fears and the way they react to anxiety-provoking situations. Current treatments can be highly effective for most people.

Dr. Denise Chavira, a psychologist at the University of California, San Diego, works with anxious youth in underserved, rural areas. Her team is studying ways to make CBT more accessible to these children, who may have trouble getting to therapy sessions. To help make up for the lack of in-person contact, the researchers are examining telephone and self-help approaches that focus on

teaching parents how to use CBT skills with their children.

In one study, the scientists are comparing CBT training delivered to parents by phone versus in-person CBT provided to anxious youth and their parents. With a therapist's help, parents and kids create lists of anxiety-producing situations. They learn how to face their fears gradually while using CBT coping skills. Both methods encourage parents to model brave behaviors for kids, and to let kids learn how to be independent.

**“These disorders put a huge burden on the individual, the family, and society,” Bishop says. “Anxiety disorders are one of the most common reasons that people visit their primary healthcare provider.”**

NIH-funded researchers are also using advanced imaging tools to pinpoint the areas in the brain that underlie anxiety disorders. Still in its very early stages, this approach represents a major shift from how doctors usually diagnose mental illness, which is by looking at symptoms and behaviors. Using an imaging technique called functional MRI (fMRI), scientists are scanning the brain in action as it thinks, remembers, feels emotion, and regulates the body's reactions to things that cause anxiety.

Dr. Sonia Bishop of the University of California, Berkeley, uses fMRI to study people at high risk for anxiety disorders. Her team hopes to prevent anxiety disorders before patients enter a downward spiral. The researchers are working to develop a new type of CBT-related treatment that helps to retrain how patients regulate their emotions and attention.

“These disorders put a huge burden on the individual, the family, and society,” Bishop says. “Anxiety disorders are one of the most common reasons that people visit their primary health care provider.”

If you are troubled by anxiety, the first person to see is your family doctor or nurse practitioner. He or she can check for any underlying physical illness or a related condition. You may be referred to a mental health specialist, who might help to identify the specific type of anxiety disorder and the appropriate treatment. With proper care, most people with anxiety disorders can lead normal, fulfilling lives.

# No More Constant Fear

***“No matter how bad things seem, you were meant to win.”***

**Wills Murray, who suffered for most of his life with generalized anxiety disorder (GAD) and panic attacks, describes here how he sought help to turn his life around.**



▲ Wills Murray is a golf coach in Orlando, Florida.

My earliest childhood memories are of constant fear. A skinny kid with crooked teeth, somewhat shy and reserved with social anxiety, I was an easy target for bullies, which made my issues even more difficult to handle. I never spoke to anyone about my feelings because I felt they were my fault.

At the age of five I started playing baseball. As I got older it became clear I was very gifted. I saw the joy that my family and peers got when I played well, and for the first time I found a place where I wasn't scared and didn't feel inferior. I didn't understand that my self-worth shouldn't depend on other people. Baseball was my key to happiness and making people like me. I had friends, my family was happy, and everything was great as long as baseball was going well.

## Happiness ... Gone

Going into my senior year of high school, I was highly recruited to play college baseball. But in December of that year I suffered a knee injury that ended my baseball career.

My key to happiness was gone. The feelings I had covered up for years returned—and much worse than ever. I turned to alcohol, even though I didn't really enjoy drinking. I stayed in my room with no lights on for days at a time. Sometimes I slept for three days, sometimes 18 hours a day. During this period my grandfather passed away, my best friend was sent to jail, and I saw no hope of ever having a meaningful life. I reached the point of feeling that everyone would be better off, including myself, if I wasn't around anymore. I tried to end my life with alcohol and prescription drugs.

## Rebuilding Myself

Thankfully, I chose to get help through a counselor. I was diagnosed with generalized anxiety disorder (GAD) including panic attacks. I discovered that my feelings were coming from a subconscious thought of always expecting a crisis to occur. I was preparing my body for some sort of emotional trauma, which caused a problem with my fight - or flight-response. Once I learned to rationally look at my surroundings and myself, I became capable of controlling my emotions and my reactions to these emotions.

And I began the process of rebuilding myself by taking up golf. And I decided that being a golf coach would be my platform to reach people. My first golf coach, the late Barry McCann, had told me that I had a special gift and I should go after my dream of being a PGA tour coach. I moved to Orlando, Florida, to learn from Sean Foley, a coach I admired more than anybody. He has become a great friend and mentor and he has taught me many lessons to help me understand that my thinking about myself was the key to everything. The well-known sports coach Paul Dewland has also helped me understand how thinking creates feeling.

Golf is my platform to tell this story. No matter how bad things seem, you were meant to win. With faith, people who care, professional help, and the desire to change, anything is possible. Take it from someone who once no longer wanted to live and who now loves every single day.

—Courtesy of the Anxiety and Depression Association of America

## There are several kinds of anxiety disorders. The major types include:

- **Generalized anxiety disorder (GAD).** All of us worry about things like health, money, or family problems. But people with generalized anxiety disorder (GAD) are extremely worried about these and many other things, even when there is little or no reason to worry about them. They are very anxious about just getting through the day. They think things will always go badly. At times, worrying keeps people with GAD from doing everyday tasks.
- **Panic disorder.** People with panic disorder have sudden and repeated attacks of fear that last for several minutes. Sometimes symptoms may last longer. These are called panic attacks. Panic attacks are characterized by a fear of disaster or of losing control even when there is no real danger. A person may also have a strong physical reaction during a panic attack. It may feel like having a heart attack. Panic attacks can occur at any time, and many people with panic disorder worry about and dread the possibility of having another attack.
- **Social anxiety disorder (social phobia).** Social phobia is a strong fear of being judged by others and of being embarrassed. This fear can be so strong that it gets in the way of going to work or school or doing other everyday things. Everyone has felt anxious or embarrassed at one time or another. For example, meeting new people or giving a public speech can make anyone nervous. But people with social phobia worry about these and other things for weeks before they happen.

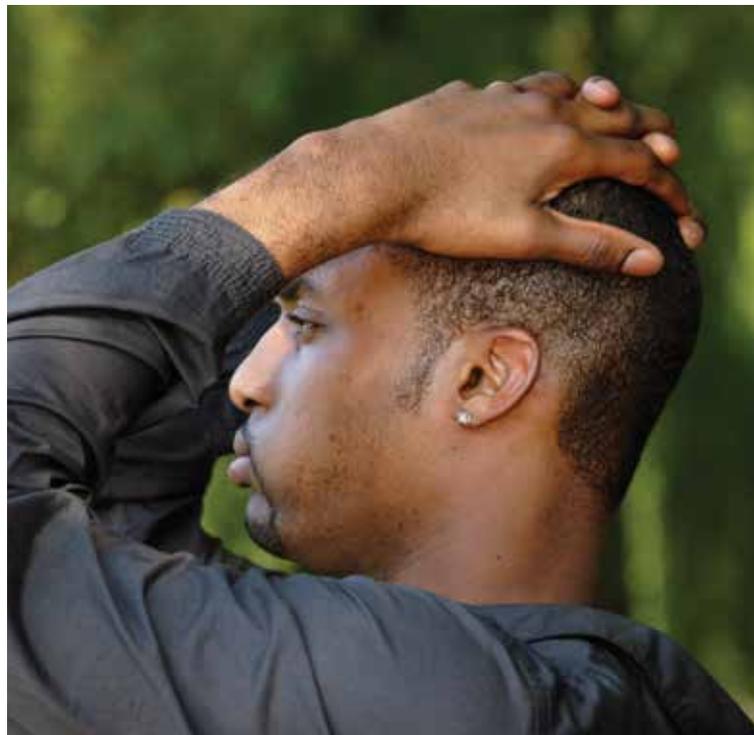
**Closely related** to anxiety disorders, but now considered categories of their own, are **obsessive-compulsive disorder (OCD)** and **post-traumatic stress disorder (PTSD)**.

- **Obsessive-compulsive disorder.** OCD is persistent, upsetting thoughts (obsessions) and repetitive rituals (compulsions), like hand washing, counting, checking, or cleaning. These behaviors are done in the hope of preventing the thoughts or making them go away.
- **Post-traumatic stress disorder.** PTSD is caused by trauma. This condition leads to flashbacks, nightmares, and insomnia. Often accompanied by depression or substance abuse, post-traumatic stress disorder can occur at any age, including childhood.

## Diagnosis and Treatment

Anxiety disorders are treatable. If you think you have an anxiety disorder, talk to your doctor.

Sometimes a physical evaluation is advisable to determine whether a person's anxiety is associated with a physical illness. If anxiety is diagnosed, the pattern of co-occurring symptoms should be identified, as well as any coexisting conditions, such as depression or substance abuse. Sometimes alcoholism, depression, or other coexisting conditions have such a strong effect on the individual that treating the anxiety should wait until the coexisting conditions are brought under control.



If your doctor thinks you may have an anxiety disorder, the next step is usually seeing a mental health professional. It is advisable to seek help from professionals who have particular expertise in diagnosing and treating anxiety. Certain kinds of cognitive and behavioral therapy and certain medications have been found to be especially helpful for anxiety.

You should feel comfortable talking with the mental health professional you choose. If you do not, you should seek help elsewhere. Once you find a clinician with whom you are comfortable, the two of you should work as a team and make a plan to treat your anxiety disorder together.

In general, anxiety disorders are treated with medication, specific types of psychotherapy, or both. Treatment choices depend on the type of disorder, the person's preference, and the expertise of the clinician.

Most insurance plans, including health maintenance organizations (HMOs), will cover treatment for anxiety disorders. Check with your insurance company and find out.

# What Medications Are Used to Treat Anxiety Disorders?

Medication does not necessarily cure anxiety disorders, but it often reduces the symptoms. Medication typically must be prescribed by a doctor. A psychiatrist is a doctor who specializes in mental disorders. Many psychiatrists offer psychotherapy themselves or work as a team with psychologists, social workers, or counselors who provide psychotherapy. The principal medications used for anxiety disorders are antidepressants, anti-anxiety drugs, and beta-blockers. Be aware that some medications are effective only if they are taken regularly and that symptoms may recur if the medication is stopped.

Choosing the right medication, medication dose, and treatment plan should be based on a person's individual needs and medical situation, and done under an expert's care. Only an expert clinician can help you decide whether the medicine's ability to help is worth the risk of a side effect. Your doctor may try several medicines before finding the right one.

## Antidepressants

Antidepressants were developed to treat depression, but they also help people with anxiety disorders. They are commonly prescribed for panic disorder, OCD, PTSD, and social anxiety disorder.

Some tricyclic antidepressants work well for anxiety. Monoamine oxidase inhibitors (MAOIs) are also used for anxiety disorders.

## Benzodiazepines (anti-anxiety medications)

The anti-anxiety medications called benzodiazepines can start working more quickly than antidepressants.

## Beta-blockers

Beta-blockers control some of the physical symptoms of anxiety, such as trembling and sweating.



Choosing the right medication, medication dose, and treatment plan should be based on a person's individual needs and medical situation, and done under an expert's care.

## Find Out More

- ✓ **National Institute of Mental Health (NIMH)**  
NIMH has a library of free, up-to-date booklets on anxiety disorders. [www.nimh.nih.gov/health/publications/anxiety-disorders-listing.shtml](http://www.nimh.nih.gov/health/publications/anxiety-disorders-listing.shtml)
- ✓ **Adults: Anxiety Disorders – Research Studies**  
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- ✓ **MedlinePlus.gov**  
Type "anxiety disorders" in Search box
- ✓ **NCCIH Clearinghouse**  
Provides information on complementary and integrative health approaches. [nccih.nih.gov](http://nccih.nih.gov)
- ✓ **Anxiety and Depression Association of America**  
[www.adaa.org](http://www.adaa.org)





To be effective, therapy must be directed at the person's specific anxieties and must be tailored to his or her needs.

## Cognitive Behavioral Therapy (CBT)

CBT (sometimes called "talk therapy" or psychotherapy) involves talking with a trained clinician, such as a psychiatrist, psychologist, social worker, or counselor, to understand what caused an anxiety disorder and how to deal with it.

CBT can be useful in treating anxiety disorders. It can help people change the thinking patterns that support their fears and change the way they react to anxiety-provoking situations.

For example, CBT can help people with panic disorder learn that their panic attacks are not really heart attacks and help people with social phobia learn how to overcome the belief that others are always watching and judging them. When people are ready to confront their fears, they are shown how to use exposure techniques to desensitize themselves to situations that trigger their anxieties.

Exposure-based treatment has been used for many years to treat specific phobias. The person gradually encounters the object or situation that is feared, perhaps at first only through pictures or tapes, then later face-to-face. Sometimes the therapist will accompany the person to a feared situation to provide support and guidance. Exposure exercises are undertaken once the patient decides he is ready for it and with his cooperation.

To be effective, therapy must be directed at the person's specific anxieties and must be tailored to his or her needs. A typical "side effect" is temporary discomfort involved with thinking about confronting feared situations.

CBT may be conducted individually or with a group of people who have similar problems. Group therapy is particularly effective for social phobia. Often "homework" is assigned for participants

to complete between sessions. If a disorder recurs at a later date, the same therapy can be used to treat it successfully a second time.

Medication can be combined with psychotherapy for specific anxiety disorders, and combination treatment has been found to be the best approach for many people.

Some people with anxiety disorders might benefit from joining a self-help or support group and sharing their problems and achievements with others. Internet chat rooms might also be useful in this regard, but any advice received over the Internet should be used with caution, as Internet acquaintances have usually never seen each other and false identities are common. Talking with a trusted friend or member of the clergy can also provide support, but it is not necessarily a sufficient alternative to care from an expert clinician.

Stress management techniques and meditation can help people with anxiety disorders calm themselves and may enhance the effects of therapy. There is preliminary evidence that aerobic exercise may have a calming effect. Since caffeine, certain illicit drugs, and even some over-the-counter cold medications can aggravate the symptoms of anxiety disorders, avoiding them should be considered. Check with your physician or pharmacist before taking any additional medications.

The family can be important in the recovery of a person with an anxiety disorder. Ideally, the family should be supportive but not help perpetuate their loved one's symptoms. Family members should not trivialize the disorder or demand improvement without treatment.

# Safe Use of Complementary Health Products and Practices for Anxiety

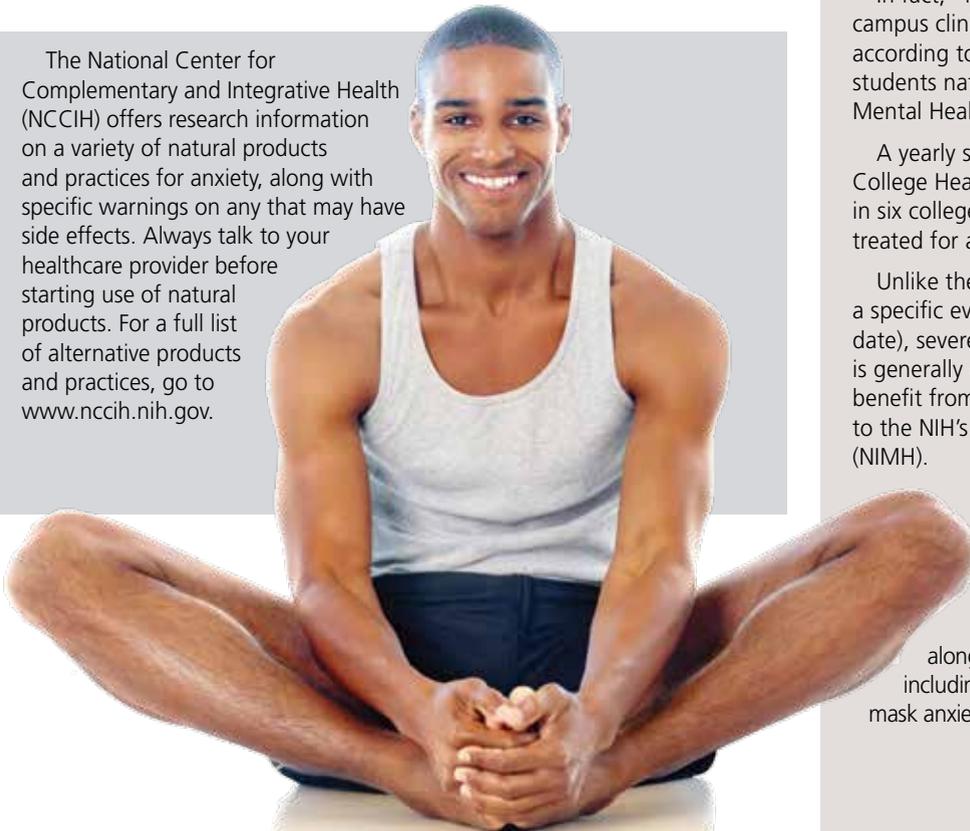
Research studies funded by the NIH's National Center for Complementary and Integrative Health (NCCIH) have investigated several natural products and mind and body practices for anxiety. As with any treatment, it is important to consider safety before using complementary health products and practices. Safety depends on the specific therapy, and each complementary product or practice should be considered on its own.

Mind and body practices such as meditation and yoga, for example, are generally considered to be safe in healthy people when practiced appropriately. Natural products such as herbal medicines or botanicals are often sold as dietary supplements and are readily available to consumers; however, there is a lot we don't know about the safety of many of these products, in part because a manufacturer does not have to prove the safety and effectiveness of a dietary supplement before it is available to the public.

Two of the main safety concerns for dietary supplements are:

- The possibilities of drug interactions—for example, research has shown that St. John's wort interacts with drugs, such as antidepressants, in ways that can interfere with their intended effects.
- The possibilities of product contamination—supplements have been found to contain hidden prescription drugs or other compounds, particularly in dietary supplements marketed for weight loss, sexual health, including erectile dysfunction, and athletic performance or body-building.

The National Center for Complementary and Integrative Health (NCCIH) offers research information on a variety of natural products and practices for anxiety, along with specific warnings on any that may have side effects. Always talk to your healthcare provider before starting use of natural products. For a full list of alternative products and practices, go to [www.nccih.nih.gov](http://www.nccih.nih.gov).



## Anxiety and College Students

"Anxiety has now surpassed depression as the most common mental health diagnosis among college students," even though depression is also increasing among young people.

In fact, "more than half of students visiting campus clinics cite anxiety as a health concern", according to a recent study of more than 100,000 students nationwide by the Center for Collegiate Mental Health at Penn State.

A yearly survey conducted by the American College Health Association found that "nearly one in six college students has been diagnosed with or treated for anxiety within the last 12 months."

Unlike the relatively mild, brief anxiety caused by a specific event (such as speaking in public or a first date), severe anxiety that lasts at least six months is generally considered to be a problem that might benefit from evaluation and treatment, according to the NIH's National Institute for Mental Health (NIMH).

Each anxiety disorder has different symptoms, but all the symptoms cluster around excessive, irrational fear and dread.

Anxiety disorders commonly occur along with other mental or physical illnesses, including alcohol or substance abuse, which may mask anxiety symptoms or make them worse.

# Sports and Concussion



For kids—of all ages—reducing blows to the head by playing sports safely and avoiding falls is vital to a healthy life.

## What Is a Concussion?

A concussion is a type of traumatic brain injury (TBI) caused by a bump, blow, or jolt to the head or by a hit to the body that causes the head and brain to move rapidly back and forth. This sudden movement can cause the brain to move around or twist in the skull, stretching and damaging connections within the brain and brain cells and creating chemical changes in the brain.

Medical providers may describe a concussion as a “mild” traumatic brain injury (TBI), but concussions are only “mild” relative to life-threatening “severe” TBI. TBI of all severities, including concussion, are serious and require medical attention.

Though hitting your head during a fall or in a car accident are the most common causes of concussions, they also can occur while playing sports.

Symptoms of a concussion may not start right away. They may start days or weeks after the injury. Symptoms may include a headache or neck pain. You may also have nausea, irritability, dizziness, loss of concentration, or tiredness. You may feel dazed or not your normal self for several days or weeks after the injury. Consult your healthcare provider if any of your symptoms get worse, or if you have more serious symptoms, such as

- Seizures
- Trouble walking or sleeping
- Weakness, numbness, or decreased coordination
- Repeated vomiting or nausea
- Confusion
- Slurred speech

Health professionals use a neurologic exam and imaging tests to diagnose a concussion. Most people recover fully after a concussion, but it can take some time. Rest is very important after a concussion because it helps the brain to heal.

# NIH Research on Concussion and the Brain

In 2012, the National Football League (NFL) donated \$30 million to the Foundation for the National Institutes of Health (FNIH) for research studies on injuries affecting athletes—with brain trauma, including concussions, being the primary area of focus. The National Institutes of Health (NIH) selected eight projects to receive funding support to answer some of the most fundamental problems on traumatic brain injury, including understanding long-term effects of repeated head injuries and improving diagnosis of concussions.

Traumatic brain injury (TBI) is a major public health problem that affects all age groups and is the leading cause of death and disability in children and young adults. Recently, concern has been raised about the potential long-term effects of repeated concussions, particularly in those most at risk: young athletes and those engaged in professions associated with frequent head injury, including men and women in the military.

Current tests cannot reliably identify concussions, and there is no way to predict who will recover quickly, who will suffer long-term symptoms, and which few individuals will develop progressive brain degeneration, called chronic traumatic encephalopathy (CTE).

## “Boxing, Football and the Brain”

One study, funded in part by NIH, is to help determine the connections between repeated head trauma and CTE. The research is led by neuropathologist Ann McKee, M.D., director of the CTE Program at Boston University School of Medicine.

Dr. McKee has extensive experience in neurodegenerative disease, particularly in traumatic brain injury. She has identified the CTE disease in dozens of former college and professional football players. But, she notes, there is CTE among members of the military and athletes in other sports—anywhere where there are repeated blows to the head.

She recently gave the Joseph Leiter Lecture at the Medical Library Association’s annual conference. Her topic was “Boxing, Football, and the Brain.”

Dr. McKee noted that the first recognition of what we now label CTE was in research among retired boxers in 1928—what later came to be called punch drunk. More recently, CTE has become the standard term.

As her research has become more widely known, dozens of former football players have made arrangements to have their brains, after death, sent to Dr. McKee for study.

Among the wide range of CTE symptoms are depression, anger, violent mood swings, memory problems, depression, slowed thought and speech, and dementia. Increases in suicides are correlated to CTE, as well. Clinical symptoms of CTE often occur years and even decades after the trauma, but not always, Dr. McKee noted.

Among the findings is that CTE can appear in some players while they are still very young: “Ex-Missouri State player Michael Keck had severe CTE by the time of his death at 25,” said Dr.

McKee. “High school football and rugby player Eric Pelly died 10 days after his fourth concussion. He was 18 years old, and his brain should have been pristine, but his brain showed early-stage CTE.”

“Of the brains we have in the Brain Bank, there are 87 that are former NFL players. And 83 of those—95 percent—had CTE.”

“There is a huge effort afoot to educate,” she said. “There’s concussion management: policies in most of the states to not return an athlete to play unless they’ve been cleared by a medical professional.”

This research has important cultural implications related to the perception of concussion as an injury. “Since I have been working on this, there has been such a change,” she said. “When I first began talking to athletes, they talked about their concussions as a badge of honor. But that has changed now.”

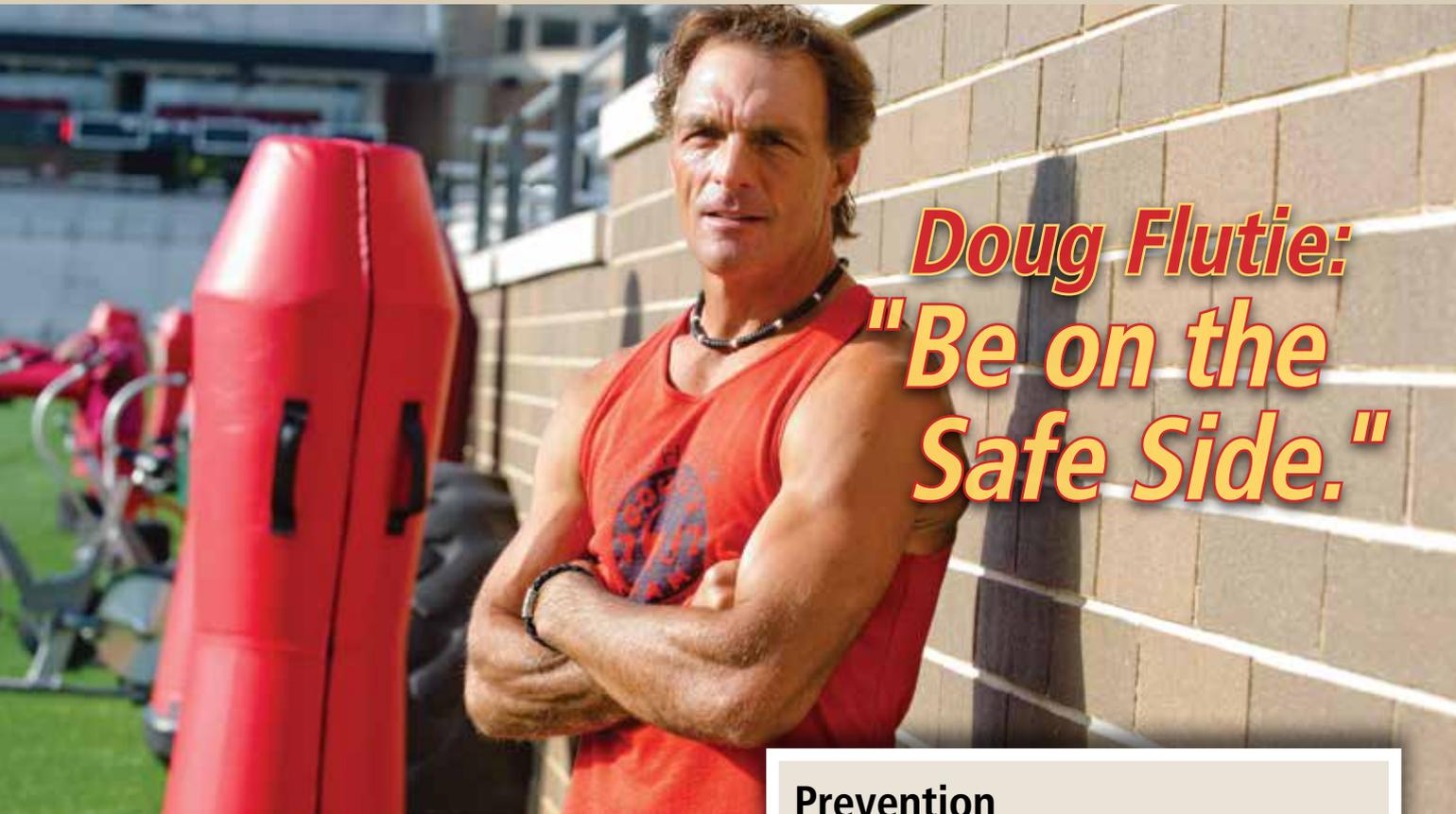


Photo: Boston University

▲ Dr. Anne McKee is a pioneer in the study of athletes’ brains and the damage to them by repeated blows to the head.

## FastFacts

- ✓ Traumatic brain injury (TBI)—including concussion—occurs when a sudden trauma causes damage to the brain. Symptoms of TBI can be mild, moderate, or severe, depending on the extent of damage.
- ✓ About 1.4 million people suffer a TBI each year in the United States. Of those, 50,000 die, 235,000 are hospitalized, and 1.1 million are treated and released at an emergency room.
- ✓ The leading causes of TBI are falls (28 percent), motor vehicle crashes (20 percent), other events in which the head strikes or is struck by an object (19 percent) and personal assaults (11 percent).
- ✓ U.S. hospital emergency rooms treated about 319,000 sports-related head injuries in 2006 (latest figures). That was an increase of 10,000 injuries from 2005.
- ✓ Over the last few years, tens of thousands of soldiers have suffered traumatic brain injuries from blasts due to improvised explosive devices (IED) in Afghanistan and Iraq.



## **Doug Flutie: "Be on the Safe Side."**

Doug Flutie is the Hall of Fame, Heisman Trophy-winning quarterback at Boston College and former star quarterback in the National, Canadian, and U.S. football leagues. Today, he remains a student of the game, covering college football for NBC Sports.

Flutie is often asked about concussions and brain trauma associated with sports like football, soccer, cycling, and others.

"I had two concussions with memory loss. One in college and one with the San Diego Chargers," Flutie says. "In San Diego, I came out of the game right away. At Boston College, I stayed in for another series and went five for five and a touchdown. But I threw the ball to the wrong receivers and still have no recollection of those plays. On the next series, I stood in front of the huddle with a blank stare and the players got me off the field. It was no one's fault. I didn't know and didn't bring it to anyone's attention."

His own experiences have taught him that players and coaches are not in the best position to judge when a player needs to be pulled from a game or not allowed to go back in a game because of head injuries.

"I believe it's up to training staff to pull the player off the field. Follow protocol and be on the safe side," he says. "Coaches and players need to just do as determined by staff. Coaches and players should be out of the decision-making process."

### **Prevention**

To prevent head injury and reduce the risk of TBI, the National Institute of Neurological Disorders and Stroke (NINDS) and the Centers for Disease Control and Prevention (CDC) urge people to always:

- Wear a seat belt when driving or riding in a car
- Use a child safety seat, booster seat, or seat belt for children when riding in a car
- Wear a helmet when:
  - Riding a bike or motorcycle
  - Playing football, ice hockey, or any contact sport
  - Roller skating or skateboarding
  - Playing baseball or softball
  - Horseback riding
  - Skiing or snowboarding
- Store firearms and ammunition in a locked cabinet or safe
- Avoid falls by using or installing:
  - A step-stool with grab bar when reaching for high objects
  - Handrails on stairways
  - Window guards to keep young children safe
  - Safety gates at the top and bottom of stairs when young children are around

# Concussion and Traumatic Brain Injury

## Symptoms

- **Mild:** Person may remain conscious or be briefly unconscious (up to a few minutes); also, headache, confusion, lightheadedness, dizziness, blurred vision, ringing in the ears, bad taste in the mouth, fatigue (including changed sleep patterns), behavior or mood swings, trouble with memory and concentration.
- **Moderate or severe:** As above, but headache worsens or does not go away; also, repeated vomiting or nausea, convulsions or seizures, inability to wake from sleep, dilation of one or both pupils, slurred speech, weakness or numbness in the arms and legs, loss of coordination, and increased confusion, restlessness, or agitation.

## Diagnosis

- Imaging tests, including X-rays of the head and neck to check for fractures or other problems; computed tomography (CT) scans to give a 3D view.
- To gauge severity, medical professionals typically use a standard, 15-point test to measure a person's level of consciousness and neurologic function, including speaking, seeing, and movement.

## Treatment

### 1. Immediate First-Aid

- Seek medical attention as soon as possible.
- Keep the person still, lying face up, with head and shoulders slightly raised; do not move the person unless absolutely necessary.
- Stop any bleeding, applying firm pressure to the wound with sterile gauze or clean cloth; do not apply direct pressure if you think there could be a skull fracture.
- Monitor breathing and alertness; if breathing or movement ceases, immediately begin CPR.

### 2. Professional Medical Care

- Medical personnel try to stabilize the person's condition and prevent further injury by ensuring an adequate supply of blood and oxygen to the brain and rest of the body, and by controlling blood pressure.
- Moderate to severe TBI requires rehabilitation, which may involve physical, speech and occupational therapy, counseling, and social services support.
- About half of the severely head-injured require brain surgery to repair or remove ruptured blood vessels or bruised brain tissue, followed by long stays in intensive care units.



Children and teens who show or report one or more of the signs and symptoms listed below, or simply say they just “don’t feel right” after a bump, blow, or jolt to the head or body, may have a concussion or more serious brain injury.

## Concussion Signs Observed

- Can't recall events *prior* to or *after* a hit or fall
- Appears dazed or stunned
- Forgets an instruction, is confused about an assignment or position, or is unsure of the game, score, or opponent
- Moves clumsily
- Answers questions slowly
- Loses consciousness (even briefly)
- Shows mood, behavior, or personality changes

## Concussion Symptoms Reported

- Headache or “pressure” in head
- Nausea or vomiting
- Balance problems or dizziness, or double or blurry vision
- Bothered by light or noise
- Feeling sluggish, hazy, foggy, or groggy
- Confusion, or concentration or memory problems
- Just not “feeling right” or “feeling down”

# Straight Talk For Good Health

**Straight talk with your healthcare provider is important.** You and your medical team can then make better decisions for your good health. Here's how.

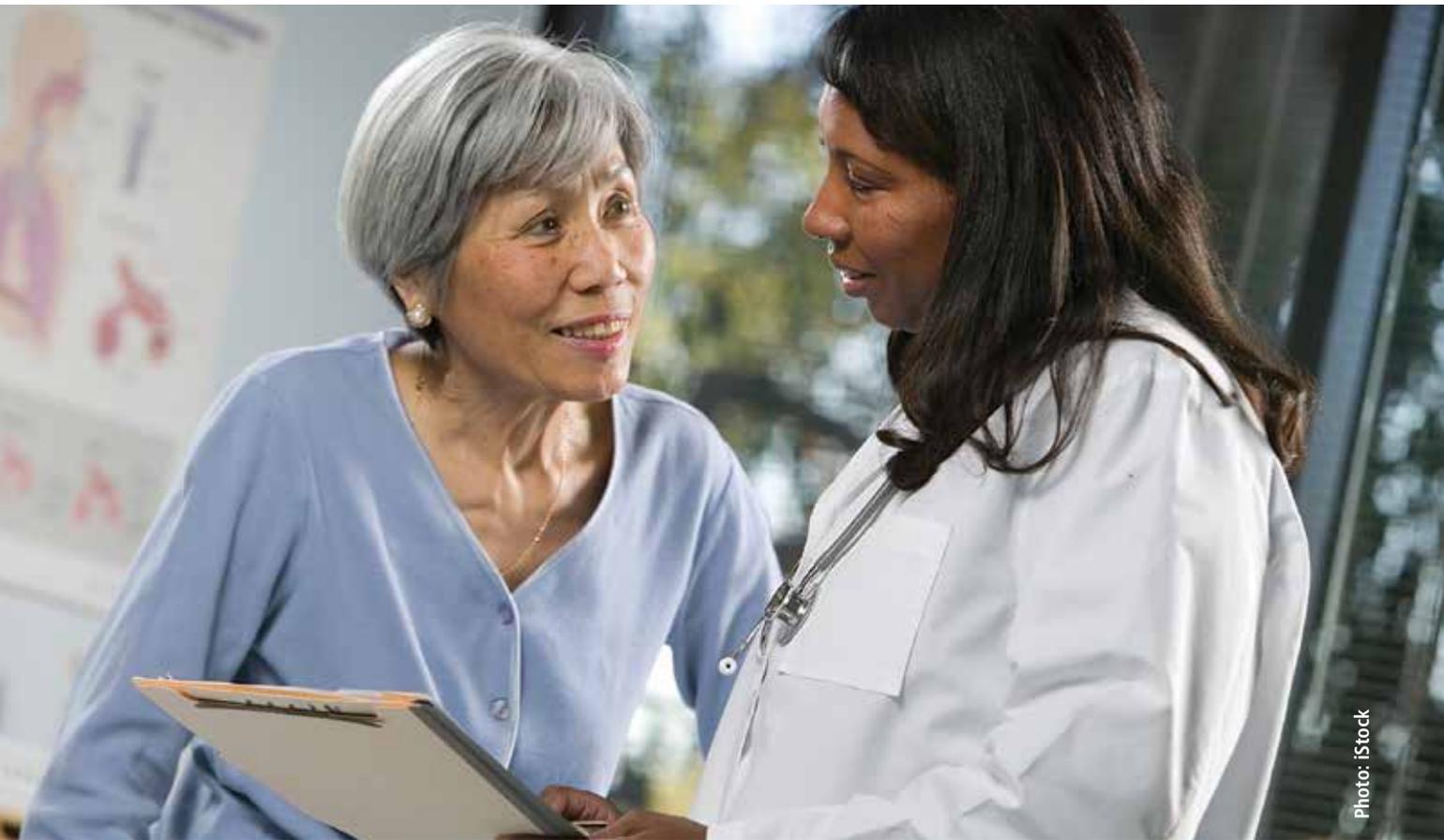


Photo: iStock

Does this sound familiar? You have only a few minutes with your healthcare provider. You say what's on your mind. But, later, you remember something you forgot to ask. Or, maybe you listen to what she says, and then forget parts of what she told you. Or, you realize that although you thought you understood what she was telling you at the time, there are some words and directions that now confuse you.

Today, patients take an active role in their health care. How well you and your healthcare provider talk to each other is one of the most important parts of getting good health care. Unfortunately, it isn't always easy. It takes time and effort on your part. Here are some tips for making the most of your visit.

Today, patients take an active role in their health care. Speaking clearly with your healthcare provider about what's wrong and how to cure it is one of the most important aspects of getting good care.

## Make a List

Come prepared for your visit. Make a list of the things that you want to discuss, such as:

- Any symptoms that are bothering you. Have they changed since your last visit?
- Medicines you take. Be sure to include vitamins and any complementary and alternative therapies you use, such as herbs or supplements.
- Any allergies you may have, especially to medications.
- A description of symptoms, when they started, and what makes them better.

Be sure to understand your diagnosis and prescribed treatments. Ask your healthcare provider to write down his or her instructions to you. If you still don't understand, ask where to go for more information.

## Ask Questions

If you don't understand your healthcare provider, ask questions until you do understand. Write down what he or she says. Go with a trusted friend or relative, and let your health professional know if you want that person to hear what is said.

### Helpful questions for clear understanding:

- About My Disease or Disorder
- What is my diagnosis?
- What caused my condition?
- Can it be treated?
- How will it affect my health now and in the future?
- Should I watch for any particular symptoms and notify you if they occur?
- Should I make any lifestyle changes?
- What are the risks and side effects associated with this treatment?
- Are there foods, drugs, or activities I should avoid while I'm on this treatment?
- If treatment includes taking a medication, what should I do if I miss a dose?
- Are other treatments available?

### Treatment

- What is the treatment for my condition?
- When will the treatment start, and how long will it last?
- What are the benefits of this treatment, and how successful will it be?
- Medical Tests
- What kinds of tests will I have?
- What do you expect to find out from these tests?
- When will I know the results?
- Do I have to do anything special to prepare for any of the tests?
- Are there any side effects or risks?
- Will I need more tests later?

## Look it up

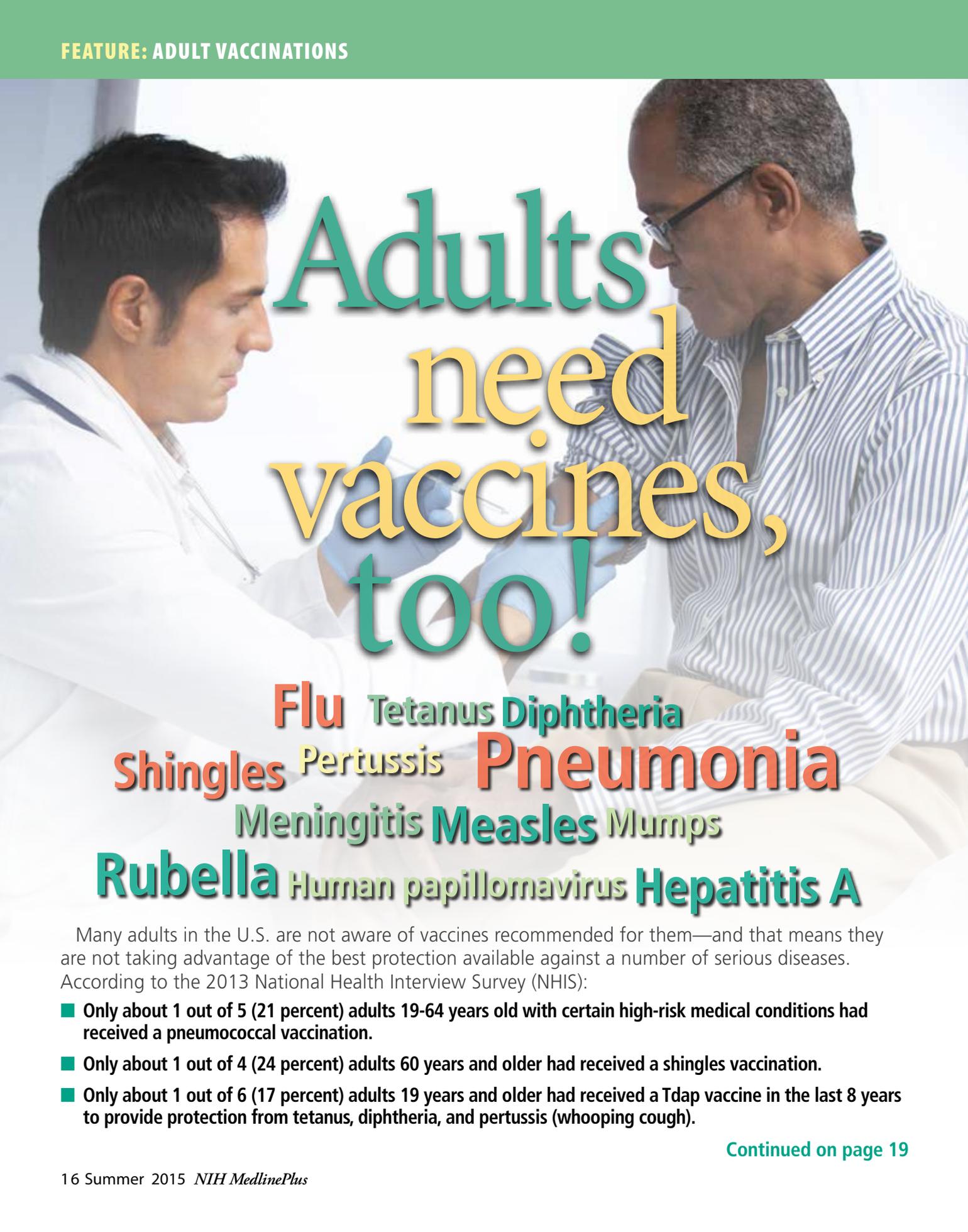
Sometimes, it can seem as if you and your healthcare provider are speaking different languages. Health professionals often use technical terms instead of more common names for conditions. For example, a doctor might say you have a contusion. You would call it a bruise.

You can use the *Merriam-Webster Medical Dictionary* at [www.MedlinePlus.gov](http://www.MedlinePlus.gov) to look up words. Just go to [www.nlm.nih.gov/medlineplus/mpldictionary.html](http://www.nlm.nih.gov/medlineplus/mpldictionary.html) and enter the word you're looking for. On that same page, you can also find lists of word parts and what they mean, some common abbreviations, and even a tutorial, "Understanding Medical Words."

- Understanding Medical Words: [www.nlm.nih.gov/medlineplus/medicalwords.html](http://www.nlm.nih.gov/medlineplus/medicalwords.html)
- Word Parts and What They Mean: [www.nlm.nih.gov/medlineplus/appendixa.html](http://www.nlm.nih.gov/medlineplus/appendixa.html)
- Some Common Abbreviations: [www.nlm.nih.gov/medlineplus/appendixb.html](http://www.nlm.nih.gov/medlineplus/appendixb.html)

## Find Out More

- ✓ Talking to Your Doctor  
[www.nei.nih.gov/health/talktodoc.asp](http://www.nei.nih.gov/health/talktodoc.asp)
- ✓ Questions are the Answer  
[www.ahrq.gov/questionsaretheanswer/index.html](http://www.ahrq.gov/questionsaretheanswer/index.html)
- ✓ Talking with your Doctor  
[nihseniorhealth.gov/talkingwithyourdoctor/toc.html](http://nihseniorhealth.gov/talkingwithyourdoctor/toc.html)



# Adults need vaccines, too!

**Flu** Tetanus Diphtheria  
**Shingles** Pertussis **Pneumonia**  
Meningitis Measles Mumps  
**Rubella** Human papillomavirus **Hepatitis A**

Many adults in the U.S. are not aware of vaccines recommended for them—and that means they are not taking advantage of the best protection available against a number of serious diseases. According to the 2013 National Health Interview Survey (NHIS):

- Only about 1 out of 5 (21 percent) adults 19-64 years old with certain high-risk medical conditions had received a pneumococcal vaccination.
- Only about 1 out of 4 (24 percent) adults 60 years and older had received a shingles vaccination.
- Only about 1 out of 6 (17 percent) adults 19 years and older had received a Tdap vaccine in the last 8 years to provide protection from tetanus, diphtheria, and pertussis (whooping cough).

Continued on page 19

## Recommended Adult Immunization Schedule—United States - 2015

Note: These recommendations must be read with the footnotes that follow containing number of doses, intervals between doses, and other important information.

**Figure 1. Recommended adult immunization schedule, by vaccine and age group<sup>1</sup>**

VACCINE ▼	AGE GROUP ▶	19-21 years	22-26 years	27-49 years	50-59 years	60-64 years	≥ 65 years	
Influenza <sup>2,3</sup>		1 dose annually						
Tetanus, diphtheria, pertussis (Td/Tdap) <sup>3,4</sup>		Substitute 1-time dose of Tdap for Td booster; then boost with Td every 10 yrs						
Varicella <sup>5,6</sup>		2 doses						
Human papillomavirus (HPV) Female <sup>5,6</sup>		3 doses						
Human papillomavirus (HPV) Male <sup>5,6</sup>		3 doses						
Zoster <sup>6</sup>		1 or 2 doses						1 dose
Measles, mumps, rubella (MMR) <sup>7,8</sup>		1 or 2 doses						
Pneumococcal 13-valent conjugate (PCV13) <sup>9,8</sup>		1-time dose						
Pneumococcal polysaccharide (PPSV23) <sup>8</sup>		1 or 2 doses						1 dose
Meningococcal <sup>9,8</sup>		1 or more doses						
Hepatitis A <sup>10</sup>		2 doses						
Hepatitis B <sup>11</sup>		3 doses						
<i>Haemophilus influenzae</i> type b (Hib) <sup>12</sup>		1 or 3 doses						

<sup>1</sup>Covered by the Vaccine Injury Compensation Program

For all persons in this category who meet the age requirements and who lack documentation of vaccination or have no evidence of previous infection; zoster vaccine recommended regardless of prior episode of zoster

Recommended if some other risk factor is present (e.g., on the basis of medical, occupational, lifestyle, or other indication)

No recommendation

Report all clinically significant postvaccination reactions to the Vaccine Adverse Event Reporting System (VAERS). Reporting forms and instructions on filing a VAERS report are available at [www.vaers.hhs.gov](http://www.vaers.hhs.gov) or by telephone, 800-822-7967.

Information on how to file a Vaccine Injury Compensation Program claim is available at [www.hrsa.gov/vaccinecompensation](http://www.hrsa.gov/vaccinecompensation) or by telephone, 800-338-2382. To file a claim for vaccine injury, contact the U.S. Court of Federal Claims, 717 Madison Place, N.W., Washington, D.C. 20005; telephone, 202-357-6400.

Additional information about the vaccines in this schedule, extent of available data, and contraindications for vaccination is also available at [www.cdc.gov/vaccines](http://www.cdc.gov/vaccines) or from the CDC-INFO Contact Center at 800-CDC-INFO (800-232-4636) in English and Spanish, 8:00 a.m. - 8:00 p.m. Eastern Time, Monday - Friday, excluding holidays.

Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.

The recommendations in this schedule were approved by the Centers for Disease Control and Prevention's (CDC) Advisory Committee on Immunization Practices (ACIP), the American Academy of Family Physicians (AAFP), the American College of Physicians (ACP), the American College of Obstetricians and Gynecologists (ACOG) and American College of Nurse-Midwives (ACNM).

Clip and Save

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Figure 2. Vaccines that might be indicated for adults based on medical and other indications<sup>1</sup>

VACCINE ▼	INDICATION ▶	Immuno-compromising conditions (excluding human immunodeficiency virus [HIV]) <sup>4,5,7,8,10</sup>	HIV infection count <sup>4,5,7,8,10</sup>		Men who have sex with men (MSM) <sup>11</sup>	Kidney failure, end-stage renal disease, receipt of hemodialysis	Heart disease, chronic lung disease, chronic alcoholism	Asplenia (including elective splenectomy and persistent complement component deficiencies) <sup>4,12</sup>	Chronic liver disease	Diabetes	Healthcare personnel
			< 200 cells/μL	≥ 200 cells/μL							
Influenza <sup>1,2</sup>	Pregnancy	1 dose IV annually			1 dose IV <sup>13</sup> or LA <sup>14</sup> annually			1 dose IV annually			1 dose IV <sup>13</sup> or LA <sup>14</sup> annually
Tetanus, diphtheria, pertussis (Td/Tdap) <sup>1,2</sup>		Substitute 1-time dose of Tdap for Td booster; then boost with Td every 10 yrs									
Varicella <sup>1,4</sup>		Contraindicated						2 doses			
Human papillomavirus (HPV) Female <sup>1,5</sup>		3 doses through age 26 yrs						3 doses through age 26 yrs			
Human papillomavirus (HPV) Male <sup>1,5</sup>		3 doses through age 26 yrs						3 doses through age 21 yrs			
Zoster <sup>4</sup>		Contraindicated						1 dose			
Measles, mumps, rubella (MMR) <sup>1,2</sup>		Contraindicated						1 or 2 doses			
Pneumococcal 13-valent conjugate (PCV13) <sup>1,2</sup>								1 dose			
Pneumococcal polysaccharide (PPSV23) <sup>1,2</sup>								1 or 2 doses			
Meningococcal <sup>1,2</sup>								1 or more doses			
Hepatitis A <sup>1,16</sup>								2 doses			
Hepatitis B <sup>1,11</sup>								3 doses			
Haemophilus influenzae type b (Hib) <sup>1,16</sup>								1 or 3 doses			

<sup>1</sup>Covered by the Vaccine Injury Compensation Program.  For all persons in this category who meet the age requirements and who lack documentation of vaccination or have no evidence of previous infection; zoster vaccine recommended regardless of prior episode of zoster.  Recommended if some other risk factor is present (e.g., on the basis of medical, occupational, lifestyle, or other indications).  No recommendation.



These schedules indicate the recommended age groups and medical indications for which administration of currently licensed vaccines is commonly recommended for adults ages 19 years and older, as of February 1, 2015. For all vaccines being recommended on the Adult Immunization Schedule, a vaccine series does not need to be restarted, regardless of the time that has elapsed between doses. Licensed combination vaccines may be used whenever any components of the combination are indicated, and when the vaccine's other components are not contraindicated. For detailed recommendations on all vaccines, including those used primarily for travelers or that are issued during the year, consult the manufacturers' package inserts and the complete statements from the Advisory Committee on Immunization Practices ([www.cdc.gov/vaccines/imz/adip-recommend.html](http://www.cdc.gov/vaccines/imz/adip-recommend.html)). Use of trade names and commercial sources is for identification only and does not imply endorsement by the U.S. Department of Health and Human Services.



## Are you one of the millions of adults not receiving the vaccines you need?

### What vaccines do you need?

All adults should get:

- Annual flu vaccine to protect against seasonal flu
- Td/Tdap vaccine to protect against tetanus, diphtheria and pertussis

Some additional vaccines you may need (depending on your age, health conditions and other factors) include:

- Hepatitis A
- Hepatitis B
- Human Papillomavirus (HPV)
- Meningococcal
- Pneumococcal
- Shingles

Find out which vaccines are recommended for you: [www.cdc.gov/vaccines/adults/rec-vac/index.html](http://www.cdc.gov/vaccines/adults/rec-vac/index.html).

Traveling overseas? There may be additional vaccines you need depending on the location. Visit [wwwnc.cdc.gov/travel](http://wwwnc.cdc.gov/travel).

## There are many reasons to get vaccinated; here are just 10.

1. You may be at risk for serious diseases that could be prevented by vaccines, such as influenza, pertussis, and shingles.
2. You may be at increased risk for complications from certain diseases if you have a chronic health condition or weakened immune system, such as heart disease, diabetes, or lung disease.
3. You can reduce the chance that you'll pass on a serious disease to your loved ones.
4. You can help protect those who can't get vaccinated. People with certain medical conditions (like pregnant women or people undergoing cancer treatment) may not be able to get certain vaccines, but are very vulnerable to illness.
5. You don't have time to get sick. You have too much responsibility to risk getting sick, including people counting on you at work and at home.
6. You don't want to miss what's important to you. Spending time with family and friends or taking time out for your hobbies may not be possible if you get sick.
7. You don't want to pay the price of getting sick.
8. You like to travel—or have to travel for work. Travel can present exciting opportunities, but it can also put you at risk for certain diseases.
9. You want the peace of mind that comes with protecting your health.
10. You don't want to feel crummy if you can prevent it! No one wants to feel sick.

—Source: Centers for Disease Control and Prevention (CDC)

### To Find Out More

- ✓ MedlinePlus – Vaccines Overview  
[www.nlm.nih.gov/medlineplus/ency/article/002024.htm](http://www.nlm.nih.gov/medlineplus/ency/article/002024.htm)
- ✓ NIAID Community Immunity  
[www.niaid.nih.gov/topics/pages/communityimmunity.aspx](http://www.niaid.nih.gov/topics/pages/communityimmunity.aspx)
- ✓ U.S. National Vaccine Plan  
[www.hhs.gov/nvpo/vacc\\_plan/index.html](http://www.hhs.gov/nvpo/vacc_plan/index.html)
- ✓ Centers for Disease Control and Prevention (CDC)  
[www.cdc.gov/vaccines/](http://www.cdc.gov/vaccines/)



# Are You Sleep Deprived?

Is it difficult for you to fall asleep or stay asleep through the night? Do you wake up feeling tired? Do you feel sleepy during the day, even if you think you've had enough sleep? You might have a sleep disorder.

There are many treatments for sleep disorders and ways to make sure you are getting enough healthy sleep.

A variety of conditions plague the sleep of Americans. These sleep disorders include:

- sleep deficiency (irregular sleep schedules that result in not getting enough sleep)
- sleep apnea (a condition that causes pauses in breathing, shallow breaths, and occasionally snoring during sleep)
- insomnia (trouble falling or staying asleep)
- restless legs syndrome (also called Willis-Ekbom disease)
- narcolepsy (vivid dreams, daytime sleepiness, brief periods of deep sleep, sleep paralysis, muscle weakness)
- parasomnias (abnormal sleep behaviors).

Add to that list the demands of daily life that require many people to cut short the hours they spend sleeping each night, and the sleep problem becomes even greater, according to Michael J. Twery, PhD, director of the National Center on Sleep Disorders Research in NIH's National Heart, Lung, and Blood Institute (NHLBI).

The challenge with sleep disorders is that unlike many other medical conditions, your healthcare provider depends on you to explain the problem, which occurs in the privacy of your bedroom while you are sleeping. There is no pain associated with sleep

disorders. Instead, people often have daytime symptoms, such as a morning headache or daytime sleepiness. There is no blood test to help diagnose a sleep disorder. Instead, successful diagnosis depends on the patient. It is important to discuss your symptoms with your physician so he or she can help you determine if you have sleep apnea or another sleep disorder.

"As many as 30 percent or more of U.S. adults are not getting enough sleep," says Dr. Twery. Chronic sleep loss and sleep disorders are estimated to cost the nation as much as \$16 billion in healthcare expenses and \$50 billion in lost productivity.

The consequences can be severe. Drowsy driving, for example, is responsible for an estimated 1,500 fatalities and 40,000 nonfatal injuries each year.

"It's actually quite serious," says Daniel Chapman, PhD, MSc, at the Centers for Disease Control and Prevention (CDC). "Drowsy driving was implicated in about 16 percent of fatal crashes and about 13 percent of crashes resulting in hospitalization."

Dr. Chapman says sleep is as important to health as eating right and getting enough physical activity. And research has been finding that lack of sleep—like poor diet and lack of physical activity—has been associated with weight gain and diabetes.



## The Importance of Sleep

Many people view sleep as merely a “down time,” when their brains shut off and their bodies rest. People may cut back on sleep, because other responsibilities seem much more important. But research shows that a number of vital tasks carried out during sleep help people stay healthy and function at their best.

While you sleep, your brain is hard at work forming the pathways necessary for learning and creating memories and new insights. Without enough sleep, you can't focus and pay attention or respond quickly. A lack of sleep may even cause mood problems. Growing evidence shows that a chronic lack of sleep can also increase your risk of obesity, diabetes, cardiovascular disease, and infections.

The nonstop “24/7” nature of the world today encourages longer or nighttime work hours and offers continual access to entertainment and other activities. To keep up, people cut back on sleep. A common myth is that people can learn to get by on little sleep (such as less than six hours a night) with no negative effects. Research suggests, however, that adults need at least seven to eight hours of sleep each night to be well rested.

Evidence from other national surveys indicate that 70 percent of adolescents sleep less than the recommended 8 to 9 hours each night. Lack of sleep may have a direct effect on children's health, behavior, and development.

## Diagnosing Sleep Disorders

Depending on your symptoms, it may help you to gather information on your sleep behaviors. Your healthcare provider will review this information and consider several possible tests when trying to diagnose a sleep disorder:

### Sleep history and sleep log

If you believe you have a sleep problem, consider keeping a sleep diary and bringing it to your next medical appointment. Your physician will ask you how many hours you sleep each night, how often you awaken during the night and for how long, how long it takes you to fall asleep, how well rested you feel upon awakening, and how sleepy you feel during the day. If you don't already keep a sleep diary, your health professional may ask you to keep one for a few weeks. (See sample sleep diary on page 24.) Your provider also may ask you whether you have any symptoms of a sleep disorder, such as loud snoring, snorting or gasping, morning headaches, tingling or unpleasant sensations in the limbs that are relieved by moving them, and jerking of the limbs during sleep. You may want to ask your sleeping partner if you have these symptoms, since you may not be aware of them yourself.

### Sleep recording in a sleep laboratory

A sleep recording or polysomnogram (PSG) may be done while you stay overnight at a sleep center or at home. Your doctor will suggest the appropriate location for the PSG based on

your symptoms and health. Electrodes and other monitors are placed on your scalp, face, chest, limbs, and finger. While you sleep, these devices measure your brain activity, eye movements, muscle activity, heart rate and rhythm, blood pressure, and how much air moves in and out of your lungs. This test also checks the amount of oxygen in your blood. A PSG test is painless. In certain circumstances, the PSG can be done at home. A home monitor can be used to record heart rate, how air moves in and out of your lungs, the amount of oxygen in your blood, and your breathing effort.

### Multiple sleep latency test (MSLT)

This daytime sleep study measures how sleepy you are and is particularly useful for diagnosing problems staying awake during the day. The MSLT is conducted in a sleep laboratory and typically done after an overnight sleep recording (PSG). In this test, monitoring devices for sleep stage are placed on your scalp and face. You are asked to nap four or five times for 20 minutes every two hours during the day. Technicians note how quickly you fall asleep and how long it takes you to reach various stages of sleep, especially REM (rapid eye movement) sleep, during your naps. Normal individuals either do not fall asleep during these short designated naptimes or take a long time to fall asleep. People who fall asleep in less than five minutes are likely to require treatment for a sleep disorder, as are those who quickly reach REM sleep during their naps.

# Tips for Getting A GOOD Night's Sleep

- **Stick to a sleep schedule.** Go to bed and wake up at the same time each day. As creatures of habit, people have a hard time adjusting to changes in sleep patterns. Sleeping later on weekends won't fully make up for a lack of sleep during the week and will make it harder to wake up early on Monday morning.
- **Exercise is great, but not too late in the day.** Try to exercise at least 30 minutes on most days but not later than 2-3 hours before your bedtime.
- **Avoid caffeine and nicotine before bed.** Coffee, colas, certain teas, and chocolate contain the stimulant caffeine, and its effects can take as long as 8 hours to wear off fully. Therefore, a cup of coffee in the late afternoon can make it hard for you to fall asleep at night. Nicotine is also a stimulant, often causing smokers to sleep only very lightly. In addition, smokers often wake up too early in the morning because of nicotine withdrawal.
- **Avoid alcoholic drinks before bed.** Having a "nightcap" or alcoholic beverage before sleep may help you relax, but heavy use robs you of deep sleep and REM sleep, keeping you in the lighter stages of sleep. Heavy alcohol ingestion also may contribute to breathing impairment at night. You also tend to wake up in the middle of the night when the effects of the alcohol have worn off.
- **Avoid large meals and beverages late at night.** A light snack is okay, but a large meal can cause indigestion that interferes with sleep. Drinking too many fluids at night can cause frequent awakenings to urinate.
- **If possible, avoid medicines that delay or disrupt your sleep.** Some commonly prescribed heart, blood pressure, or asthma medications, as well as some over-the-counter and herbal remedies for coughs, colds, or allergies, can disrupt sleep patterns. If you have trouble sleeping, talk to your healthcare provider or pharmacist to see whether any drugs you're taking might be contributing to your insomnia and ask whether they can be taken at other times during the day or early in the evening.
- **Don't take naps after 3 p.m.** Naps can help make up for lost sleep, but late afternoon naps can make it harder to fall asleep at night.
- **Relax before bed.** Don't overschedule your day so that no time is left for unwinding. A relaxing activity, such as reading or listening to music, should be part of your bedtime ritual.
- **Take a hot bath before bed.** The drop in body temperature after getting out of the bath may help you feel sleepy, and the bath can help you relax and slow down so you're more ready to sleep.
- **Have a good sleeping environment.** Get rid of anything in your bedroom that might distract you from sleep, such as noises, bright lights, an uncomfortable bed, or warm temperatures. You sleep better if the temperature in the room is kept cool. A TV, cell phone, or computer in the bedroom can be a distraction and deprive you of needed sleep. Having a comfortable mattress and pillow can help promote a good night's sleep. Individuals who have insomnia often watch the clock. Turn the clock's face out of view so you don't worry about the time while trying to fall asleep.
- **Have the right sunlight exposure.** Daylight is key to regulating daily sleep patterns. Try to get outside in natural sunlight for at least 30 minutes each day. If possible, wake up with the sun or use bright room lights in the morning. Sleep experts recommend that, if you have problems falling asleep, you should get an hour of exposure to morning sunlight and turn down the lights before bedtime.
- **Don't lie in bed awake.** If you find yourself still awake after staying in bed for more than 30 minutes or if you are starting to feel anxious or worried, get up and do some relaxing activity until you feel sleepy. The anxiety of not being able to sleep can make it harder to fall asleep.
- **See a health professional if you continue to have trouble sleeping.** If you consistently find it difficult to fall or stay asleep and/or feel tired or not well rested during the day despite spending enough time in bed at night, you may have a sleep disorder. Your family healthcare provider or a sleep specialist should be able to help you, and it is important to rule out other health or emotional problems that may be disturbing your sleep.



▲ At a sleep disorder and therapy center, a participant has his sleep patterns and possible problems diagnosed.

## What Are Sleep Studies?

Sleep studies are tests that measure how well you sleep and how your body responds to sleep problems. These tests can help your healthcare provider find out whether you have a sleep disorder and how severe it is. Sleep studies are important because untreated sleep disorders can raise your risk for heart disease, high blood pressure, stroke, and other medical conditions. Sleep disorders also have been linked to an increased risk of injury, such as falling, particularly among the elderly, and car accidents.

Research is helping to improve our understanding of the connection between sleep disorders and our physical, mental, and behavioral health. NIH supports a range of sleep-related research that focuses on:

- Better understanding of how a lack of sleep increases the risk for obesity, diabetes, heart disease, and stroke.
- Genetic, environmental, and social factors that lead to sleep disorders.
- The adverse effects from a lack of sleep on body and brain.

## Advances in Sleep Studies

Research has uncovered many of the nuts and bolts that link the need for sleep to the chemistry of life in the brain and virtually every part of our body. Insufficient sleep damages areas of the brain involved in managing stress, learning, and memory. Individuals who experience excessive sleepiness are often unable to perform at school or in the work- place. Sleep problems also contribute to the risk of serious medical conditions and the management of mental health illnesses.



▲ Michael J. Twery, PhD, is the director of the National Center on Sleep Disorders Research (NCSDR) in the NIH's National Heart, Lung, and Blood Institute.

The brain lives in a fluid that is important for its continued health across the lifespan. Researchers have discovered that during sleep the flow of this fluid is redirected deeper into the cortex, the thinking part of the brain, where it helps flush out waste products that contribute to the risk of Alzheimer's and other neurological disorders.

New evidence indicates that sleep is also important to maternal and fetal health during pregnancy. Untreated sleep disorders during pregnancy may threaten the health of approximately 500,000 pregnant women and their unborn babies each year.

Studies are now under way to determine how poor sleep and difficulty breathing during sleep contribute to the risk of gestational medical conditions such as diabetes, hypertension, and pre-term delivery. A landmark NIH-supported study called nuMoM2b found that pregnant women with difficulty breathing during sleep (sleep apnea) are more likely to develop hypertension and preeclampsia—a pregnancy complication that includes high blood pressure and organ damage, often to the kidneys. These women are also three times more likely to develop gestational diabetes compared with pregnant women who do not have difficulty breathing during sleep.

Mounting evidence indicates that irregular sleep and untreated sleep disorders may contribute to health disparities. A landmark study funded by the National Heart, Lung, and Blood Institute (NHLBI) on Hispanic community health—The Hispanic Community Health Study/Study of Latinos—has revealed that sleep apnea, which is characterized by difficulty breathing during sleep, is common and rarely diagnosed and treated. Approximately 26 percent of the more than 1400 study participants had sleep disordered breathing which is associated with increased risk for developing high blood pressure, heart disease, diabetes, and stroke. The study also found that sleep apnea was associated with peripheral arterial disease, a condition in which narrowed arteries reduce blood flow to the arms and legs.

## FEATURE: SLEEP DISORDERS

One of the best ways you can tell if you are getting enough good quality sleep, and whether you have signs of a sleep disorder, is by keeping a sleep diary. Use this sample diary to get started.—Source: NHLBI

Sample Sleep Diary								
Name								
Complete in the Morning	Today's date (include month/day/year):	Mon*	Tues	Wed	Thurs	Fri	Sat	Sun
	Time I went to bed last night:	11 p.m.						
	Time I woke up this morning:	7 a.m.						
	No. of hours slept last night:	8						
	Number of awakenings and	5 times						
	Total time awake last night:	2 hours						
	How long I took to fall asleep last night:	30 mins.						
How awake did I feel when I got up this morning? 1—Wide awake 2—Awake but a little tired 3—Sleepy	2							
Complete in the Evening	Number of caffeinated drinks (coffee, tea, cola) and time when I had them today:	1 drink at 8 p.m.						
	Number of alcoholic drinks (beer, wine, liquor) and time when I had them today:	2 drinks 9 p.m.						
	Nap times and lengths today:	3:30 p.m. 45 mins.						
	Exercise times and lengths today:	None						
	How sleepy did I feel during the day today? 1—So sleepy had to struggle to stay awake during much of the day 2—Somewhat tired 3—Fairly alert 4—Wide awake	1						
		* This column shows example diary entries—use as a model for your own diary notes						



Cut and Carry



▲ Kerry, a patient, is with the therapy dog team of Jeanette Golden (left) and Tucker. Holly Parker, Recreation Therapist, is at right.

Photos: Ernie Branson, NIH

## Animal-Assisted Therapy for Patients Undergoing Treatment at NIH Clinical Center

“Therapy dogs make a powerful connection with patients, giving them unconditional love,” says Holly Parker, a recreational therapist at the NIH Clinical Center in the Rehabilitation Medicine Department. “The emotional and physical comfort they provide is unlike any other.”

A self-described “huge animal lover,” she coordinates 14 teams of trained and certified volunteers and their dogs who come once each week to the Clinical Center under an exclusive arrangement with National Capital Therapy Dogs (NCTD).

The Clinical Center veterinarian, Lisa G. Portnoy, DVM, heads the separate Animal Care Program, which functions to oversee the humane care and use of research animals in the Clinical Center. The program is accredited by the Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC) International. “The visits provide patients

with a sense of normalcy, an hour in which their illness is not the focus of attention,” she says. “Everyone benefits: the patients, the Clinical Center staff, the volunteer-owners, and their dogs.”

Portnoy should know. She and her friendly beagle, Juno, are trusted animal-assisted therapy volunteers. Accompanied by Parker or other Clinical Center recreational therapists, the therapy dog teams visit the hospital for one hour each week. They typically see several patients during that time—both adult and pediatric patients with cancer, rare immune and genetic disorders, mental health challenges, and other conditions.

According to Parker, they try to match the dogs’ temperaments to the patients’ therapy needs. With high-energy pediatric behavior health patients, for example, retrievers work best because they chase balls and respond to commands. Small, quiet, curl-up dogs suit intensive care patients.

## FEATURE: THERAPY DOGS



▲ Three of the Clinical Center's therapy dog teams: Front left is Jeanette Golden and her dog Tucker; front right is Dr. Lisa Portnoy and her dog, Juno; back left is Nandini Murthy and her (partially obscured) dog, Lincoln. Accompanying them, at right rear, is Holly Parker.

In Parker's experience, patients make progress in their treatment because of the dogs. For example, surgery patients will say, "I'm going to walk the dog. They're focused on that, not their discomfort."

"The dogs seem to recognize they can help," Parker says. "They know they're on the job and they get to please their owners and interact with other dogs, too. But visits are typically very intense, and the dogs are ready for a treat and a nap at the end of the hour visit."

The teams—owners and dogs together—must pass obedience training and specialized therapy dog training to qualify as Animal Care program volunteers. The breed and gender of dog isn't important. What matters is innate personality and how well the volunteer and dog work together as a team.



"It's not easy to volunteer at NIH because of the security requirements," notes Parker. "It takes a special person to be in a hospital. Some of them have been sick or had illness in the family. They understand their dogs and want to share them, and many share their second dogs with us."

► Kerry (center), from North Carolina, is a patient at the NIH Clinical Center. The therapy dog team of Jeanette Golden (left) with dog, Tucker, and Holly Parker (right), Recreation Therapist, are walking with Kerry in the Clinical Center.





◀ Jon, from South Carolina, is a patient at the Clinical Center. The therapy dog's name is Lincoln.

*“Therapy dogs make a powerful connection with patients, giving them unconditional love.”*



◀ Brooke, age 10, from New Jersey and a patient at the NIH Clinical Center, plays with therapy dog Juno. At right is Lisa G. Portnoy, DVM, Animal Program Director at the Clinical Center. At left is Holly Parker, Recreation Therapist and coordinator of the Animal-Assisted Therapy Program.



▶ Patient Brooke with Juno, who is playing the game “Find It,” searching for treats.



## Animals' Presence May Ease Social Anxiety in Kids with Autism

When animals are present, children with autism spectrum disorders (ASDs) have lower readings on a device that detects anxiety and other forms of social arousal when interacting with their peers. The device measures the speed at which an unnoticeable electric current passes through the skin, and is considered to be an indicator of anxiety.

According to a study funded in part by the National Institutes of Health, companion animals—like dogs, cats or



▲ Can companion animals help children with autism reduce their social anxiety levels?

the guinea pigs in the study—may prove to be a helpful addition to treatment programs designed to help children with ASDs improve their social skills and interactions with other people.

The study, published online in *Developmental Psychobiology*, was conducted by Marguerite O'Haire, PhD, from the Center for the Human-Animal Bond in the College of Veterinary Medicine of Purdue University in West Lafayette, Indiana, and colleagues in the School of Psychology at the University of Queensland in Brisbane, Australia.

"Previous studies suggest that in the presence of companion animals, children with autism spectrum disorders function better socially," said James Griffin, PhD, of the Child Development and Behavior Branch at NIH's *Eunice Kennedy Shriver* National Institute of Child Health and Hu-

man Development (NICHD). "This study provides physiological evidence that the proximity of animals eases the stress that children with autism may experience in social situations."

This study is among several funded under a public-private partnership established in 2008 between NICHD and the WALTHAM Centre for Pet Nutrition, a division of Mars Inc., to establish a human-animal interaction research program to support studies relevant to child development, health, and the therapeutic use of animals.

## A Patient's Budding Cortex—In a Dish?

A patient tormented by suicidal thoughts gives his psychiatrist a few strands of his hair. She derives stem cells from them to grow budding brain tissue harboring the secrets of his unique illness in a petri dish. She then uses the information to genetically engineer a personalized treatment to correct his brain circuit functioning. Just sci-fi? Yes, but...

An evolving "disease-in-a-dish" technology, funded by the National Institutes of Health (NIH), is bringing closer the day when such a seemingly futuristic

personalized medicine scenario might not seem so far-fetched. Scientists have perfected mini cultured 3-D structures that grow and function much like the outer mantle—the key working tissue, or cortex—of the brain of the person from whom they were derived. Strikingly, these "organoids" buzz with neuronal network activity. Cells talk with each other in circuits, much as they do in our brains.

Sergiu Pasca, MD, of Stanford University, Palo Alto, California, and colleagues, debuted what they call "human cortical spheroids," May 25, 2015 online in the journal *Nature Methods*.

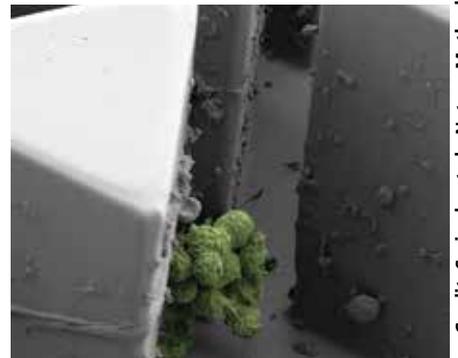
"There's been amazing progress in this field over the past few years," said Thomas R. Insel, MD, Director of the NIH's National Institute of Mental Health, which provided most of the funding for the study. "The cortex spheroids grow to a state in which they express functional connectivity, allowing for modeling and understanding of mental illnesses. They do

not even begin to approach the complexity of a whole human brain. But that is not exactly what we need to study disorders of brain circuitry. As we seek advances that promise enormous potential benefits to patients, we are ever mindful of the ethical issues they present."

## Microchip Captures Clusters of Circulating Tumor Cells

Researchers have developed a microchip that can capture rare clusters of circulating tumor cells, which could yield important new insights into how cancer spreads. The work was funded by the National Institute of Biomedical Imaging and Bioengineering (NIBIB), part of the National Institutes of Health.

Circulating tumor cells (CTCs) are cells that break away from a tumor and move through a cancer patient's bloodstream. Single CTCs are extremely rare, typically fewer than 1 in 1 billion cells. These cells can take up residence in distant organs, and researchers believe this is one mode by which cancer spreads. Clusters of circulating tumor cells are even less common in the blood, but recent studies suggest they may be more likely to cause metastases than single circulating tumor cells.



▲ Cancer cell cluster balancing on the tip of a post within a microchip.

"Very little is known about CTC clusters and their role in the progression and metastasis of cancer. This unique technology presents an exciting opportunity to capture these exceptionally rare groups of cells for further analysis in a way that is minimally-invasive," said NIBIB Director Roderic I. Pettigrew, PhD, MD. "This is the kind of breakthrough technology that could have a very large impact on cancer research."

Credit: Sarioglu et al., *Nature Methods*.

# Info to Know

## NIH Quickfinder

For more information or to contact any of the following NIH Institutions, centers, and offices directly, please call or go online as noted below:

### Institutes

- **National Library of Medicine (NLM)**  
[www.nlm.nih.gov](http://www.nlm.nih.gov)  
1-888-FIND-NLM (1-888-346-3656)
- **National Cancer Institute (NCI)**  
[www.cancer.gov](http://www.cancer.gov)  
1-800-4-CANCER (1-800-422-6237)
- **National Eye Institute (NEI)**  
[www.nei.nih.gov](http://www.nei.nih.gov) | (301) 496-5248
- **National Heart, Lung, and Blood Institute (NHLBI)**  
[www.nhlbi.nih.gov](http://www.nhlbi.nih.gov) | (301) 592-8573
- **National Human Genome Research Institute (NHGRI)**  
[www.genome.gov](http://www.genome.gov) | (301) 402-0911
- **National Institute on Aging (NIA)**  
[www.nia.nih.gov](http://www.nia.nih.gov)  
Aging information 1-800-222-2225  
Alzheimer's information 1-800-438-4380
- **National Institute on Alcohol Abuse and Alcoholism (NIAAA)**  
[www.niaaa.nih.gov](http://www.niaaa.nih.gov) | (301) 443-3860
- **National Institute of Allergy and Infectious Diseases (NIAID)**  
[www.niaid.nih.gov](http://www.niaid.nih.gov) | (301) 496-5717
- **National Institute of Arthritis and Musculoskeletal and Skin Diseases**  
[www.niams.nih.gov](http://www.niams.nih.gov)  
1-877-22NIAMS (1-877-226-4267)
- **National Institute of Biomedical Imaging and Bioengineering (NIBIB)**  
[www.nibib.nih.gov](http://www.nibib.nih.gov) | (301) 451-6772
- **Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD)**  
[www.nichd.nih.gov](http://www.nichd.nih.gov) | 1-800-370-2943
- **National Institute on Deafness and Other Communication Disorders (NIDCD)**  
[www.nidcd.nih.gov](http://www.nidcd.nih.gov)  
1-800-241-1044 (voice)  
1-800-241-1055 (TTY)
- **National Institute of Dental and Craniofacial Research (NIDCR)**  
[www.nidcr.nih.gov](http://www.nidcr.nih.gov) | (301) 480-4098
- **National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)**  
[www.niddk.nih.gov](http://www.niddk.nih.gov)  
Diabetes 1-800-860-8747  
Digestive disorders 1-800-891-5389  
Overweight and obesity  
1-877-946-4627

Kidney and urologic diseases  
1-800-891-5390

- **National Institute on Drug Abuse (NIDA)**  
[www.nida.nih.gov](http://www.nida.nih.gov) | (301) 443-1124
- **National Institute of Environmental Health Sciences (NIEHS)**  
[www.niehs.nih.gov](http://www.niehs.nih.gov) | (919) 541-3345
- **National Institute of General Medical Sciences (NIGMS)**  
[www.nigms.nih.gov](http://www.nigms.nih.gov) | (301) 496-7301
- **National Institute of Mental Health (NIMH)**  
[www.nimh.nih.gov](http://www.nimh.nih.gov) | 1-866-615-6464
- **National Institute on Minority Health and Health Disparities (NIMHD)**  
[www.nimhd.nih.gov](http://www.nimhd.nih.gov) | (301) 402-1366
- **National Institute of Neurological Disorders and Stroke (NINDS)**  
[www.ninds.nih.gov](http://www.ninds.nih.gov) | 1-800-352-9424
- **National Institute of Nursing Research (NINR)**  
[www.ninr.nih.gov](http://www.ninr.nih.gov) | (301) 496-0207

### Centers & Offices

- **Fogarty International Center (FIC)**  
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- **National Center for Complementary and Integrative Health (NCCIH)**  
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- **National Center for Advancing Translational Research (NCATS)**  
[www.ncats.nih.gov](http://www.ncats.nih.gov) | (301) 435-0888
- **NIH Clinical Center (CC)**  
[www.cc.nih.gov](http://www.cc.nih.gov) | (301) 496-2563
- **Office of AIDS Research (OAR)**  
<http://www.oar.nih.gov> | (301) 496-0357
- **Office of Behavioral and Social Sciences Research (OBSSR)**  
<http://obssr.od.nih.gov> | (301) 402-1146
- **Office of Rare Diseases Research (ORDR)**  
<http://rarediseases.info.nih.gov>  
Genetic and Rare Disease Information Center  
1-888-205-2311
- **Office of Research on Women's Health (ORWH)**  
<http://orwh.od.nih.gov> | (301) 402-1770

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