

NIH
MedlinePlus
the magazine

Trusted Health Information
from the National
Institutes of Health

Summer 2007

Anne & Kirk Douglas
never gave in to his...

Stroke

Know the signs. Act in time.

**Beating
Depression**

Help is available

Back Pain

What you need to know

Obesity & Kids

A path to healthy weight

Health News You Can Use

... from the world's premier research institute

On behalf of the Friends of the National Library of Medicine (FNLN), we welcome you to this issue of *NIH MedlinePlus* magazine.

This issue marks the first anniversary of our publication and we are very pleased with the progress we've made and the response we've received over the past year. The magazine has taken on many important topics, from cancer to diabetes, from the new science of aging well to heart health. Each issue has provided the latest advice and research findings direct from the scientists and medical experts who work for you at the world's leading medical and health research organization, the National Institutes of Health. We are greatly indebted to those experts and the major public figures, like Lance Armstrong, Mary Tyler Moore, Phylicia Rashad, Sam Donaldson, and Kirk Douglas, who have joined our effort to provide you with a gold standard of reliable, understandable, and up-to-date health information.

We are excited to enter the second year of *NIH MedlinePlus* magazine and will continue to focus on bringing you the most up-to-date and trustworthy information you need to keep you and your family healthy. This issue tackles common problems like sleep disorders and back pain and provides the latest information on the prevention, diagnosis, and treatment of one of the leading killers in America — stroke.

We hope you enjoy this issue of *NIH MedlinePlus* magazine. Please let us know if you have suggestions for future topics to be covered in the magazine and if you would like to receive a free subscription. You can reach us at the address below.

Sincerely,
Paul G. Rogers
Chairman
Friends of the National Library of Medicine



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NIH MedlinePlus, the Magazine is published by
Vitality Communications
407 Norwalk St.
Greensboro, NC 27407
(336) 547-8970

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Stem Cell Research: Unlocking the Mystery of Disease

When he testified earlier this year before the U.S. Senate Appropriations Subcommittee on Labor, Health and Human Services, and Education, **Dr. Elias Zerhouni, NIH Director**, described the need for expanding stem cell research. Recently, he spoke about stem cell research with MLP coordinator Christopher Klose.



Klose: You have said the greatest risk to scientific progress is to stop taking risks; that risk-taking is the essence of science. Since becoming Director of NIH, you have consistently supported embryonic and adult stem cell research to develop cell-based therapies for heart disease, stroke, and countless other devastating conditions. What's been the progress?

Dr. Zerhouni: Biomedical research over the past 30 years has markedly reduced the mortality due to heart disease and stroke, for instance. But understanding the software of DNA, of how things play out, is the challenge of 21st century biomedical research.

That is why NIH scientists are working hard to understand how an infant cell—a childhood neuron—can create new circuits and regenerate them, whereas an adult neuron is much less capable.



Klose: How difficult is the challenge?

Dr. Zerhouni: It is extraordinarily complex. Picture the embryonic cell (and its DNA) as a very complex keyboard, with thousands of keys. With the human genome, we've identified the size of the keyboard, the number of keys, and the notes each plays. What we haven't figured out is how they end up playing Bach and Beethoven, so to speak—how becoming a neuron is one symphony, a skin cell another.

There are billions of cells, all with their own music. As the brain develops, it turns out they're pretty harmonious—an orchestra of keyboards. So signaling among them becomes important.

But who is the conductor? How is an adult cell that only plays neuron music conducted, why does it stop, and how can you make it play heart or skin music? And for the embryonic stem cell—a keyboard that has never played—how is it directed to play neuron music and not muscle or liver music, even though all of our cells contain the same instruction books?

This is what stem cell science is all about.

Klose: All in search of a conductor?

Dr. Zerhouni: Yes. We've made great progress, but people still suffer. With stroke, as with all conditions, we must be able to predict them earlier so we can act at the personal level—through changes in lifestyle, diet, exercise, etc.—to preempt it from striking, if possible. Fundamentally, however, we need to understand how things are organized.

Therefore, all avenues of research need to be pursued.

Klose: Despite the controversy over stem cells?

Dr. Zerhouni: Yes. Unfortunately, the scientific foundation of stem cell research is sometimes lost in the societal, moral, and ethical battle between hype and hope. But our job at NIH is to push the science forward to serve our patients.

Klose: When can we expect results?

Dr. Zerhouni: The research is advancing at an incredible pace, but as we move forward we're finding more complexity. When I became director of the NIH we only knew of one gene that had anything to do with diabetes. Then, last June, we discovered 10 more that are clearly associated; we must accelerate our research into how these notes play.

Klose: And that's the issue of supporting basic research, isn't it?

Dr. Zerhouni: That's right. We must continue the research at all levels, or there will be no progress. We need to understand these fundamental facts of life: how and why the young brain adapts, why the old does not. If we can know how a disease occurs, we can prevent it.

So I think it's a multi-pronged attack, both from the point of basic understanding and continually improving what we do. Finally, it's important to emphasize that science evolves with strong ethics.

Good science is good ethics. ■



“Good science is good ethics.”

KNOW STROKE • KNOW THE SIGNS • ACT IN TIME

Understanding Stroke

“When I walked into the locker room at work, I realized something was wrong. I couldn’t speak. I tried to pick up my lock, but my right hand couldn’t grab it.” For Ruth Junious, the sudden onset of a stroke was as bewildering as it was frightening.

“One of my co-workers noticed something was wrong and asked if I could write. With my left hand, I scribbled 911 on a piece of paper. Luckily, my friend knew the signs of stroke and got help. She called an ambulance, and I was rushed to the emergency room. The doctors ran some tests and put a drug into my IV. Within 10 minutes I could speak again.” The fact that her coworker knew the signs of stroke and understood the importance of urgent medical attention, may have saved Junious’s life. Today, she understands much more about this disorder that occurs to more than 700,000 Americans each year—and is more common among African-Americans than any other racial or ethnic group in the United States.

“I didn’t know a thing about stroke before I had one,” she says. “Now, I make sure that all my family knows the signs of stroke, so they can get help if they need it.”

Stroke occurs when blood flow to your brain is stopped, either by blockage of a blood vessel supplying the brain or rupture of a blood vessel that causes bleeding into the brain. And once you have a stroke, your chances of having another stroke are much greater. Many entertainers and other celebrities who have suffered a stroke go on to help warn others about the dangers, including such entertainers as Kirk Douglas (See page 8) and Della Reese, news broadcaster Mark McEwan, actress Julie Harris, and motivational speaker David Layton.

Preventing Stroke

“Until I had my stroke, I didn’t do anything good for my health,” says stroke survivor Ted Turner. “I had high blood pressure, I was overweight, and I smoked. When bad things happen to people, they tend to think ‘why me?’ But, when I think about my stroke, I think ‘why not me?’ I had all the risk factors and wasn’t taking care of myself like I am now. I’ve learned a lot of important lessons from my stroke, which have caused me to change my eating habits, quit smoking, and really control my high blood pressure for the first time in my life. I hope people realize they can prevent stroke. It doesn’t have to happen to them.”

Like many stroke survivors, Turner knows the truth in the old saying that “an ounce of prevention is worth a pound of cure.” That need to promote stroke prevention is one reason that the National Institute of Neurological Disorders and Stroke (NINDS) has developed a national “Know Stroke” educational campaign to help all Americans understand and respond to stroke. (See page 7 for more information.)



Stroke survivor **Ruth Junious** credits her quick recovery to a coworker who knew the warning signs.

When Alma Shandling's husband Robert had a stroke, she knew just what to do.

"I could not speak," says Robert Shandling. "All I knew was that she was my wife, and I reached over and took her hand. I couldn't remember the names of my grandchildren or my daughters. I was a complete blank."

But Alma knew not only that it was a stroke, but that speed was of the essence. "I said to him, 'You're having a stroke. Stay here. I'm going to call an ambulance,'" Alma says. "He made it to the hospital in about 25 minutes, and six days later he walked out of the hospital. I think that is a miracle; I really do."

"Somehow, we have to get the hopeful message out that there is something you can do. It's not hopeless; you can do something," says John Marler, M.D., NINDS Associate Director for Clinical Trials. "We've been able to develop a drug, t-PA, which you can inject in a vein, and it goes through the body, knows where the clot [causing the stroke] is, locks onto that clot, and dissolves it. And blood starts flowing again."

Since about 80 percent of strokes involve a blood clot, t-PA has been a major advance in the treatment of strokes.

In fact, the risk of stroke in any given year is actually decreasing, notes Walter J. Koroshetz, M.D., NINDS Deputy Director. "Stroke rates have been decreasing since the 1960s and '70s, and the annual risk of stroke death is still going down." Because stroke risk increases with age, as the population ages, total stroke incidence has not decreased. Progress in reducing risk is necessary just to keep up.

The challenge, Dr. Koroshetz adds, is to help people understand that some unhealthy lifestyle issues—high blood pressure, obesity, smoking—may prevent further declines in stroke rates. "Hypertension (high blood pressure) is the main risk factor for stroke," says Dr. Koroshetz. "And there is evidence that as you lower your cholesterol, stroke risk goes down. But the 'epidemic' of obesity and sedentary lifestyle are acting against us. These are associated with high blood pressure and elevated cholesterol, atherosclerosis" (plaque buildup, causing narrowing in the arteries), and stroke risk. ■



Walter Koroshetz, M.D., is Deputy Director of the National Institute of Neurological Disorders and Stroke (NINDS).

Know Stroke

Welcome to this special section on stroke, the third leading cause of death in the United States. Each year, there are more than 700,000 strokes in this country, and stroke causes more serious long-term disabilities than any other disease. For African-Americans, stroke is more common and more deadly—even in young and middle-aged adults—than for any ethnic or other racial group in the nation.

But there is also good news in the fight against stroke, and this special section presents information that can help you understand and prevent stroke, and know the warning signs and the need for quick action when a stroke occurs.

Our mission at the National Institute of Neurological Disorders and Stroke (NINDS) is to reduce the impact of neurological disorders, such as stroke, by developing ways to prevent or to treat these diseases. Disorders of the nervous system cause many lost lives, disability, and suffering. They also cost billions of dollars each year in medical expenses and reduced productivity.

Because of basic and clinical medical research progress over the last decades, thousands of strokes are prevented each year, and emergency treatment lessens chronic disability for many people who do have a stroke. A decade ago, an NINDS clinical trial showed that the clot-busting drug t-PA was the first emergency treatment that could improve the outcome from stroke. This engaged the health care community in stroke education, energized hospitals to develop even better emergency stroke care, and stimulated the organization of more than 250 certified primary stroke centers nationally. More recently, investigators reported the first positive randomized controlled trial to show that constraint therapy can improve motor function in patients years after a stroke.

NINDS researchers in Bethesda, MD, and around the world continue to pioneer stroke research, translating the promise of this research into the progress of tangible results for the public. Relevant research comes from basic laboratories studying the process of cell death or neuroplasticity to clinical trials of new therapeutic strategies. This special section offers you information that you can use to help in the fight against stroke, including information from the NINDS "Know Stroke" educational campaign, which is being conducted with both English and Spanish components.

We hope that you find this special section of NIH MedlinePlus informative and useful.

Story C. Landis, Ph.D.
Director, NINDS



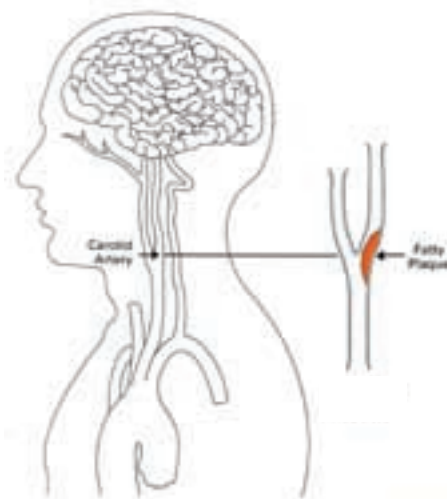
Story C. Landis, Ph.D.
Director, National Institute of
Neurological Disorders and Stroke

Two Kinds of Stroke: Ischemic and Hemorrhagic

Strokes happen when blood flow to your brain stops. Within minutes, brain cells begin to die. There are two kinds of stroke. The more common kind, called ischemic stroke, accounts for approximately 80 percent of all strokes. It is caused by a blood clot that blocks or plugs a blood vessel in the brain (see illustration at right). The other kind, called hemorrhagic stroke, is caused by a blood vessel that breaks and bleeds into the brain.

Transient ischemic attacks (TIAs) are “mini-strokes” that occur when the blood supply to the brain is briefly interrupted. A TIA is a stroke that comes and goes quickly. It happens when a blood clot blocks a blood vessel in your brain. Symptoms of a TIA are like other stroke symptoms, but do not last as long. Most symptoms of a TIA disappear within an hour, although they may last for up to 24 hours. Because you cannot tell if these symptoms are from a TIA or a stroke, you should get to the hospital quickly. TIAs are often a warning sign for future strokes.

Ischemic Stroke



Stroke Can Affect Anyone



Award-winning actress **Julie Harris** survived a 2001 stroke and succeeded through therapy in regaining speaking ability.



Since her stroke in 1979, singer **Della Reese** has been a tireless spokesperson for the National Stroke Association.



Former CBS newsman **Mark McEwen** is writing a book, to be published in 2008, about his stroke and subsequent recovery.



Motivational speaker **David Layton**, who suffered a stroke in 2002, has reached more than 1 million people with his stroke prevention message.

NINDS and Stroke

NINDS conducts stroke research and clinical trials at its laboratories and clinics at the National Institutes of Health in Bethesda, MD., and in nearby hospitals; and through grants to major medical institutions across the country. Currently, NINDS researchers are studying risk factors for stroke and how brain damage results from a stroke. Basic research has also focused on the genetics of stroke, stroke risk factors, and how to protect the brain against damage during a stroke. Scientists are also working to develop new and better ways to help the brain repair itself to restore important functions after a stroke. New advances in imaging and rehabilitation have shown that the brain can compensate for function lost as a result of stroke.

The “Know Stroke” Campaign

NINDS is conducting a public awareness campaign across the United States to educate people about stroke. The full name of the program, “Know Stroke. Know the Signs. Act in Time.” include the three most important points about stroke—understanding stroke, knowing the warning signs, and acting quickly. There is also a Spanish-language version of the campaign for the U.S. Hispanic community.

1 Know Stroke

A stroke occurs when the blood supply to part of the brain is suddenly interrupted or when a blood vessel in the brain bursts, spilling blood into the spaces surrounding brain cells. Brain cells die when they no longer receive oxygen and nutrients from the blood, or when there is sudden bleeding into or around the brain.

There are two forms of stroke: an ischemic stroke occurs when a blood vessel supplying the brain becomes blocked, and a hemorrhagic stroke occurs when there is bleeding into or around the brain.

2 Know the Signs

Because stroke injures the brain, you may not realize that you are having a stroke. To a bystander, someone having a stroke may just look unaware or confused. Stroke victims have the best chance if someone around them recognizes the symptoms and acts quickly.

■ **What are the symptoms of a stroke?**—The symptoms of stroke are distinctive because they happen quickly—thus the origin of the name “stroke.”

- Sudden numbness or weakness of the face, arm, or leg (especially on one side of the body)
- Sudden confusion, trouble speaking or understanding speech
- Sudden trouble seeing in one or both eyes
- Sudden trouble walking, dizziness, loss of balance or coordination
- Sudden severe headache with no known cause

■ **What should a bystander do?**—If you believe someone is having a stroke—if he or she suddenly loses the ability to speak, or move an arm or leg on one side, or experiences facial paralysis on one side—call 911 immediately.

3 Act in Time

Stroke is a medical emergency. Every minute counts when someone is having a stroke. The longer blood flow is cut off to the brain, the greater the damage. Immediate treatment can save people's lives and improve their chances for successful recovery.

■ **Why is there a need to act fast?**—Ischemic strokes, the most common type of stroke, can be treated with a drug called t-PA that dissolves blood clots obstructing blood flow to the brain. The window of opportunity to start treating stroke patients is three hours, but to be evaluated and receive treatment, patients need to get to the hospital within 60 minutes. Hemorrhagic strokes often continue to enlarge due to continued bleeding, which in some cases can be prevented by normalizing the clotting system. Sometimes the blood clots need to be removed emergently.

■ **What is the benefit of treatment?**—A five-year study by NINDS found that some stroke patients who received t-PA within three hours of the start of stroke symptoms were at least 30 percent more likely to recover with little or no disability after three months.

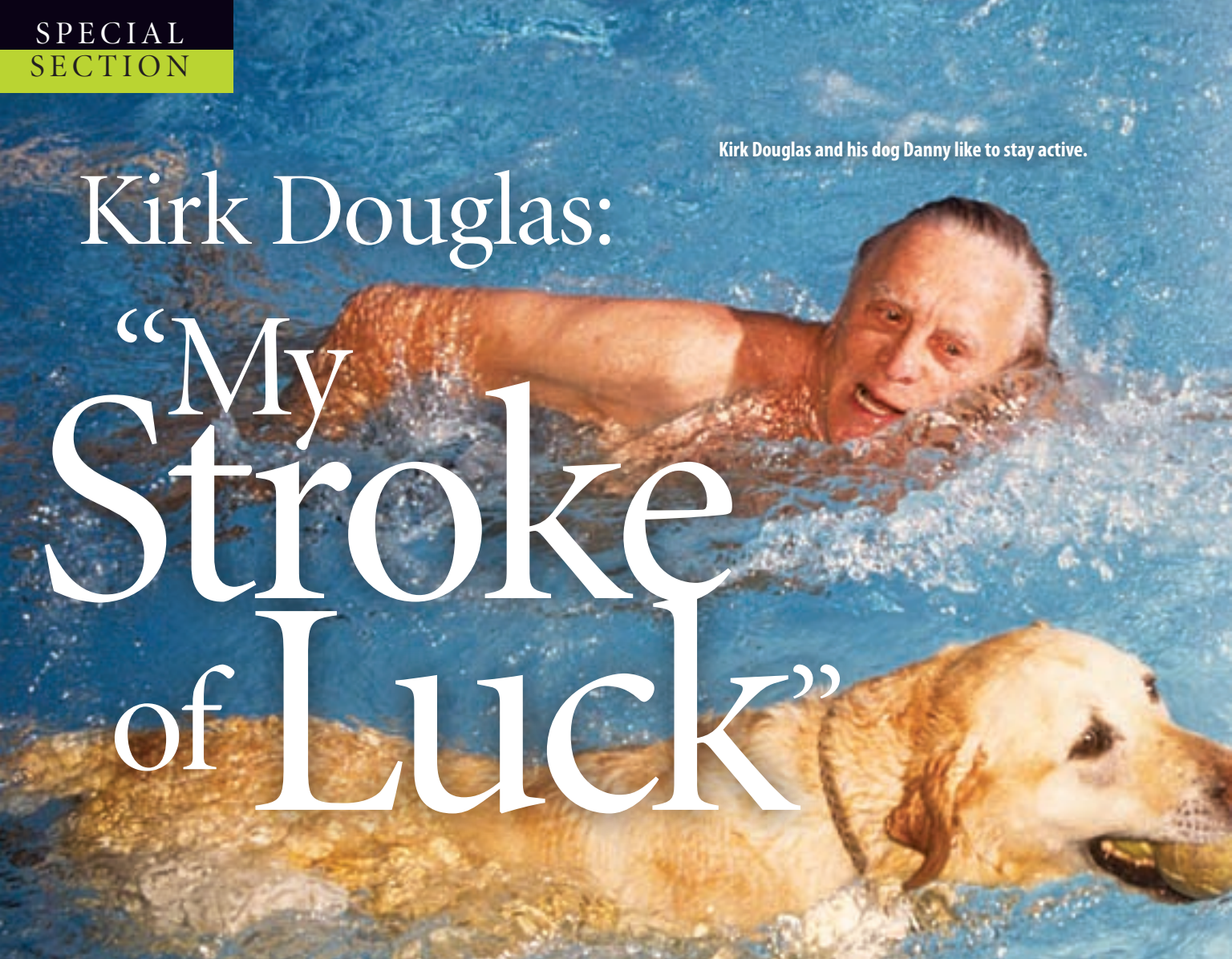
■ **What can I do to prevent a stroke?**—The best treatment for stroke is prevention. There are several risk factors that increase your chances of having a stroke:

- High blood pressure
- Heart disease
- Smoking
- Diabetes
- High cholesterol
- Sedentary lifestyle

If you smoke—quit. If you have high blood pressure, heart disease, diabetes, or high cholesterol, getting them under control—and keeping them under control—will greatly reduce your chances of having a stroke.

Kirk Douglas and his dog Danny like to stay active.

Kirk Douglas: “My Stroke of Luck”

A photograph of Kirk Douglas swimming in a pool, with his dog Danny swimming alongside him. The water is blue and splashing around them.

When a stroke felled actor and writer Kirk Douglas in 1996, he thought his world was coming to an end. Now, he considers his stroke and subsequent efforts at recovery to have opened a new window on life.

At the age of 90, Kirk Douglas is an American institution and one of the world's most revered actors, writers, and philanthropists. His 60-year entertainment career has also included speaking trips all over the world to talk about American democracy and freedom, and he has been honored with the U.S. Medal of Freedom and similar awards from many countries and international organizations.

But today, Douglas feels that one of the most important lessons in life occurred when, seemingly out of the blue, he had a stroke 11 years ago. He chronicled that event and therapy in his bestselling memoir, *My Stroke of Luck*. Earlier this year, Douglas expanded on that topic and others in his new book, *Let's Face It: 90 years of Living, Loving, and Learning*. Recently, Douglas talked about his stroke and what he considers important in life.

It has been 11 years since your stroke and you look terrific and keep a very active schedule. Are there daily routines that you have that have helped you recover and help keep you feeling good?

My stroke, 11 years ago, was a blessing in disguise. I learned that we take too many things for granted in this world—even speech. We think our thoughts and then we have no difficulty saying it in words. When you have a stroke your mind thinks quickly but your speech reacts very slowly. You have to learn how to use your tongue, your lips, your teeth. I am lucky, although my speech is still impaired, I suffer no paralysis and I didn't die. I have begun to appreciate the gift of life. Of course, I do my speech exercises every day. When I asked my speech therapist how long would I have to do my exercises? Her answer was, "until you die."

Meanwhile, I exercise every day in the gym with a trainer who is 93 years young. My wife goes with me.

You have spoken openly about the depression you suffered following your stroke. How did you overcome this and do you have a message for others who face a similar reaction?

The most difficult thing about a stroke is the depression. When I couldn't talk, I had to cope with a suicidal impulse. I finally realized that suicide is selfish. You are only thinking of yourself and not of the mess you leave behind. The antidote to depression is humor and thinking of others. When I could barely speak, I made up a joke: "What does an actor do when he can't talk? He waits for silent pictures to come back!"

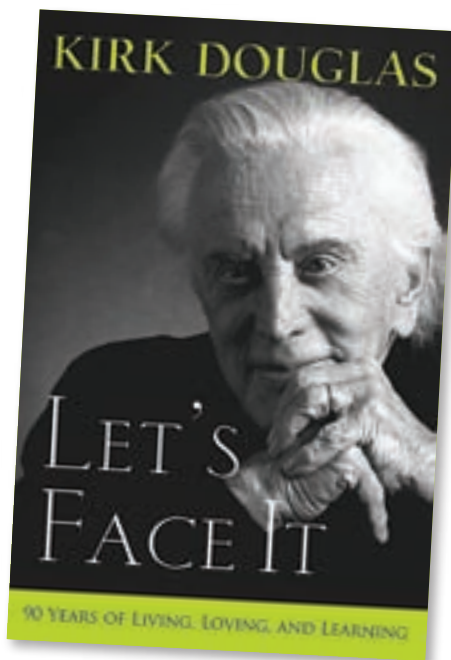
Humor is a very important element in life. I deal with it extensively in my book *Let's Face It*. But the most important thing to counteract depression is to think of other people. Try to be concerned with the problems of others, try to help them. This will help you deal with depression. (See more on depression, starting on page 10.)

You have said that your family—particularly your wife Anne—was instrumental in helping you to recover from stroke by not coddling you or trying to do everything for you. What is the importance of that for those who have had a stroke and their loved ones? Do you have any other recommendations for others who are now recovering from a stroke?

I am lucky to be married to a fantastic woman—Anne. She didn't coddle me; she helped me. When I was lying in bed bemoaning my fate, Anne would

say, "Get your ass out of bed and start with working with your speech therapist." That helped me.

You wrote a terrific book about your experiences with your stroke called *My Stroke of Luck*. In it, you talked about how you were inspired by others who had endured physical hardship. Can you share an example of someone who inspired you?



It was gratifying for me to know that [this book] helped people with strokes, and also it helped the people close to them. I was helped by a friend who endured so many physical hardships. His name is Jim McClaren. He is a tall, good-looking, young man who lost his leg in a motorcycle crash while he was in college. We became friends after that, and he handled his prosthesis with ease. He participated in triathlons, which included swimming, running, and bicycle riding. He was a champion in the handicapped class.

Then tragedy struck. He was participating in a triathlon in Orange County, here in California. The last event was a 20-mile bicycle ride. He asked me to come and see him, but I couldn't get away. We arranged to have him visit me in Beverly Hills when the race was over. That was not to be. In the middle of the race, his bicycle was hit by a

van, and he was thrown into an iron post. I quickly went to visit him in the hospital where I found him completely paralyzed. With a smile he said to me, "Kirk, what are the chances that I would have two similar accidents?" From that day on our friendship continued, with him in a wheelchair. I never saw him depressed. He gives motivational speeches and sometimes he gives me a ride, sitting on his lap, in his wheelchair.

You just celebrated your 90th birthday and wrote another book, *Let's Face It: 90 Years of Living, Loving and Learning*. What does the future hold for Kirk Douglas?

No one was more surprised than me when I became 90 years old. While trying to blow out 90 candles with my sons Michael, Joel, and Peter, I decided to write my last book. I call it *Let's Face It*. I dedicate it to my grandchildren and the younger generation. Let's face it, the world is in a mess, and the younger generation will inherit that mess. I think all the "old guys" should never retire but try to help those who have followed them. They will have so many problems to deal with that they didn't create. I hope my book *Let's Face It* will help. I believe in the quotation by Horace Mann, "Be ashamed to die before you have won some victory for humanity." ■

Beating Depression

...Help Is Available

Researchers estimate that as many as 20 million people in the United States suffer from some form of depression—yet, many people remain undiagnosed and untreated. Could you have depression?



Serious postpartum depression, like that suffered by actress **Brooke Shields**, affects 10-15 percent of women any time from a month to a year after childbirth.



Newsman **Mike Wallace** has spoken frequently about his own battle with major depression.

Winston Churchill called his continual bouts of depression “the black dog.” President Abraham Lincoln, who suffered with depression throughout his adult life, once said, “I am now the most miserable man living.” Until very recently, the understanding and treatment of various forms of depression were usually poor; and people were reluctant to admit to depression even when they understood that they had it.

Thanks to recent research, a new generation of medications, and a deeper understanding of how depression works, those days are gone. In the past few years, many celebrities and public figures have gone public with their own depressive experiences. (Read actor Kirk Douglas’s comments about depression related to his stroke, starting on page 8.) Among them are newsman Mike Wallace and humorist Art Buchwald, actresses Brooke Shields and Lorraine Bracco (who played psychiatrist Dr. Jennifer Melfi on *The Sopranos* television series), Tipper Gore and Alanis Morissette, and many others. Their testimony has also helped Americans to understand the different kinds of depression.

In her book *Down Came the Rain: My Journey Through Postpartum Depression*, Shields candidly discussed her depression, and the sense that it would never go away. “I just felt as though I would never be happy again, and as if I had fallen into a big black hole.” But Shields and many others have gotten help, and they know that depression can be successfully treated.

Getting Help

“There’s nothing, repeat, *nothing* to be ashamed of when you’re going through a depression,” says *60 Minutes*’ newsman Mike Wallace, who has taped public service



Sopranos’ star **Lorraine Bracco** has successfully battled depression and written about her experiences.

announcements about depression for the CBS Cares ads. “If you get help, the chances of your licking it are really good. But, you have to get yourself onto a safe path.”

“There’s help. It’s treatable,” writes Lorraine Bracco in her book, *On the Couch*. “Getting treatment for depression was the best decision I ever made; going public about it was the second best.”

But many people today continue to suffer from the baffling condition that can leave them feeling sad, worthless, and uninterested in any activities. Other symptoms can include sleeplessness or oversleeping, energy loss, weight gain or loss, and even thoughts of death or suicide.

The National Institute of Mental Health (NIMH) is at the forefront of research on the different types of depression, their treatments, and on ways to help the American public understand that help is available. The first step, say NIMH researchers, is to understand the types of depression and what treatments are available from your physician.

Types of Depression

Just like other illnesses, such as heart disease, depression comes in different forms. And within these, there are variations in the number of symptoms, their severity, and persistence.

- **Major depression** can have a combination of symptoms (see accompanying symptoms list) that interferes with the ability to work, study, sleep, eat, and enjoy previously pleasurable activities. A major depressive episode may occur only once; but more commonly, several episodes may occur in a lifetime.
- **Dysthymia**, a less severe type of depression, involves long-lasting, chronic symptoms that do not seriously disable, but keep you from functioning well or feeling good.
- **Bipolar disorder** (or *manic depressive illness*) is characterized by cycling mood changes: severe highs (mania) and lows (depression), often with periods of normal mood in between.
- **Postpartum depression** can make new mothers feel restless, anxious, fatigued, and worthless. Some new moms worry they will hurt themselves or their babies. Unlike the “baby blues,” postpartum depression does not go away quickly. Researchers think that changes in a woman’s hormone levels during and after pregnancy may lead to postpartum depression.
- **Seasonal affective disorder (SAD)** has been linked to a biochemical imbalance in the brain prompted by shorter daylight hours and a lack of sunlight in winter. Some people may sleep too much, have little energy, and crave sweets and starchy foods. They may also feel depressed.

Types of Medications

There are several types of medications used to treat depression. These include newer antidepressant medications—chiefly what are called selective serotonin reuptake inhibitors (SSRIs)—and older ones, called tricyclics and monoamine oxidase inhibitors (MAOIs). In addition to medications, a

Symptoms of Depression

Not everyone who is depressed or manic experiences every symptom. The severity of symptoms varies among individuals and also over time.

- Persistent sad, anxious, or “empty” mood.
- Feelings of hopelessness or pessimism.
- Feelings of guilt, worthlessness, or helplessness.
- Loss of interest or pleasure in hobbies and activities that were once enjoyable, including sex.
- Decreased energy, fatigue; feeling “slowed down.”
- Difficulty concentrating, remembering, or making decisions.
- Trouble sleeping, early morning awakening, or oversleeping.
- Changes in appetite and/or weight.
- Thoughts of death or suicide, or suicide attempts.
- Restlessness or irritability.
- Persistent physical symptoms, such as headaches, digestive disorders, and chronic pain that do not respond to routine treatment.

type of psychotherapy called cognitive behavioral therapy (CBT) can help relieve depression. (See accompanying article, “Working It Out.”)

Sometimes, a doctor will try a variety of antidepressants before finding the most effective medication or combination of medications for the patient.

Selective serotonin reuptake inhibitors (SSRIs):

- citalopram (brand name: Celexa)
- escitalopram (brand name: Lexapro)
- fluoxetine (brand name: Prozac)
- paroxetine (brand names: Paxil, Pexeva)
- sertraline (brand name: Zoloft)

Tricyclics:

- amitriptyline (brand name: Elavil)
- desipramine (brand name: Norpramin)
- imipramine (brand name: Tofranil)
- nortriptyline (brand name: Aventyl, Pamelor) ■

Working It Out

A specific kind of “talk” psychotherapy can help relieve depression

Few people may have heard of a type of psychotherapy called cognitive behavioral therapy (CBT) – but people with depression and their doctors should take notice of this technique. Especially when combined with medications, it can help relieve depression. Research shows that it even helps reduce the likelihood of the most tragic outcome of



Dr. Thomas R. Insel, Director of the National Institute of Mental Health

extreme depression: suicide.

Unlike some other kinds of psychotherapy, CBT is meant to be short-term, usually 10 to 20 sessions, and research shows that it can be effective. The health professionals who provide CBT help patients work through the thoughts and emotions that are troubling them now, rather than trying to work through emotions and circumstances of the distant past.

CBT is based on the idea that changing thought patterns and the behaviors that result from them can help change emotional reactions – including the negative emotional components of depression. People sometimes develop thought patterns that aren't very realistic and that lead to negative feelings about themselves; a fertile breeding ground for depression.

While some people go through the same experiences and don't develop depression, others do. Depression is a brain disorder, and variations in genes that are active in the brain set the stage for how different people react to everyday life events. Some gene variations make it more likely that people will react in ways that lead to depression, which can become severe.

Research Shows the Potential of CBT

Results of a recent clinical trial illustrate the potential power of CBT. Depression is, by far, the leading reason that people end their own lives. Researchers gave one group of



adults who had attempted suicide CBT and compared them with another group that instead got the usual treatments that clinicians in the community provide for such patients. In the next 18 months, only 24 percent of those who had undergone CBT attempted suicide again, but 42 percent of the patients in the other group made another suicide attempt.

Research also shows that CBT can be helpful for adolescents—a group that is in an emotionally vulnerable stage of life even under the best of circumstances—who are depressed. A recent study showed that a combination of CBT and the medication fluoxetine (Prozac and other medications like it) was more helpful than treatment with either therapy alone.

NIMH Director Thomas R. Insel, M.D., suggests thinking about treating depression the same way you would think about treating other major illness. For example, with mild high blood pressure, he says, your clinician might start by prescribing lifestyle changes, like diet and exercise. But if your blood pressure was very high when you were diagnosed, you'd probably have to take a medication, and you might have to try different ones to find the one that worked best for you. If your blood pressure got worse, you might have to add another medication.

“Depression follows the same principle,” Dr. Insel says. “If you have mild depression, your clinician might want to start with cognitive behavioral therapy. But if you're diagnosed with more severe depression, it's more likely that you'll get a medication, and you'll probably need to try a few before you find the one that's right for you. For some people, a combination of CBT and medication will be the best treatment.”

The key, he adds, is to make sure that you get treatment from a licensed health professional, whether it's for CBT or for treatment with medications. He notes that if your clinician offers CBT, you should make sure that he or she has had the training required to provide this helpful kind of therapy. ■

Depression Research

The STAR*D Study

New research reveals that, by working with their doctors and trying multiple treatment options, two-thirds of those with depression can become symptom-free.

Research results from the largest clinical trial for depression ever conducted have helped scientists track “real-world” patients who became symptom-free and to identify those who were not helped by initial depression treatment. The results show that more than two-thirds of those suffering from major depression can become symptom-free, if they are willing to work with their doctors and try various treatments to determine which work best for them.

“The study offers clear evidence of what happens step-by-step,” says Madhukar Trivedi, M.D., co-author of the study and professor of psychiatry at the University of Texas (UT) Southwestern Medical Center in Dallas. “And it gives us a good idea of what outcomes will be the following year, if patients continue the same treatment.”

The study, funded by the National Institute of Mental

Health (NIMH), used flexible adjustment of medication dosages, based on quick and easy-to-use ratings of symptoms, and the patients’ own ratings of side effects.

“The take-home message for patients is to hang in there and stay in treatment, even if several steps and various medications must be tried,” says A. John Rush, M.D., the principal investigator in the study, the vice chairman of clinical sciences, and professor of psychiatry at UT Southwestern. “Be patient and willing to tell your doctor if a medication isn’t working, if the dosage is bothering you, or if you’re having side effects. Collaborate with your physician to find the right medication and dosage for you, and stay on it long enough to give it a chance to work.”

The trial was known as the STAR*D study—Sequenced Treatment Alternatives to Relieve Depression—and was conducted over six years. More information can be found at www.star-d.org and at www.ids-qids.org.



Dr. A. John Rush (left) and **Dr. Madhukar Trivedi**, both of the University of Texas (UT) Southwestern Medical Center and co-authors of the STAR*D study.

Relief in Hours?

An experimental medication called ketamine relieves depression in just hours. Is it a key to the future of treatment?

Today’s medications for depression take 4 to 6 weeks or longer to start working for most patients. But that long wait may become much shorter in the future.

A new study has revealed more about how a medication called ketamine, when used experimentally for depression, can relieve symptoms of depression in hours instead of weeks or months. Ketamine itself probably won’t come into use as an antidepressant because of its side effects, notes lead researcher Carlos A. Zarate, Jr., M.D., Chief of Experimental Therapeutics of the Mood and Anxiety Disorders Program at the National Institute of Mental Health (NIMH). But the new finding moves scientists considerably closer to understanding how to develop faster-acting antidepressant medications.

“This may be a key to developing medications that eliminate the weeks or months patients have to wait for antidepressant treatments to kick in,” says Dr. Zarate.

Ketamine works by blocking a receptor called NMDA on brain cells. A new 2007 study in mice reveals that this is just one of the steps involved. It turns out that ketamine blocks the NMDA receptor and increases the activity of another receptor, AMPA. Both of the receptors are binding sites for a chemical messenger in the brain called glutamate. This interplay of the two receptors appears to be crucial for ketamine’s rapid actions.

“Our research is showing us how to develop medications that get at the biological roots of depression. This new finding is a major step toward learning how to improve treatment for the millions of Americans with this debilitating disorder; toward eliminating the weeks of suffering and uncertainty they have to endure while they wait for their medications to work,” says NIH Director Elias Zerhouni, M.D. ■



Dr. Carlos A. Zarate, Jr., Chief of Experimental Therapeutics of the Mood and Anxiety Disorders Program at the National Institute of Mental Health (NIMH).

Researchers at NIH's National Center on Sleep Disorders Research are discovering the many ways that skimping on sleep can be harmful to your health.



At a SleepMed diagnosis and therapy center in Maryland, participant Scott Ward prepares to have his own sleep patterns and possible problems diagnosed.

Your Wake-Up Call

When you're trying to squeeze in more time for your work, family, and other activities, it can seem like your only option is to cut back on sleep. But that could be a dangerous choice. Sleep isn't just "down time," when your brain shuts off and your body rests.

"We are learning more and more about how sleep disturbances can increase the risk of many health problems, including hypertension, cardiovascular disease, diabetes, obesity, and infections," says Michael Twery, Ph.D., Director of the National Heart, Lung, and Blood Institute's National Center on Sleep Disorders Research (NCSDR).

The NCSDR was established in 1993 to combat a serious public health concern. About 70 million

Americans suffer from sleep problems; among them, nearly 60 percent have a chronic disorder. Each year, sleep disorders, sleep deprivation, and sleepiness add an estimated \$15.9 billion to the national health care bill. Additional costs to society for related health problems, lost worker productivity, and accidents have not been calculated. Sleep disorders and disturbances of sleep comprise a broad range of problems, including sleep apnea, narcolepsy, insomnia, parasomnia, jet-lag syndrome, and disturbed biological and circadian rhythms. The NCSDR conducts and funds research relating to all sleep disorders.

Why Sleep Is Important

Adults, even seniors, need at least 7 to 8 hours



Dr. Michael Twery:
"Sleep disturbances increase your health risks."



Take the National Center on Sleep Disorders Research Sleep Quiz

TRUE OR FALSE?

- _____ 1. Sleep is a time when your body and brain shut down for rest and relaxation.
- _____ 2. If you regularly doze off unintentionally during the day, you may need more than just a good night's sleep.
- _____ 3. If you snore loudly and persistently at night and are sleepy during the day, you may have a sleep disorder.
- _____ 4. Opening the car window or turning the radio up will keep the drowsy driver awake.
- _____ 5. Narcolepsy is a sleep disorder marked by "sleep attacks."
- _____ 6. The primary cause of insomnia is worry.
- _____ 7. One cause of not getting enough sleep is restless legs syndrome.
- _____ 8. The body has a natural ability to adjust to different sleep schedules such as working different shifts or traveling through multiple time zones quickly.
- _____ 9. People need less sleep as they grow older.
- _____ 10. More people doze off at the wheel of a car in the early morning or midafternoon than in the evening.

(Answers on opposite page.)

of sleep a night, NCSDR research shows. Not getting enough sleep has many well-known consequences, such as interfering with concentration, learning, and problem-solving. Sleepiness is also an obvious danger on the road.

Sleep lets your heart and vascular system rest. The body releases hormones during sleep, including those related to stress and growth. The immune system creates more infection-fighting cells. All of these important functions are disrupted when a person doesn't get sufficient sleep, which can lead to illness in a variety of ways. "Our goal is to provide information that people can use to make decisions about their lifestyles and sleep that will lead to better health," Dr. Twery says.

Are You Getting Enough Sleep?

You may have a sleep disorder and should see your doctor if:

- You regularly take more than 30 minutes each night to fall asleep.
- You regularly awaken more than a few times or for long periods of time each night.
- You take frequent naps.
- You often feel sleepy during the day—especially if you fall asleep at inappropriate times during the day.

One way to help your doctor determine if you need help with your sleep is to create a sleep diary for a week or two. It should include what time you go to bed, what time you get up, how you feel when you get up, and what time of day you feel sleepy. Your doctor will also take into account your medical history and may order certain tests to see what might be causing your sleep disturbance. He or she can recommend lifestyle changes or medical treatment to help you sleep better.

Sleep Apnea and Children

Snoring is common in children and usually isn't a serious medical concern. But in some children, snoring is a sign of underlying obstructive sleep apnea—a common but potentially dangerous condition during which a person has episodes of stopped breathing while asleep.

Like adults with this nighttime breathing disorder, children with sleep apnea are at risk of developing abnormal blood pressure levels and insulin resistance, which may lead to serious health problems later in life, including heart disease, stroke, and high blood pressure. Sleep apnea can also lead to problems with behavior, growth, and learning, says Susan Redline, M.D., Director of the Case Western Reserve Sleep and Epidemiology Research Center and Director of the Sleep Disorders Center at University Hospitals of Cleveland.

In addition to snoring, children with sleep apnea may snort or gasp. Sleep apnea in children is often caused by large tonsils and adenoids, which are tissues at the back of the nasal cavity and throat. When the throat muscles relax during sleep, the adenoids and tonsils can block the airway.

Dr. Redline is leading a multi-center study of children with sleep

To Find Out More

For more ideas on improving your sleep, download a free copy of the National Heart, Lung, and Blood Institute's "Your Guide to Healthy Sleep" at www.nhlbi.nih.gov/health. There is a variety of sleep-related information there. Just click on "Sleep Disorders." And visit www.medlineplus.gov for more information.

apnea funded by the National Heart, Lung, and Blood Institute. The Childhood Adenotonsillectomy Study (CHAT) will compare children who have a tonsillectomy soon after their diagnosis with children who are observed but not treated for seven months. The study will determine the overall effectiveness of this treatment, and will identify whether there are subgroups of children who may need additional treatment to improve their sleep apnea. The researchers also will see if improvement in sleep apnea results in improved health and functioning, including learning abilities and behavior, blood pressure, and growth.

SIDS and Infant Sleep

Sudden infant death syndrome (SIDS) is the sudden, unexplained death of an infant younger than one year old. Some

people call SIDS “crib death” because many babies who die of SIDS are found in their cribs. SIDS is the leading cause of death in children between one month and one year old. Most SIDS deaths occur when babies are between two months and four months old. Although health care professionals don’t know what causes SIDS, they do know ways to reduce the risk. These include

- Placing babies on their backs to sleep, even for short naps—“tummy time” is for when babies are awake and someone is watching
- Using a firm sleep surface, such as a crib mattress covered with a fitted sheet
- Keeping soft objects and loose bedding away from sleep area
- Making sure babies don’t get too hot—keep the room at a comfortable temperature for an adult ■

Snooze You Can Use—Sleep Quiz Answers (Questions on previous page.)

1. False is correct. Although it is a time when your body rests and restores its energy levels, sleep is an active state that affects both your physical and mental well being.

2. True is correct. Many people doze off unintentionally during the day despite getting their usual night of sleep. This could be a sign of a sleep disorder.

3. True is correct. Persistent loud snoring at night and daytime sleepiness are the main symptoms of a common and serious sleep disorder, sleep apnea. Another symptom is frequent long pauses in breathing during sleep, followed by choking and gasping for breath.

4. False is correct. Opening the car window or turning the radio up may arouse a drowsy driver briefly, but this won’t keep that person alert behind the wheel. Even mild drowsiness is enough to reduce concentration and reaction time. The sleep-deprived driver may nod off for a couple of seconds at a time without even knowing it—enough time to kill himself or someone else.

5. True is correct. People with narcolepsy fall asleep uncontrollably—at any time of the day, in all types of situations—regardless of the amount or quality of sleep they’ve had the night before. Narcolepsy is characterized by these ‘sleep attacks,’ as well as by daytime sleepiness, episodes of muscle weakness or paralysis, and disrupted nighttime sleep.

6. False is correct. Insomnia has many different causes, including physical and mental conditions and stress. Insomnia is the perception that you don’t get enough sleep because you can’t fall asleep or stay asleep or get back to sleep once you’ve awakened during the night. It affects people of all ages, usually for just an occasional night or two, but sometimes for weeks, months, or even years.

7. True is correct. Restless legs syndrome (RLS) is a medical condition distinguished by tingling sensations in the legs—and sometimes the arms—while sitting or lying still, especially at

bedtime. The person with RLS needs to constantly stretch or move the legs to try to relieve these uncomfortable or painful symptoms. As a result, he or she has difficulty falling asleep or staying asleep and usually feels extremely sleepy and unable to function fully during the day. Good sleep habits and medication can help the person with RLS.

8. False is correct. The human body’s biological clock programs each person to feel sleepy during the nighttime hours and to be active during the daylight hours. So people who work the night shift and try to sleep during the day are constantly fighting their biological clocks. This puts them at risk of error and accident at work and of disturbed sleep. Sleeping during the day in a dark, quiet bedroom and getting exposure to sufficient bright light at the right time can help improve daytime alertness.

9. False is correct. As we get older, we don’t need less sleep, but we often get less sleep. That’s because our ability to sleep for long periods of time and to get into the deep restful stages of sleep decreases with age. Older people have more fragile sleep and are more easily disturbed by light, noise, and pain. They also may have medical conditions that contribute to sleep problems. Going to bed at the same time every night and getting up at the same time every morning, getting exposure to natural outdoor light during the day, and sleeping in a cool, dark, quiet place at night may help.

10. True is the correct answer. Our bodies are programmed by our biological clock to experience two natural periods of sleepiness during the 24-hour day, regardless of the amount of sleep we’ve had in the previous 24 hours. The primary period is between about midnight and 7:00 a.m. A second period of less intense sleepiness is in the midafternoon, between about 1:00 and 3:00. This means that we are more at risk of falling asleep at the wheel at these times than in the evening—especially if we haven’t been getting enough sleep.

Connections

Brain-Computer Interface Enables the Profoundly Paralyzed to Communicate



A brain-computer interface (BCI) system

This brain-computer interface (BCI) system assists patients who are completely paralyzed from severe neuromuscular disorders such as Lou Gehrig's disease, brainstem stroke, or high-level spinal cord injury. Image courtesy of the Wadsworth Center.

"For the locked-in, the BCI is like being let out of jail—only better!"

By **Christopher Klose**

Most of us take the ability to communicate for granted. We talk and write. But what if you're paralyzed and can't speak? Each year, stroke silences tens of thousands of Americans. One of the most devastating consequences is "locked in" syndrome—a situation in which people are unable to move a muscle or utter a sound. Severe head injuries, spinal injuries, and amyotrophic lateral sclerosis (ALS, or Lou Gehrig's disease) are also responsible for this bleak condition.

"It is hard to overestimate how much of human life is communication—being able to listen and then respond,"

points out William J. Heetderks, M.D., director of extramural science programs at the National Institute of Biomedical Imaging and Bioengineering (NIBIB).

Since the early 1990s, Jonathan R. Wolpaw, M.D., a neurologist and chief of the Wadsworth Center Laboratory of Nervous System Disorders, New York State Department of Health, Albany, has led a team of researchers in developing a brain-computer interface (BCI) system to help the profoundly paralyzed communicate. Dr. Wolpaw has received support from two NIH Institutes—NIBIB and the National Institute of Child Health and Human Development—and the James S. McDonnell Foundation.

that Count



In a BCI system, the brain's electrical activity is detected through the scalp, from the surface of the brain, or from within the brain, and then processed by a computer to extract patterns indicating the user's intent. The patterns are then translated into commands for a device, such as moving a cursor on a computer screen or operating a wheelchair.

NIBIB: Improving Diagnosis, Treatment, and Prevention

The National Institute of Biomedical Imaging and Bioengineering (NIBIB) was established in 2000. Its mission is to integrate the physical and engineering sciences with the life sciences to advance basic research and medical care. Examples of innovative technologies supported by NIBIB include

- New diagnostic techniques such as MRI combined with brain activity images
- New ways to deliver medications to places in the body
- Using light for minimally invasive diagnosis
- Developing specific types of tissues to help burn victims or restore vision to damaged eyes

"For the locked-in, the BCI is like being let out of jail—only better," Dr. Heetderks emphasizes.

Thought into action

The Wadsworth BCI system works on brainpower, not muscle control. It uses the team's specially developed software platform (called BCI2000) and consists of a laptop computer, portable amplifier, and a skullcap containing eight electrodes hitched to the computer. The electrodes record the user's electrical brain waves, which the computer analyzes and translates into specific commands, such as writing e-mails, selecting computer icons, or moving robotic devices. No surgery is required and users typically master the system within an hour or two.

"We are trying to use the scientific research for practical results," Dr. Wolpaw explains. "Life can be reasonable for the locked-in with the right support. That's our goal."

Currently, the Wadsworth team supports seven patients, five in the United States and two in Germany. Much time is required for system maintenance and technical support. "Our major challenge is to produce a trouble-free, reliable, affordable system that can be used at home by patients and their caregivers," Dr. Wolpaw says.

Although BCI research has been under way since the 1970s, NIBIB's Dr. Heetderks says it has taken off only in the last five years or so, thanks to substantial improvements in signal processing. In particular, he attributes such progress to "clever people like Dr. Wolpaw for making sense out of how to find and process information (the brain's electrical signals)."

The Wadsworth BCI2000 software accepts and analyzes any brain signal and can be used with a wide range of output devices—from computer icons to wheelchairs. It is now in use by more than 140 research laboratories worldwide.

"There is increased appreciation of the severely disabled and their capabilities," says Dr. Wolpaw. He predicts that "in five or 10 years, everything will be much clearer. We know—and are learning—much more about the brain, and the revolution in computers and electronics gives us the technology to operate BCIs in real time."

Like many physician researchers, Dr. Wolpaw combines a passion for science with the practical urges of the clinician. Of his BCI system he says, simply, "I wanted to help severely disabled people."

His greatest satisfaction? "When we got those first e-mails from the locked-in, that was great!" ■

To Find Out More

Visit www.medlineplus.gov and www.nibib.nih.gov.

NIH's National Institute of
General Medical Sciences
celebrates 45 years of

Discovery for Health

By **Alison Davis**

The National Institute of General Medical Sciences (NIGMS) is the NIH institute that primarily supports what is called “basic research”—exploratory research that lays the foundation for advances in disease diagnosis, treatment, and prevention. Each year since 1962, NIGMS has been funding the research of scientists who make advances in our understanding of fundamental life processes. Today, NIGMS funds more than 4,000 scientists who bring discovery to life.

In the course of answering basic research questions, these investigators increase our knowledge about the mechanisms and pathways involved in certain diseases. They also develop important new tools and techniques, some of which have medical applications. In recognition of the significance of their work, a number of NIGMS grantees have received the Nobel Prize and other high scientific honors. The Institute's research training programs help provide the next generation of scientists.

“We never know where the next major discovery is going to come from,” says Jeremy M. Berg, Ph.D., and NIGMS Director. “But we do know that basic medical research is essential for tomorrow's health. Human curiosity creates cures.”

It is this scientific curiosity among NIGMS researchers that helps extend our overall medical knowledge.

True or False

One of the valuable aspects of basic research is the discovery of new, previously unimagined scientific connections. For example:

True or False: Electrified bacteria help treat cancer patients.

Believe it or not, it's true. Well, what really happened was this: Years ago, a chemist was studying how electric fields affect bacteria. To his surprise, the platinum electrodes used in the experiment changed how the bacteria divided—even when he switched off the electric field. Later, he found the same thing in cancer cells. This insight led to the development of cisplatin, a cancer drug still used widely today.

Let's try another one: A biological revolution took place because a scientific experiment didn't work.

Yes, that's true, too. Fed up and hoping to recoup their losses on an experiment that didn't work, two researchers were trying to figure out a seemingly impossible result and in the process discovered “RNA interference,” a powerful tool for manipulating genes. In just five years' time, the work transformed the way scientists all over the world do medical research and earned the persistent pair the 2006 Nobel Prize in physiology or medicine.

These breakthroughs occurred when chance met curiosity. Most scientific progress is not accidental, but it is always driven by good ideas and perseverance. While a lot of medical research focuses on specific conditions, other studies are less targeted. They seek to understand human biology and disease. This is called basic research, and it builds a foundation of knowledge that improves health for all of us.



Jeremy M. Berg, Ph.D.
NIGMS Director

Behind the Curtain

Keeping Surgical Patients Warmer Fights Infection

As recently as the mid-1990s, doctors thought it was perfectly normal that body temperature went down during surgery. Operating rooms were cold, and the operations themselves increased heat loss. What's more, anesthetic medicines impair the body's ability to control its temperature and sometimes produce hypothermia.

Challenging conventional wisdom, anesthesiologist Dan Sessler found that just a few degrees of body cooling tripled the risk of surgical wound infection. His research led to a new conclusion: Keep surgical patients warm.

No new drugs, no fancy technology. Warming patients during an operation can be as simple as blowing heated air through a disposable, quilt-like covering.

Sessler has also discovered that giving surgical patients additional oxygen can lower the risk of wound infections.



Daniel Sessler, M.D.,
Cleveland Clinic, Ohio

Sessler has found simple, risk-free and inexpensive interventions that improve patient health after surgery.



Chiara Cirelli, M.D., Ph.D.,
University of Wisconsin, Madison

Cirelli's research with fruit flies may help answer the question: Why is sleep so important for good health?

Fruit Flies Help Human Sleep Research

Neuroscientist Chiara Cirelli uses experimental fruit flies to study sleep. Although it may be tough to imagine a fly snoozing, these rice grain-sized animals sleep about 12 hours every night.

When they sleep, flies are completely still and only loud noises or other disturbances wake them. Like us, a jolt of caffeine keeps them awake.

Also like us, without enough sleep, flies feel the effects of sleep deprivation. Cirelli has shown that they are a good model for researching human sleep. She has found fruit fly genes that seem to have a powerful effect on sleep.

In time, her research could lead to new clues about the causes of sleep disorders and some forms of mental illness.

To Find Out More

To learn more about NIGMS and basic medical research, visit www.nigms.nih.gov.

NIGMS's Living Labs

Simple, easy-to-breed organisms are a very important part of medical research because their body chemistry is remarkably similar to ours.



Worm

Harmless roundworms found in soil now live in lab dishes, helping scientists discover fundamental mechanisms involved in cancer, aging, and the nervous system.



Fruit Fly

Researchers have used fruit flies to uncover many basic processes in genetics. Today, flies also play a part in studies of blindness, deafness, mental retardation, heart disease, and other human disorders.



Mouse

Genetic engineering allows scientists to create specific strains of mice that reveal the functions of specific genes. Some mouse strains are models for human genetic diseases, increasing knowledge about how the conditions arise and serving as testbeds for possible treatments.

Zebrafish

Zebrafish eggs and embryos are transparent, meaning that scientists can actually watch development unfold. In just a few days, the cells form eyes, heart, liver, stomach, and other parts of the baby fish's body.



Alison Davis, Ph.D., is an NIH science writer and editor.



President Franklin D. Roosevelt in one of the very few photos showing him in a wheelchair.

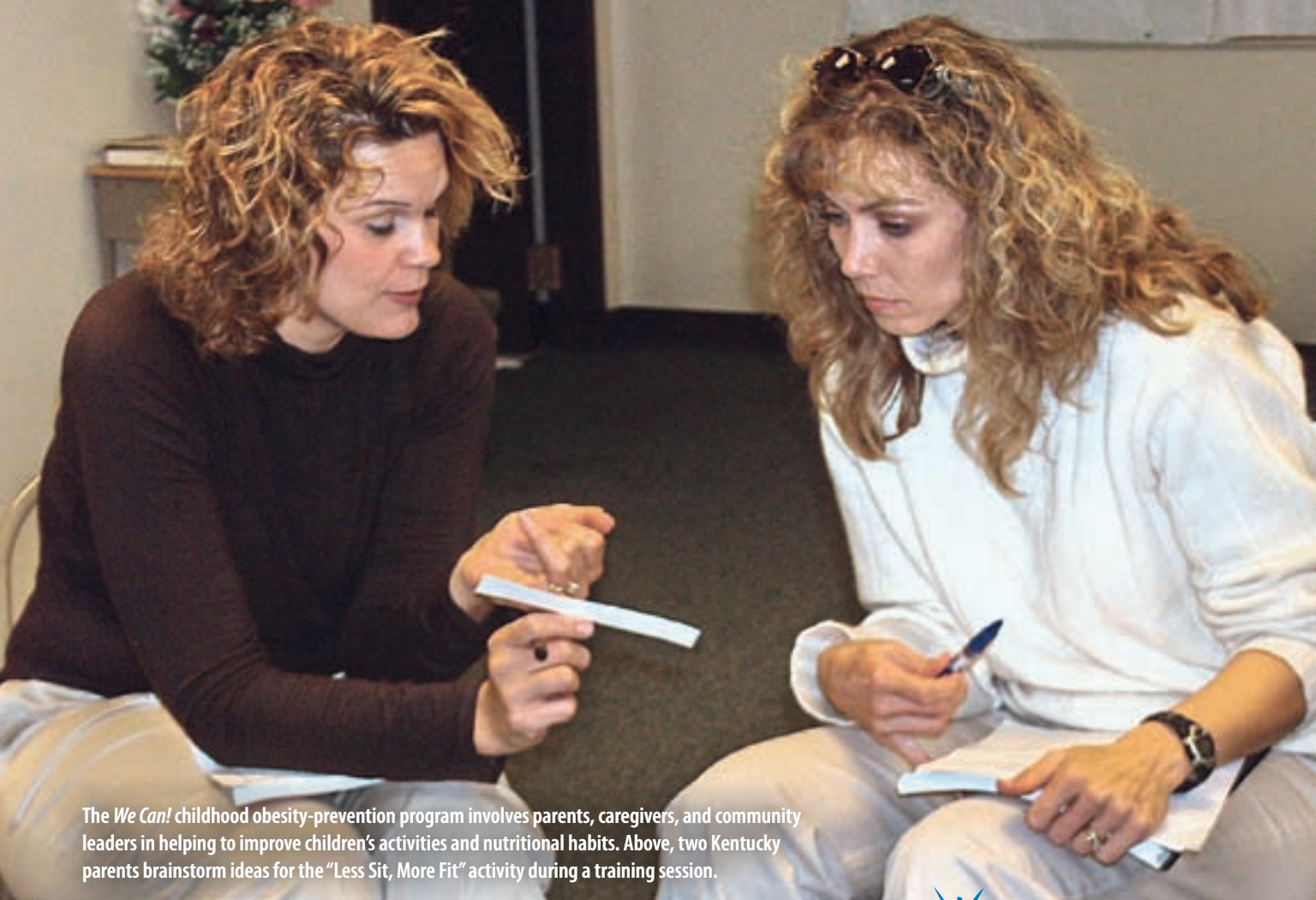
Medical Research Pays Off for All Americans

Franklin Delano Roosevelt (1882-1945), thirty-second President of the United States, was born before the advent of modern medical science. Elected president in 1932, he led the country through the Great Depression and World War II. His most famous saying was, “The only thing we have to fear is fear itself.”

While enduring the stresses of “the world’s most demanding job,” FDR also suffered from serious medical conditions. He was struck by polio in the summer of 1921, at age 39. A heavy smoker, he also had high blood pressure and hardening of the arteries. He died of a stroke on April 12, 1945 at the age of 63.

Thanks to the country’s continuing commitment to long-term medical research and scientific advancement, the ills, which afflicted Roosevelt, are either gone or can be controlled.

FDR’s Condition	Treatment Then	Treatment Today
Polio – (infantile paralysis, poliomyelitis) Polio is an infection of the nervous system caused by a virus. It affects mostly young children. It is spread by contaminated food and water. In rare cases, like FDR’s, it can cause paralysis. The height of the U.S. polio epidemic was in the early 1950s, when more than 50,000 new cases a year were diagnosed.	■ Moist heat, physical therapy and medicines to ease symptoms ■ Use of “iron lung,” a large machine to help a person breathe ■ Braces and crutches to assist standing and walking, as in FDR’s case	There are almost no cases of polio today. In 1938, FDR established the National Foundation for Infantile Paralysis, later known as the “March of Dimes.” It helped develop two vaccines. The first, by Dr. Jonas Salk at the University of Pittsburgh, in 1955, and the second, in 1962, by Dr. Albert Sabin, at the Cincinnati Children’s Hospital Medical Center – have virtually eliminated polio worldwide. Cases dropped from 350,000 in 1986 to fewer than 2,000 in 2006.
Arteriosclerosis – (“hardening of the arteries”) This happens when cholesterol and other substances build up on artery walls and block blood circulation. The results can be angina (chest pain), congestive heart failure, heart attack and stroke.	■ Light exercise and change in diet, including reduced salt/sodium ■ Stopping smoking ■ Digitalis, a drug derived from the foxglove plant, to strengthen contraction of the heart muscle, slow the heart rate and help eliminate fluid	Exercise, diet and lifestyle changes such as weight loss. Medicines: There are several new types of drugs unavailable during FDR’s lifetime, including beta blockers and calcium channel blockers and the family of statin drugs. Surgery, including angioplasty, bypass, and open-heart surgery are also new since FDR’s time.
Hypertension – (high blood pressure) is called the “silent killer” because it usually has no symptoms. It occurs when blood moves through the arteries at a higher pressure than normal. It afflicts nearly 1 in 3 Americans. When not found and treated, it can cause an enlarged heart and heart failure; aneurysms (small bulges) in arteries that can burst; kidney failure; heart attack, stroke, kidney failure or amputation of the leg; vision changes and blindness.	■ Dietary changes: less salt/sodium ■ Lifestyle changes: reduce stress, lose weight ■ Give up smoking FDR ignored his doctors.	Dietary changes, including following the National Heart, Blood and Lung Institute “Dietary Approaches to Stop Hypertension” (DASH) eating plan. It features plenty of fruits, vegetables, whole grains, and other heart healthy foods lower in salt/sodium. Lifestyle changes—physical exercise, maintaining a healthy body weight, limiting alcohol intake and quitting smoking Medicines: Unlike in FDR’s time, a vast array of medicines are now available to help control high blood pressure, including diuretics, beta-blockers, ACE inhibitors, angiotensin antagonists, calcium channel blockers, alpha beta-blockers, nervous system inhibitors, vasodilators, and more.



The *We Can!* childhood obesity-prevention program involves parents, caregivers, and community leaders in helping to improve children's activities and nutritional habits. Above, two Kentucky parents brainstorm ideas for the "Less Sit, More Fit" activity during a training session.

Reducing Childhood Obesity



By Keith Ferrell

The success of an ongoing childhood fitness and weight-loss program sponsored by five NIH institutes is spreading across the United States. Here's how you can get involved in *We Can!*—Ways to Enhance Children's Activity and Nutrition.

“**T**he heart of *We Can!* is empowering parents to see that they can do this for their children,” says Anita Courtney, the state of Kentucky's coordinator for the *We Can!* obesity-prevention program. “Of all the things that we parents do to try to help our children, this gift of teaching them healthy behaviors as a part of life is the best gift we can give our kids.”

To help counter the current epidemic of childhood obesity in the United States, five NIH institutes joined together in 2005 to start and promote an obesity-prevention program “*We Can!*”—“Ways to Enhance Children's Activity and Nutrition.”

Today, the program has grown to include 369 *We Can!* community sites in 43 states, is supported by dozens of national and state health care organizations, and such corporate partners as Alltel, Delphi, Mutual of Omaha, Univision Communications, Wal-Mart, and others. They key to its success, according to Courtney, is to get parents and community leaders actively involved in influencing children's eating and exercise decisions in new ways.

Courtney has already trained more than 200 Kentucky parents and community volunteers through the program's four 90-minute instructional sessions.

Obesity Research: A New Approach

The percentage of children and teens who are overweight has more than doubled in the past 30 years. A total of 17 percent of American children ages 2 to 19 are overweight or at risk of becoming overweight. Like adults, overweight children and adolescents are at risk for a variety of health consequences, including type 2 diabetes, high blood pressure, high blood cholesterol, cardiovascular disease, and asthma. Those facts are changing the way that researchers are approaching obesity itself, as well as its causes and treatment.

"We're reaching the point where we're shifting away from traditional behavior-modification approaches to childhood and adolescent obesity," says Terry Huang, M.D., Program Director of Pediatric Obesity and Metabolic Syndromes at NICHD. "Those approaches did not yield very good success rates."

The new approach pursued by Dr. Huang and his colleagues calls for a dramatic re-examination of the causes of childhood and adolescent obesity, one that takes into account far more than physiological factors.

"We're broadening our approach to the epidemic," he says, "looking at a far wider range of factors in order to have a better chance of getting closer to a viable solution to the problem. We're now considering both the social and physical environments that contribute to the obesity epidemic."

Obesity in Context

"The ways in which we as a society have constructed our social and physical environments doesn't easily enable the behavioral changes that may be necessary to achieve victories against obesity," he says. "In other

words, you can't just encourage kids to take responsibility when the context of their lives actually works against them taking that responsibility."

Understanding that context requires parents to look closely at all of the activities their kids are involved in—school, after-school time, and leisure time.

"How we get around, how we spend our time, what is considered important—all of these factors can have a bearing on a child's or adolescent's nutrition and exercise," Dr. Huang says.

Walk, Don't Ride

For example, the habit of hopping in the car to give children a ride to a destination just a short distance away plays a role in creating a context in which the child thinks of riding rather than walking as the primary—or only—means of transportation, no matter how short the distance. The car is just one of countless factors, such as the constant presence of soft drinks, fast foods, and convenience foods rather than fresh fruits, juices, and vegetables.

Other factors include the amount of time spent with video games and other electronic media, and the amount of time spent indoors rather than outside. All of these play a role in creating a social context that not only encourages obesity, but also may work against solving the childhood and adolescent obesity epidemic.

"If we want to turn the obesity trend around," Dr. Huang says, "we'll need to address some of these more fundamental issues involving our way of life, our policies, our society. And to accomplish that, we'll need to address these issues as a society, on all levels."

We Can! is unique among existing youth obesity-prevention initiatives because it focuses its activities and education on parents and caregivers—the primary group influencing children and adolescents. Joining in this effort with the National Institute of Child Health and Human Development (NICHD) are the National Heart, Lung, and Blood Institute (NHLBI), the National Cancer Institute (NCI), and the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK).

The program, which is aimed at families and entire communities, is an outstanding example of how NIH research is being translated into significant beneficial results for the American public, notes Karen Donato, coordinator of the NHLBI Obesity Education Initiative. (See accompanying article, "Obesity Research: A New Approach.")

We Can! focuses on three important behaviors: improved food choices, increased physical activity, and reduced recreational screen time.

Fighting the obesity battle properly requires not only a collective effort to alter and improve children's nutritional habits and exercise patterns, but also work to learn more about the causes of childhood obesity in the first place. *We Can!* community sites include schools, YMCAs, parks and recreation departments, worksites, and hospitals. The new *We Can!* City program helps mayors and policy makers to mobilize community members. South Bend, Ind., Gary Ind., and Roswell, Ga. were the first three *We Can!* cities. ■

To Find Out More

Visit www.medlineplus.gov or www.nichd.nih.gov and type "We Can!" in either of the Search boxes.



Go, Slow, and Whoa Foods

Use this chart as a guide to help you and your family make smart food choices.

For more healthy eating information, visit www.wecan.nhlbi.nih.gov/.

Food Group	GO Almost anytime foods	SLOW Sometimes foods	WHOA Once in a while foods
Vegetables	Almost all fresh, frozen, and canned vegetables without added fat and sauces	All vegetables with added fat and sauces; ovenbaked french fries; avocado	Fried potatoes, like french fries or hash browns; other deep-fried vegetables
Fruits	All fresh, frozen, canned (in juice)	100 percent fruit juice; fruits canned in light syrup; dried fruits	Fruits canned in heavy syrup
Breads and Cereals	Whole-grain breads, including pita bread; tortillas and whole-grain pasta; brown rice; hot and cold unsweetened whole grain breakfast cereals	White refined flour bread, rice, and pasta. French toast; taco shells; cornbread; biscuits; granola; waffles and pancakes	Croissants; muffins; doughnuts; sweet rolls; crackers made with trans fats; calorically sweetened breakfast cereals
Milk and Milk Products	Fat-free or 1 percent lowfat milk; fat-free or low-fat yogurt; part skim, reduced fat, and fat-free cheese; low-fat or fat-free cottage cheese	2 percent low-fat milk; processed cheese spread	Whole milk; full-fat American, cheddar, Colby, Swiss, cream cheese; whole-milk yogurt
Meats, Poultry, Fish, Eggs, Beans, and Nuts	Trimmed beef and pork; extra lean ground beef; chicken and turkey without skin; tuna canned in water; baked, broiled, steamed, grilled fish and shellfish; beans, split peas, lentils, tofu; egg whites and egg substitutes	Lean ground beef, broiled hamburgers; ham, Canadian bacon; chicken and turkey with skin; lowfat hot dogs; tuna canned in oil; peanut butter; nuts; whole eggs cooked without added fat	Untrimmed beef and pork; regular ground beef; fried hamburgers; ribs; bacon; fried chicken, chicken nuggets; hot dogs, lunch meats, pepperoni, sausage; fried fish and shellfish; whole eggs cooked with fat
Sweets and Snacks		Ice milk bars; frozen fruit juice bars; low-fat or fatfree frozen yogurt and ice cream; fig bars, ginger snaps, baked chips; low-fat microwave popcorn; pretzels	Cookies and cakes; pies; cheese cake; ice cream; chocolate; candy; chips; buttered microwave popcorn
Fats/Condiments	Vinegar; ketchup; mustard; fat-free creamy salad dressing; fat-free mayonnaise; fat-free sour cream,	Vegetable oil, olive oil, and oil-based salad dressing; soft margarine; low-fat creamy salad dressing; low-fat mayonnaise; low-fat sour cream	Butter, stick margarine; lard; salt pork; gravy; regular creamy salad dressing; mayonnaise; tartar sauce; sour cream; cheese sauce; cream sauce; cream cheese dips
Beverages	Water, fat-free milk or 1 percent low-fat milk; diet soda; unsweetened ice tea or diet iced tea and lemonade	2 percent low-fat milk; 100 percent fruit juice; sports drinks	Whole milk; regular soda; calorically sweetened iced teas and lemonade; fruit drinks with less than 100 percent fruit juice

Source: Adapted from CATCH: Coordinated Approach to Child Health, 4th Grade Curriculum, University of California and Flaghouse, Inc. 2002

NIH Quickfinder

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Institutes

- **National Cancer Institute (NCI)** www.cancer.gov
1-800-4-CANCER (1-800-422-6237)
- **National Eye Institute (NEI)** www.nei.nih.gov
(301) 496-5248
- **National Heart, Lung, and Blood Institute (NHLBI)**
www.nhlbi.nih.gov (301) 592-8573
- **National Human Genome Research Institute (NHGRI)** www.genome.gov
- **National Institute on Aging (NIA)** 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
(301) 443-3860
- **National Institute of Allergy and Infectious Diseases (NIAID)** www.niaid.nih.gov
(301) 496-5717
- **National Institute of Arthritis and Musculoskeletal and Skin Diseases** www.niams.nih.gov
1-877-22NIAMS (1-877-226-4267)
- **National Institute of Biological Imaging and Bioengineering (NIBIB)** www.nibib.nih.gov
(301) 451-6772
- **National Institute of Child Health and Human Development (NICHD)** www.nichd.nih.gov
1-800-370-2943
- **National Institute on Deafness and Other Communication Disorders (NIDCD)**
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
- **National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK)** 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 (301) 443-1124
- **National Institute of Environmental Health Sciences (NIEHS)** www.niehs.nih.gov
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- **National Institute of General Medical Sciences (NIGMS)** www.nigms.nih.gov
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- **National Institute of Mental Health (NIMH)**
www.nimh.nih.gov niminfo@nimh.gov
1-866-615-6464
- **National Institute of Neurological Disorders and Stroke (NINDS)** www.ninds.nih.gov
braininfo@ninds.nih.gov 1-800-352-9424
- **National Institute of Nursing Research (NINR)**
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