



NH MedlinePlus

Trusted Health Information
from the National
Institutes of Health

Fall 2007

the magazine

Easing Chronic Pain

Better treatments
and medications

Medicine in Outer Space

Space-based medical
research is bringing benefits
to all Americans

Understanding Alzheimer's Disease

The risk factors and the
ongoing efforts to treat
and cure AD

Controlling Asthma

Wynonna Judd
never lets
her asthma
hold her back

New guidelines, meds, and action plans



Photos: Bill Branson, NLM

Helping the Library Reach Out to the Future

On behalf of the Friends of the National Library of Medicine (FNLM), welcome to the Fall 2007 issue of *NIH MedlinePlus* magazine. We take pride in bringing you the most up-to-date and trustworthy information you need to keep you and your family healthy. In the pages that follow, you'll find 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 (NIH).

The FNLM is also working to promote and expand the availability of other terrific work carried out by the National Library of Medicine (NLM) to improve the health of Americans. One such program is helping to recruit the next generation of top medical researchers.

Earlier this year, thanks to the Library, 500 New York City high school science students spent the day with some of the nation's top scientists and medical doctors, learning about the latest advances in research on organ transplants. Afterwards, the students asked questions and explored exhibits featuring artificial body parts and recent examples of medical breakthroughs. They saw and touched heart stents, pacemakers, oxygenators (old and new), a coronary artery bypass graft, and hearing aids (old and new). For these kids, it was an experience they won't soon forget. This session at New York University School of Medicine was part of a series of presentations sponsored by the Library across the nation. They are aimed at getting young people excited about careers in medical research.

One of these school children could be the one to find a cure for cancer or make a similar contribution to our nation's health. That is why we need your help to bring programs like this to thousands of additional school children across America. To join us in this effort, contact FNLM at the address below—and help the Friends support the greatest medical library in the world.

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

Encouraging future medical

researchers: (l-r) NLM Director Dr. Donald A.B. Lindberg explaining a medical exhibit; some of the 500 New York City science students attending the NLM outreach day; NLM Deputy Director Dr. Donald West King and Dr. Henry W. Foster discussing the day's activities.

How You Can Help the Library Extend Medical Knowledge

You can be a part of the Friends' mission to help educate the health, corporate, and public communities about NIH's many vital research initiatives.

If you or your company can help to support and expand the Library's efforts by providing sponsorship and other charitable donations for *NIH MedlinePlus* magazine's publication and distribution, many more thousands of Americans will gain valuable, free access to the world's

best online medical library, www.medlineplus.gov.

For more information, please visit www.fnlm.org or call (202) 719-8094. Written correspondence may be sent to FNLM, 2801 M Street NW, Washington, DC 20007.

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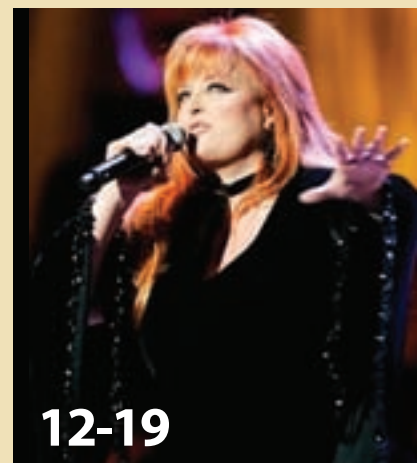
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The Joy of Science, the Courage of Research



NIH Director **Dr. Elias Zerhouni** meets frequently with young researchers to help promote their interest in vital medical research.

Photo: Bill Branson

NIH Director Dr. Elias Zerhouni recently spoke to a gathering of young researchers about the importance of good scientific research for the future of our world. We are entering a new era of medicine, noted **Dr. Zerhouni**, one that combines an appreciation of biological complexity with the fearless search for scientific knowledge.

Opportunities Abound

There has never been a more exciting era in science, and the opportunities are enormous. Medicine is moving from the curative model of the last 5,000 years, in which symptoms are obvious, loss of function is clear, and intervention too late. We are now moving toward a more preemptive model, one that integrates quantitative techniques for greater understanding of the complexity of biological systems.

The one thing that has driven my own scientific life is marrying quantitative information with biological systems—creating measurable parameters that give insight into biology. Science is not a game of abstract insight divorced from the physical realities of measurement, nor is it just technologies in search of solutions. You cannot do science with bad technologies and bad methodologies.

Today, we realize there is much greater biological complexity than anybody thought possible 30 years ago. Back then, for example, researchers at the National Cancer Institute (NCI) looked for the magic bullet that would hit the one, two, or three molecular targets of cancer and cure it. That is not happening because of the complexity we've uncovered.

The goal now is to transform health and medicine through discovery.

Cures Depend on Public Access to Information

Understanding biological complexity and how it orchestrates normal development as well as disease is fundamentally where we are in science today. Because of the explosion in the amount of data young scientists need to master, their experiments will be much more quantitative and multidimensional.

Consequently, they will need to work together, across disciplines, to develop common standards to facilitate the exchange of data. At the same time, it will be critical to maintain open public access to

The greatest risk in science is to stop taking risks. When you take risks, you gain new perspectives.

scientific information; that's fundamental. Not having open access will delay cures. So we need to emphasize that knowledge must be accumulated across laboratories and around the world.

Manhattan Project Approach Doesn't Work

Everyone likes NIH to use the top-down, Manhattan Project approach that says, "We have all the wisdom, the microscopes, and genomics we need, so let's put it all into one great ship that is going to find new islands and continents of knowledge."

This worked in engineering, say, for going to the moon in 1969 because we knew exactly where the moon was and could optimize everything to get there. But it doesn't work in fundamental discovery science. Having the all-knowing professors, managers, leaders, and authorities come up with the best and only way leads to—the Titanic!

Follow Columbus

I prefer the Christopher Columbus discovery model. Like Columbus and the known world in 1492, everyone today at the edge of science is in the dark. Success depends more on how the problems are defined, rather than on what solutions are reached.

When Columbus went to Queen Isabella, he didn't ask for the moon. He just said he thought he had a new way of going to India and wanted a couple of ships to get there. Similarly, the scientific investigator should say, "I have an idea. Could you fund me even if I don't know if I can get there?"

Like Columbus, the researcher might miss India—but hit upon a whole new world of potential knowledge to exploit.

No "One-Size-Fits-All" Scientist

In every scientific exploration, there is not a one-size-fits-all scientist. Some of us have a nose for discovery, and are the pioneers. Others explore lands already visited but uncover new discoveries through a team approach. Still others become the "early settlers." They know the milestones, can sequence DNA, understand where the genes are going to be, and come to know that piece of a genome to an unprecedented level.

So there are different ways of advancing knowledge at different levels, and one is not more meritorious than the other. It would be a mistake to believe the only way to be "somebody" is by being a pioneer.

Leave a Little Bit of Chance ... to Chance

We need to leave a little bit of chance to chance. The best way to guarantee failure is to work very hard to assure success. You can't know it all in advance; knowing everything is not good when it comes to generating new insights and making unique, new contributions.

In 1945, when asked by President Roosevelt to devise a way for American science to continue contributing to society as it had during the war, Vannevar Bush, the founder of modern American science, said, "We think it very important that circumstances be such that there be no such ceilings, other than ability itself, to intellectual ambition; that every boy and girl shall know that, if he shows that he has what it takes, the sky is the limit."

To me, this is probably the best scientific policy ever put forward.

Don't Fear Bad Ideas

Over my career, I have found the best way to never have a good idea is to never have a bad one. Scientists will tell you how many bad ideas they've had that led them to one good one. It's easy to discard bad ideas, not so easy to create good ones.

The greatest risk in science is to stop taking risks. When you take risks, you gain new perspectives. When I ask other scientists, they agree the greatest professional moment is to gain a totally new scientific insight, which no one else has had before, and the excitement of being able to share it with the rest of humanity.

This is the fundamental joy of science. ■

By Keith Ferrell

SPACE

The New Medical Frontier

Even as you read these words, there's a world of research going on high over our heads—approximately 200–215 miles up. The International Space Station (ISS), which has been taking shape for much of the past decade, is an orbiting laboratory for many kinds of research.

This past September, the National Institutes of Health (NIH) and the National Aeronautics and Space Administration (NASA) established a formal understanding that will make medical and health research an important ongoing part of ISS research activities. This new relationship between the nation's premier medical laboratories and the national space effort is a first, and already there is much excitement about the various

advances to come from space-based research.

"There are many new frontiers and considerable new knowledge that medical researchers can gain from using the space station," says Stephen I. Katz, M.D., Ph.D., director of the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) and NIH's liaison with NASA.

A Unique Laboratory

Continuously inhabited by astronauts and scientists since 2000, the ISS is a perfect place to research all manner of scientific, technical, and medical questions. In fact, some medical research can only be performed in orbit. That means aboard the space station, where there is no gravity. The same weightlessness that lets space-suited astronauts move massive



American scientists now have an out-of-this-world platform from which to conduct groundbreaking health and medical research. A recent agreement between NIH and NASA provides the basis for a U.S. national laboratory on the International Space Station.



Photo: NASA

objects easily also offers a unique learning opportunity.

Zero-gravity's effects on astronauts' skeletal systems and loss of bone and muscle mass have long attracted scientific interest, Dr. Katz says. "Research on the space station will help generate better understanding of how weightlessness affects the bone, muscle, and inner ear systems."

The more we know about how the various systems of the human body react to weightlessness and the other conditions found only in space, the better able we will be to ensure the health of ISS crew members, as well as those future astronauts and researchers who will journey to the moon (again), Mars, and beyond.

The benefits also will pay off back on earth:

- Increased understanding of bone-strength and loss of bone-mass may help patients suffering from delicate bones or muscle-wasting diseases.
- Without gravity to help orient them, astronauts experience changes in their sense of balance. Studying this phenomenon may yield insights into dizziness, vertigo, and balance problems and disorders related to the inner ear.
- Observing the behavior of microbes and other organisms in space can generate insights into the behavior of organisms on earth, and perhaps lead to better understanding of infectious diseases and the immune system's response to them.

Our health and medical knowledge and capabilities have grown greatly because of space exploration and the equipment and techniques developed for it. Remote health-monitoring sensors and temperature-lowering "cool suits" are just two examples derived from the lessons learned from orbital space suits. And medical imaging technologies and ultrasound procedures are based, in part, on NASA innovations.

Long-Term Space Research

Until the advent of the ISS, research missions in space were necessarily brief—usually only a few days or weeks, at best. With long-term human residence in space now made possible by the ISS, it is important that a certain percentage of each ISS crew be dedicated to vital medical research. As with everything connected with space travel, results will take time because of the planning, preparation, and training involved.

"An enormous amount of time will be required to develop the questions and experimental models for use on the

space station," says Dr. Katz. "First, you have to make sure you're asking important questions. Also, the scientists' time is valuable, and it's very expensive to put the experiments together and transport them to the space station." Added to this is additional training the astronauts—many of whom are scientists—must complete to be able to perform the



NIH Director **Dr. Elias A. Zerhouni** and NASA Administrator **Dr. Michael D. Griffin** sign an agreement making U.S. resources on the International Space Station available for NIH-funded research. **Senator Kay Bailey Hutchison** (left), **Senator Barbara Mikulski** and **NIAMS Director Dr. Stephen I. Katz** witness the occasion.

experiments correctly. Thanks to the formal agreement between NIH and NASA, the research will be carefully coordinated into high-priority areas, with promise of practical results.

"Both NIH and NASA are committed to real cooperation," Dr. Katz says.

This cooperation may serve as the foundation for a potential flowering of both space medicine and earth-based health care.

"We are extremely pleased that this collaborative effort is moving forward," adds NIH Director Dr. Elias Zerhouni. "The International Space Station provides a unique environment where researchers can explore fundamental questions about human health issues, including how the body heals itself, fights infection, or develops diseases such as cancer or osteoporosis."

Research projects on the ISS funded by the NIH will be conducted on the U.S. segment of the space station and be consistent with existing NIH priorities and relevant to improving human health on earth.

Dr. Michael Griffin, NASA administrator, adds enthusiastically, "Not only will the station help to explore the moon, Mars, and beyond, its resources also will be applied to the much broader purpose of improving human health."

NASA Spinoffs

Milestones in Space Research

DIGITAL IMAGING BREAST BIOPSY SYSTEM—A non-surgical system developed with Space Telescope Technology that greatly reduces the time, cost, pain, and other effects associated with traditional surgical biopsies.

BREAST CANCER DETECTION—A solar cell sensor that determines exactly when x-ray film has been exposed to optimum density; it reduces exposure to radiation and doubles the number of patient exams per machine.

LASER ANGIOPLASTY—A “cool” type of laser, called an excimer laser, which offers precise non-surgical cleanings of clogged arteries and fewer complications than in balloon angioplasty.

ULTRASOUND SKIN DAMAGE ASSESSMENT—An advanced ultrasound instrument to immediately assess depth of damage, improving patient treatment and saving lives in serious burn cases.

HUMAN TISSUE STIMULATOR—A device employing NASA satellite technology that is implanted in the body to help control chronic pain and involuntary motion disorders through electrical stimulation of targeted nerve centers or particular areas of the brain.

COOL SUIT—Custom-made suit that circulates coolant to lower body temperature; it dramatically improves symptoms of multiple sclerosis, cerebral palsy, spina bifida, and other conditions.

PROGRAMMABLE PACEMAKER—An implant connected to a physician’s computer and used to regulate heart rate, incorporating multiple NASA technologies.

OCULAR SCREENING—An image-processing technique developed by NASA and now used to detect eye problems in very young children.

VOICE-CONTROLLED WHEELCHAIR—Robotic wheelchair manipulator that responds to 35 one-word voice commands, helping patients to perform daily tasks like picking up packages, opening doors, and turning on appliances.

WATER PURIFICATION SYSTEM—A municipal water treatment system for developing nations that uses iodine instead of chlorine to kill harmful bacteria.



Photo: NASA

Inspired by the space suits Apollo astronauts wore to survive the moon’s harsh climate, the Recharge™ Active Cooling System by Cool Systems Inc. helps patients with multiple sclerosis and heat-related neurological disorders manage their symptoms by lowering their core body temperature.

To Find Out More

Visit www.medlineplus.gov and also www.niams.nih.gov.
Type “NASA” into either Web site’s Search box.

For almost 5 million Americans who suffer from Alzheimer's disease, and the millions more who love and care for them, the world can suddenly seem very frightening. Researchers are making progress, but for now there is no cure for the disease that takes away memory and, ultimately, life itself.

Understanding Alzheimer's

What Is Alzheimer's Disease (AD)?

Dementia (de-MEN-shuh) is a brain disorder that seriously affects a person's ability to carry out daily activities. The most common form of dementia among older people is Alzheimer's disease, which initially involves the parts of the brain that control thought, memory, and language. Although scientists are learning more every day, they still do not know what causes AD, and there is no cure.

As many as five million Americans suffer from AD. The disease usually begins after age 60, and risk goes up with age. Younger people may get the disease, but that is much less common. About five percent of men and women ages 65 to 74 have Alzheimer's, and nearly half of those age 85 and older may have it. But Alzheimer's disease is not a normal part of aging, and it progresses differently from person to person. Although it may last as long as 20 years, most Alzheimer's patients live from 8 to 10 years after diagnosis.

The challenges, compassion, and courage associated with Alzheimer's disease received national exposure earlier this year when Oscar winner Julie Christie starred in a bittersweet Alzheimer's love story, *Away From Her*, now available on DVD.

Photo: Lions Gate Entertainment

Causes of Alzheimer's Disease

Age is the most important known risk for Alzheimer's. The number of sufferers doubles every five years beyond age 65. Family history is another factor. Genetics may play a role in many cases. Early-onset familial Alzheimer's, a rare form that usually occurs between the ages of 30 and 60, is inherited. The more common form, known as late-onset Alzheimer's, occurs later, and there is no obvious inheritance pattern in most families.

Much remains to learn about what causes AD. In addition to genetics, scientists are studying the influence of education, diet, and environment. There is increasing evidence that some of the risk factors for heart disease and stroke, such as high

No treatment so far stops Alzheimer's. However, for some in the disease's early and middle stages, certain drugs may help prevent some symptoms from becoming worse for a limited time.

blood pressure, high cholesterol, and low levels of the vitamin folate, may also increase the risk of AD. Studies also point to physical, mental, and social activities as protective factors.

Diagnosing Alzheimer's

Today, the only definite way to diagnose Alzheimer's is to find out whether there are plaques (clumps of Beta-amyloid proteins) and tangles (fibrous "tau" proteins) in brain tissue. But this can be done only by examining the brain after a person dies. Therefore, doctors can only make a diagnosis of "possible" or "probable" Alzheimer's while the person is still alive.

At specialized centers, doctors can diagnose Alzheimer's correctly up to 90 percent of the time. Doctors use several tools to diagnose "probable" AD, including:

- questions about the person's general health, past medical problems, and ability to carry out daily activities;
- tests to measure memory, problem solving, attention, counting, and language;
- medical tests, such as tests of blood, urine, or spinal fluid; and
- brain scans.

Sometimes these tests show that the symptoms are being caused by thyroid problems, drug reactions, depression, brain tumors, or blood vessel disease in the brain, conditions that can cause Alzheimer's-like symptoms but are treatable.

In trying to diagnose Alzheimer's researchers have identified other problems with similarities to AD. One is multi-infarct dementia, which is caused by a series of small strokes or changes in the brain's blood supply that may result in the death of brain tissue. Where they

occur determines the seriousness of the problem and the nature of the symptoms. Symptoms that begin suddenly may be a sign of this kind of dementia. Mild cognitive impairment (MCI) is another condition with some similarities to AD. But it differs from both Alzheimer's and normal age-related memory change. People with MCI have ongoing memory problems, but do not experience confusion, attention problems, and difficulty with language.

Treating Alzheimer's

No treatment so far stops Alzheimer's. However, for some in the disease's early and middle stages, certain

drugs may help prevent some symptoms from becoming worse for a limited time. Also, some medicines may help control sleeplessness, agitation, wandering, anxiety, and depression. Treating these behavioral symptoms

often comforts patients and eases their care.

Five prescription drugs currently are approved by the U.S. Food and Drug Administration to treat people with Alzheimer's disease. Although patients can achieve comfort, dignity, and independence for longer periods, and caregiving can be less difficult, it is important to remember that none of these medications stops the disease itself.

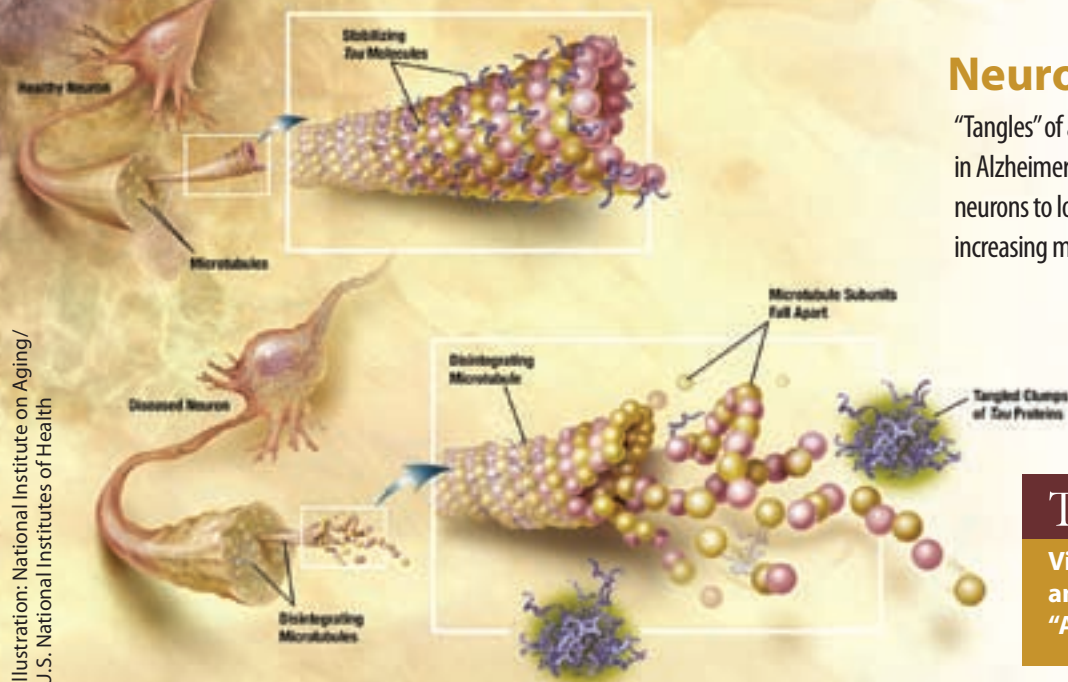
Treatment for Mild to Moderate AD

Four drugs are prescribed for mild to moderate AD. They are Razadyne (galantamine), Exelon (rivastigmine), Aricept (donepezil), and Cognex (tacrine). They are known as cholinesterase inhibitors. Scientists believe they prevent the breakdown of acetylcholine, a brain chemical that may be important for memory, and may help to delay or prevent the symptoms of Alzheimer's from becoming worse for a limited time. As Alzheimer's progresses, the brain produces less and less acetylcholine; therefore, cholinesterase inhibitors may eventually lose their effect.

Treatment for Moderate to Severe AD

The fifth approved drug, known as Namenda (memantine), is prescribed to treat moderate to severe AD. Namenda's main effect is to delay progression of some of the symptoms of moderate to severe Alzheimer's. Patients may be able to maintain certain daily functions a little longer, such as going to the bathroom independently for several more months, benefiting themselves and their caregivers.

Scientists believe that Namenda works by regulating glutamate, another important brain chemical that, when



Neurofibrillary Tangle

"Tangles" of a protein called "tau" occur in Alzheimer's patients' brains—causing neurons to lose their function and increasing memory loss.

To Find Out More

Visit www.nia.nih.gov and click on the link, "Alzheimer's Disease Information."

produced in excessive amounts, may lead to brain cell death. Because Namenda works very differently from cholinesterase inhibitors, the two types of drugs can be prescribed in combination.

The FDA also has approved Aricept for the treatment of moderate to severe AD.

NIA Alzheimer's Research

Scientists funded by the National Institute on Aging (NIA) are testing a number of drugs in clinical trials to see if they prevent Alzheimer's, slow the disease, or help reduce its symptoms.

- **Mild Cognitive Impairment (MCI)** The NIA-funded Memory Impairment Study compared donepezil (Aricept), vitamin E, or a placebo in participants with MCI to see whether the drugs might delay or prevent progression to AD. Compared with those on the placebo, the study group taking donepezil was found to be at reduced risk of progressing to AD for the first 18 months of the three-year study. However, the reduced risk disappeared after 18 months, and by the end of the study, the probability of the two groups progressing to AD was the same.
- **Neuroimaging** Damage to parts of the brain involved in memory, such as the hippocampus, can sometimes be seen on brain scans before symptoms of AD occur. An NIA public-private partnership—the AD Neuroimaging Initiative (ADNI)—is a large study to determine whether magnetic resonance imaging (MRI) and positron emission tomography (PET) scans, or other imaging or biological markers, can see early AD changes or measure its progression.
- **AD Genetics** The NIA is sponsoring the AD Genetics
- Study to learn more about risk factor genes for late-onset AD. To participate in this study, families with two or more living siblings diagnosed with AD should contact the National Cell Repository for AD (NCRAD) toll-free at 1-800-526-2839. Information may also be requested through the study's Web site: <http://ncrad.iu.edu>.
- **Inflammation** Evidence shows that inflammation in the brain may contribute to AD damage. Some studies have suggested that drugs such as nonsteroidal anti-inflammatory drugs (NSAIDs) might help slow AD, but clinical trials thus far have not demonstrated a benefit from these drugs.
- **Antioxidants** Several years ago, a clinical trial showed that vitamin E slowed the progress of some consequences of AD by about seven months. Additional studies are investigating whether antioxidants—vitamins E and C—can, too.
- **Ginkgo biloba** Early studies suggested that extracts from the leaves of the ginkgo biloba tree may help treat AD symptoms. There is no evidence yet that ginkgo biloba will cure or prevent AD, but scientists now are trying to find out in a clinical trial whether it can delay cognitive decline or prevent dementia in older people.
- **Estrogen** Since some studies have suggested that estrogen used by women to treat the symptoms of menopause also protects the brain, experts also wondered whether estrogen could reduce the risk of or slow AD. However, clinical trials have not shown that it can slow the progression of already diagnosed AD. And one study found that women over the age of 65 who used estrogen with a progestin were at greater risk of dementia, including AD, and that older women using only estrogen could also increase their chance of developing dementia.

New NIA Booklet By and For People With Early-Stage Alzheimer's Disease

- "I got the diagnosis and I thought I was going to die; then I thought I might not." — Les
- "Not being sure of my diagnosis ... I was so scared ... I didn't know which way to go." — Evelyn

Do you have a family member or friends with Alzheimer's disease? Are you wondering what they're going through or how to help them cope?

What Happens Next? is a new, free booklet developed by the early-stage support group at the Northwestern University Alzheimer's Disease Center in Chicago and published by the NIH's National Institute on Aging (NIA). Almost five million people in the United States have Alzheimer's disease, and nearly 2.2 million people are in the first stages of the disease. Early diagnosis gives people with the disease and their families more time to get the right treatment and to plan for the future.

The authors of *What Happens Next?* chose to share their thoughts and feelings because they wanted to help others facing the beginning stages of dementia. The book offers firsthand views about diagnosis, what to expect, how to talk with others about the disease, and more. It presents a list of helpful organizations that offer written materials about dementia, information about support groups and services, and ways to get involved in research that may help others in the future.

Order Your Free Copy: To order a free copy of *What Happens Next?* and other NIA publications online, visit www.alzheimers.nia.nih.gov or call 1-800-438-4380.

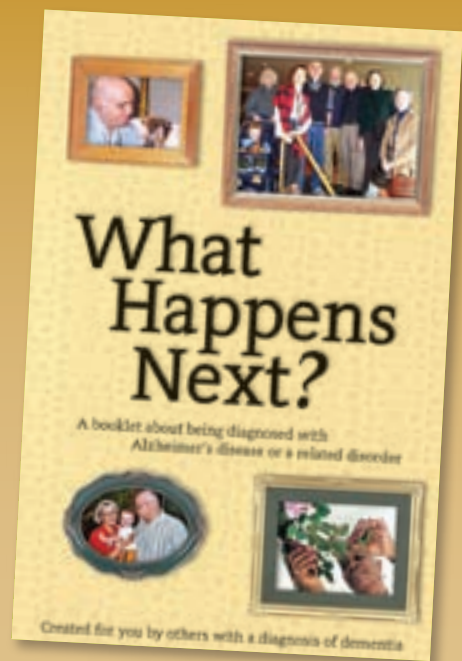


Photo: NIA

Diagnosing Dementia—Positive Signs

A new blood test offers promise in the early detection of Alzheimer's.

By **Mary Best**

What if there were an easy, affordable blood test that could accurately diagnose Alzheimer's disease (AD)—even before symptoms began to show?

Researchers at Stanford University's School of Medicine have taken that first critical step toward one simple blood test for AD. If proven effective, the test will be able to screen patients for AD as early as two to six years before symptoms of the disease surface.

The test identifies changes in a handful of proteins in blood plasma that cells use to convey messages to one another, notes Tony Wyss-Coray, Ph.D., the study's lead author and an associate professor of neurology and neurological sciences at Stanford, in Palo Alto, California.

"Our technology enables us to 'listen' to the chatter of cells communicating with each other and determine if there's anything abnormal," says Dr. Wyss-Coray. "Our data indicate blood contains a highly specific, biological signature that

can characterize Alzheimer's disease years before a clinical diagnosis can be made."

Confirming there is a connection between how cells talk to each other and brain changes due to Alzheimer's, Dr. Wyss-Coray and his team found that their blood test could indicate who had Alzheimer's with 90 percent accuracy. They also found it could predict its onset two to six years before symptoms appeared.

Where Does the Research Go from Here?

Since the study's appearance in the November issue of *Nature Medicine*, response from the medical community has been positive.

"While a lot of work remains to be done, the study's preliminary findings are remarkable," says Stephen Snyder, M.D., program director in the Neuroscience and Neuropsychology of Aging program at the National Institute on Aging, which helped fund the Stanford research. "Studies like these analyzing 'signals' are critical. Even if they don't unlock the mysteries of Alzheimer's, they help to build the research blocks necessary for those that will provide answers—and pay off for AD patients."

NEW GUIDELINES. NEW MEDICATIONS. NEW ACTION PLANS.

Controlling Asthma

People everywhere and in every age have struggled with asthma—a chronic disease that affects the airways, or tubes, that carry air in and out of your lungs. Today, asthma is a serious, widespread problem affecting an estimated 22 million people in the United States, including about six million children. But what is asthma? Who has asthma and why? Can it be managed, prevented, or cured? Scientists at the National Institutes of Health (NIH) and other research organizations know more about the answers to those questions today than ever before.



Photo: Courtesy Wynonna Judd

Wynonna Breathing Easy

Millions of Wynonna Judd's fans know and love her music, her honesty, and her compassion. But far fewer know about her lifelong battle with asthma. Today, Judd effectively controls her asthma by working with her physician, understanding and taking her medications, and paying attention to her diet and exercise patterns. She has also included asthma education among her many charitable endeavors. Wynonna Judd has never let asthma hold her back from what she loves to do.

NIH MedlinePlus: You have been a leader in speaking out about asthma and how serious a condition it can be. When were you diagnosed with asthma, and what were your symptoms?

Judd: I began to have symptoms of asthma and asthma attacks at about age 8, prior to my mom and dad's divorce. I would cry and become emotional, which would make me cough; coughing led to wheezing, and the wheezing turned into asthma attacks. I had been hospitalized on several occasions during that emotional time with my family.

NIH MedlinePlus: Many people might think that you couldn't be a successful singer and have asthma, yet you are a music superstar. How do you handle your asthma day to day and during performances?

Judd: I'm on a preventative program of taking a combination of medicines and it has literally meant the difference between using my inhaler or not using my inhaler. Every now and then, since I travel so much for shows—or if I am in a high altitude/humid setting—I will take one to two puffs from the inhaler two times daily, but that's very sporadic.

I have also taken out of my diet pretty much all of my dairy intake, with the exception of yogurt with fruit in the mornings. I have also cut out red meat, and it has made a huge difference, as well. I've also noticed that when I walk, I am much healthier, and the more I take care of myself—mind, body, and spirit—the better I feel.

Prior to my performances I pray, drink water, and do everything I can to eat the right kinds of food. For instance, I am more inclined to eat vegetables, grilled chicken, and brown rice. I try not to eat processed foods. The more processed food I eat, the more asthma I have. Before going on stage, I do my breathing exercises; I breathe in deeply through my nose and say the words "In with Peace," and then I breathe out through my mouth—almost like blowing up a balloon—and say "Out with Fear."

NIH MedlinePlus: What is the message you would most like to send to people with asthma?

Judd: It has been my experience that asthma is a combination of things. For me, it has to do with my emotional state, not just my physical and spiritual state. When I'm stressed, I tend to breathe much quicker and shallower; when I'm relaxed, I breathe more deeply and get more oxygen.

Taking the medication for me is not enough. I have to, as a woman in recovery, take care of myself—mind, body, and spirit—meaning that exercising, a 20-30 minute walk every day, if possible, and doing everything I can to stay as calm as I can are really key for me.

NIH MedlinePlus: As a mother, do you have any special messages for parents of children with asthma?

Judd: When I was 8 years old, and my parents were getting divorced, I didn't understand what was going on, and my world turned upside down. I think that because I had such little knowledge of what was going on, I lost all control of my environment and went into panic mode.

So, I would support parents who really check in with their children on how they're feeling, and do everything they can to create an environment that is safe, and also to communicate a lot with children about their feelings. I've

noticed this with my children—Grace and Elijah. My son Elijah also has asthma, and when he has an asthma attack, I check in with him and what worries he has about what's going on. And I try to listen. I've learned how to listen and not to give advice, which has been a process, certainly.

We spend a lot of time talking and sharing our feelings, which I think has made a huge difference in Elijah's asthma. Also, when Elijah does have an asthma attack, I do everything to let him know that he has a direct role in his healing. He is a co-creator in getting past the asthma attack, and he has a right to be healthy. He also has a right to move through it with dignity. I think that a lot of times children feel helpless and hopeless about the situation. I try to remind Elijah that he will get better, and that all he has to do

I'm on a preventative program of taking a combination of medicines and it has literally meant the difference between using my inhaler or not using my inhaler.

is do his part. I think that makes him a participant in his healing.

When he has an asthma attack, I allow him to self-care—which has been huge. I try not to be mommy-nurse as much as I try to be a mentor and teacher on how he can take better care of himself. This gives him a lot of satisfaction in knowing that he has the right to be better. I can notice a difference in Elijah and how he treats his asthma. He carries his portable asthma machine with him wherever he goes, and he knows he's responsible for that bag. If it gets left, then he's responsible for going back and getting it. It's made a difference in how Elijah takes care of himself, and he doesn't just look to me as his nurse to make him better. So, for me, that has made a huge difference.

So, I would support parents in allowing their children to become participants in their own healing. They need to see that they have a right to be well.

NIH MedlinePlus: What does the future hold for Wynonna Judd?

Judd: I launch my first Christmas tour, the Saturday after Thanksgiving, in Melbourne, Fla., and it continues through December 18 in my hometown of Ashland, Ky. Prior to that, I have several TV appearances that I'm excited about, including "The Macy's Thanksgiving Day Parade" and my skating tribute on NBC on December 23. It's going to be a busy holiday, to say the least.

From there, I am putting the finishing touches on my new studio album that we hope to have out next May. Making this album has been such an amazing and emotional experience; I am so in love with music right now. This album is a collection of feelings I've had and songs that I've always wanted to sing, songs that have touched me in one way or another.



Photo: Courtesy Wynonna Judd

What Is Asthma?

Asthma is a chronic disease that affects your airways. Your airways are tubes that carry air in and out of your lungs. If you have asthma, the inside walls of your airways become sore and swollen. That makes them very sensitive, and they may react strongly to things that you are allergic to or find irritating. When your airways react, they get narrower and your lungs get less air. This can cause wheezing, coughing, chest tightness, and trouble breathing, especially early in the morning or at night.

When your asthma symptoms become worse than usual, it's called an asthma attack. In a severe asthma attack, the airways can close so much that your vital organs do not get enough oxygen. People can die from severe asthma attacks.

Asthma is treated with two kinds of medicines: quick-relief medicines to stop asthma symptoms and long-term control medicines to prevent symptoms. Since the 1970s and 1980s, researchers have developed new drugs designed specifically to reduce inflammation in asthma. Scientists are now exploring ways to stop the inflammatory process or prevent it from starting in the first place.

Who Gets Asthma?

People get asthma because of an interaction between the environment in which they live and the genes they inherit.

Allergies: Most people with asthma have allergies. Your response to allergens—proteins from common materials like house dust mites, cockroaches, and pollens—may cause the inflammation that

leads to asthma symptoms. Researchers are studying methods for reducing allergen levels to prevent inflammation. For example, many inner-city children are allergic to cockroaches and experience severe asthma. Reducing cockroach allergens and tobacco smoke in inner-city homes may help.

Environment: Researchers now suspect that susceptibility to asthma develops very early in life. A pregnant woman's cigarette smoking, exposures to allergens, and diet may play a role. Children's expo-

sure to allergens and respiratory infections during the first three years of life may make them more likely to develop asthma.

Genetics: Genes also play a role in the development of asthma. Researchers are studying families in different ethnic and geographic communities to identify which genes are related to asthma. Genetic studies have also revealed differences in the ways patients respond to medications. Understanding the genetics of asthma should provide clues to preventing the disease and help physicians select the most effective treatments for individual patients.

Asthma Triggers: What to Avoid

Environmental substances that lead to the actual onset of asthma are called asthma triggers. Indoor- and outdoor-inhaled allergens are some of the most common irritants that induce asthma.

- **Common Allergens:** Household dust mites, cockroaches, dander from furred or feathered animals, fungi, and pollens are common allergens.
- **Other Irritants:** Tobacco smoke, industrial emissions, vehicle exhaust, ozone, sulfur dioxide, some foods, food additives, and smog are triggers.
- **Physical Causes:** Respiratory infections, exercise, hyperventilation, stress, depression, and fear also can trigger an asthma attack.



When airways narrow and become clogged (top), your lungs get less air than during normal breathing (bottom).



A microscopic view of dust mites, which feed off dead skin cells in bedding and carpets; they are a major trigger for asthma.

New Asthma Guidelines

What You Should Know

If you or a relative suffers from asthma, it is important to know that quality care depends on the following:

- education in self-management skills,
- keeping asthma symptoms controlled,
- reducing exposure to environmental factors that worsen asthma, and
- taking medications as prescribed.

With the right care, you can prevent hospitalizations, urgent visits to the doctor, and missed days at school or work. The National Heart, Lung, and Blood Institute's (NHLBI) National Asthma Education and Prevention Program (NAEPP) periodically reviews clinical studies on asthma, considers the findings, and translates them into guidelines for doctors to treat patients. The NAEPP recently released its third set of asthma guidelines, offering the most up-to-date information and expert advice for clinicians on managing asthma.

"The goal is to control asthma so that patients can live active, full lives while minimizing their risk of asthma attacks and related problems," says William W. Busse, M.D., who heads the University of Wisconsin Department of Medicine and chairs the Expert Panel that established the new guidelines.

The report gives health care professionals new ways for selecting treatment based on a patient's individual needs and level of asthma control. The guidelines emphasize that while it can be controlled, asthma can change over time. It also differs among individuals and by age groups. Therefore, it is important to monitor regularly a patient's level of asthma control so that treatment can be adjusted as needed. The guidelines focus on four components of asthma care: measures to assess and monitor asthma, patient education, control of environmental factors and other conditions that can worsen asthma, and medications.

"Overall, these components have stood the test of time. Many of the earlier recommendations have been solidly confirmed by additional research," says Dr. Busse. "For instance, inhaled corticosteroids are still the best long-term control treatment for all asthma patients. The evidence is even stronger that they are generally safe and are the most effective medication at reducing inflammation, a key component of asthma."

The report also describes current research to improve asthma management, such as new ways for monitoring asthma control. Tailoring treatment based on the particular characteristics of a patient's asthma or genetic make-up are also areas of research.

"The research is helping to identify the genes influencing how well certain patients respond to certain asthma medications," says James Kiley, Ph.D., director of the NHLBI Division of Lung Diseases. "This is helping us move toward more personalized

treatment, based on a patient's individual characteristics."

What differences should patients now expect in asthma care?

- You should receive a written asthma action plan that describes both how to control asthma long-term AND handle asthma attacks.
- You will need quick-relief medication for symptoms, and daily long-term control medication. The new guidelines conclude that inhaled corticosteroids are of most benefit. Other medications may also be helpful. Doctors and patients need to work together to develop the best, individualized plan.
- Your doctor will help identify which allergens or irritants are important. The guidelines stress that multiple measures are necessary to control exposure to allergens and irritants.
- You should get regular "asthma check-ups" to monitor your asthma control. Visits at least every six months are recommended because asthma varies from season to season and can change as you grow older. Monitoring allows your doctor to increase—or decrease—medications, as warranted.
- During doctor visits, your doctor will ask you about your symptoms, use of medication, and how often attacks occur. You will have a lung function test. Be sure to ask any question or discuss any concern you may have about your treatment. This way, you and your doctor can work out the best plan for you.

The new guidelines emphasize that asthma education shouldn't just happen in the doctor's office. Education and "asthma friendly" policies throughout the community—in clinics, schools, workplaces, pharmacies, patient homes, and recreation programs—will help all people with asthma receive the best possible care.

Contributors: Virginia Taggart, M.P.H., Patricia Noel, Ph.D., and James Kiley, Ph.D., National Heart, Lung, and Blood Institute (NHLBI)



To Find Out More

In addition to www.medlineplus.gov (search on "asthma guidelines"), visit www.nhlbi.nih.gov/health/public/lung/ for additional information.

Life, Death, and Second Chances

Before Diane Cushman-Neal was referred to Dr. Richard Martin

her asthma had gotten so severe that she was beginning to fear for her life.

Was there any hope at all?

By the time Richard Martin, M.D., saw Diane Cushman-Neal, her doctors had given her the prognosis that she likely had only six months to live because of the severity of her asthma. She had been hospitalized several times and could hardly walk to the bathroom without taking a rest. Her doctors in California had been providing textbook asthma care, but she was only getting worse. They sent her to Dr. Martin, Chairman of the Department of Medicine at the National Jewish Medical and Research Center in Denver, one of the world's leading centers of research on asthma and other lung diseases.

Dr. Martin took a biopsy of Cushman-Neal's lung, looking for damage to the tiny hairs that line the airways. In an electron micrograph of the biopsy the hairs looked fine, but technician Jan Henson spotted suspicious squiggles, which she pointed out to Dr. Martin. The squiggles turned out to be *Mycoplasma pneumoniae*, a bacteria that can cause pneumonia. Although Cushman-Neal did not have pneumonia, Dr. Martin decided to treat her infection with antibiotics.

Slowly but surely, Cushman-Neal's condition improved. She was able to reduce her medications and her lung function improved dramatically. She skied for the first time in years and ran a 10-kilometer race. Recently, she married and adopted two children.

"Dr. Martin was the one who made all the difference," says Cushman-Neal, who moved from San Diego to Denver to be close to Dr. Martin and National Jewish. "He gave me the ability to breathe."

But the giving went both ways. Inspired by what had happened to Cushman-Neal, Dr. Martin began studying the role that bacterial infections can play in asthma. Initial research indicated that more than half of adults with chronic, stable asthma have



Dr. Richard Martin, with Diane Cushman-Neal

Photo: Courtesy, National Jewish Medical and Research Center

bacterial infections, and that treatment with antibiotics can improve their lung function.

The NIH's National Institute of Allergy and Infectious Diseases (NIAID) considered the initial research so promising that it awarded Dr. Martin \$7.5 million to lead a multi-center study to see if those results can be replicated in a larger audience. Another trial, led at National Jewish by Stanley Szeffler, M.D., and funded by the National Heart, Lung and Blood Institute (NHLBI), is looking for the same benefit in children with moderate to severe asthma. If the findings hold up, they could significantly change the way asthma is treated.

"Diane Cushman-Neal was the sentinel patient," said Dr. Martin. "Her case inspired a very fruitful avenue of research."

When Good Treatment Fails

In another area of research, Dr. Martin and colleagues recently investigated why certain patients with asthma do not experience improved lung function with anti-inflammatory therapy. Although revised guidelines recommend anti-inflammatory therapy for persistent asthma, many patients with asthma may not improve on this therapy. This is a different medical question than what prevented Cushman-Neal from leading a normal life, but this phenomenon does affect 25–35 percent of asthma patients. What Dr. Martin discovered is that a six-week trial of inhaled corticosteroids may determine how patients will respond to continued treatment. The short-term response to inhaled corticosteroids, a type of anti-inflammatory drug used to treat asthma, was determined by measuring the amount of air that can be forced out of the lungs in one second after taking a deep breath; an important measure of lung function. Improvement in this measure predicts how well asthma can be managed for long-term control. The decision to use long-term inhaled steroids could be based on a short-term trial to determine if the patient will respond to the treatment. Different therapeutic strategies would need to be established for patients that do not experience improved lung function.

These findings have implications for what therapy will benefit patients that do not receive benefit. "Asthma is a syndrome not a disease," says Dr. Martin, "and there are a variety of causative factors that are important to identify."

Asthma Research: The NIH–NJRC Connection

Among the many ways that NIH supports and promotes asthma research is through its strong relationship with National Jewish Medical Research Center in Denver. National Jewish has been conducting research for more than 80 years and is rated as one of the top 10 independent biomedical research institutions—of any kind—in the world. Asthma is the top disease treated and studied at National Jewish, and NJRC works with four different NIH asthma programs:

- National Heart, Lung, and Blood Institute (NHLBI) Childhood Asthma Management Program
- NHLBI Childhood Asthma Research and Education Network
- NHLBI Asthma Clinical Research Network, and
- National Institute of Allergy and Infectious Diseases (NIAID) Inner City Asthma Consortium

NIH funds research all across the globe, and has worked closely with NJRC to supply grants for the important asthma research going on there. Ongoing NJRC projects include investigations of the following:

- nocturnal asthma,
- steroid-resistant asthma,
- pollution and asthma,
- obesity and asthma,
- viruses and asthma, and
- how early life exposures to allergens may help protect children from asthma.

Some of NJRC's most important research addresses the underlying causes of asthma. Erwin Gelfand, M.D., Chairman of Pediatrics, recently received a major NIH grant to do just that. The grant renews a project that initially began almost 20 years ago to focus on mechanisms of the underlying inflammation in asthma. The novel research findings continue to translate into new therapeutic strategies.

Another important study could help physicians decide definitively whether to prescribe antibiotics for asthma patients. (See accompanying story.) In pediatric asthma, doctors are studying and treating the progression of asthma, infant wheezing that leads to asthma, and severe asthma.



Dr. Floyd Malveaux teaches Rhonda, Jermid, and Jabeaux Brown of New Orleans to use a peak flow meter.

Childhood Asthma: A Chance to HEAL

Asthma, a reality of daily life for more than six million American children, is even more prevalent among children living in inner cities. Now, a public-private medical partnership called HEAL is seeking ways to reduce the nation's childhood asthma challenge.

Even before Hurricane Katrina swept through Louisiana and Mississippi in 2005, Rhonda Brown had spent many sleepless nights in hospital emergency rooms while her two asthmatic sons fought to breathe. In Katrina's wake, the complications grew even greater for Jermid, 14, and Jabeaux, 7. Both of them have had asthma since infancy, and they must take a variety of medications to control it.

"The flooding in New Orleans left buildings overrun with mold, a common asthma trigger," says Floyd J. Malveaux, M.D., Ph.D., a nationally recognized asthma expert. In addition, the devastation had dramatically reduced the city's hospitals and other health care facilities.

In response, Dr. Malveaux joined with others to help form Head-off Environmental Asthma in Louisiana (HEAL), a collaborative research project to reach out to those with childhood asthma who were affected by Katrina. Conducted by the Tulane University Health Sciences Center and the New Orleans Department of Health, the project is also examining inherited differences in children's responses to mold and indoor allergens. HEAL is funded by the National Institute of Environmental Health Sciences (NIEHS), the National Center for Minority Health and Health Disparities (NCMHD), the Foundation for the National Institutes of Health (FNIH), and the Merck Childhood Asthma Network, Inc. (MCAN), where Dr. Floyd Malveaux is the Execu-

tive Director. NIEHS and NCMHD are part of the National Institutes of Health (NIH).

Jabeaux Brown is enrolled in HEAL. He receives allergy tests and the levels of indoor allergens in the Browns' apartment are tested as well. He and his family also meet regularly with an asthma counselor, trained to help families monitor and manage asthma.

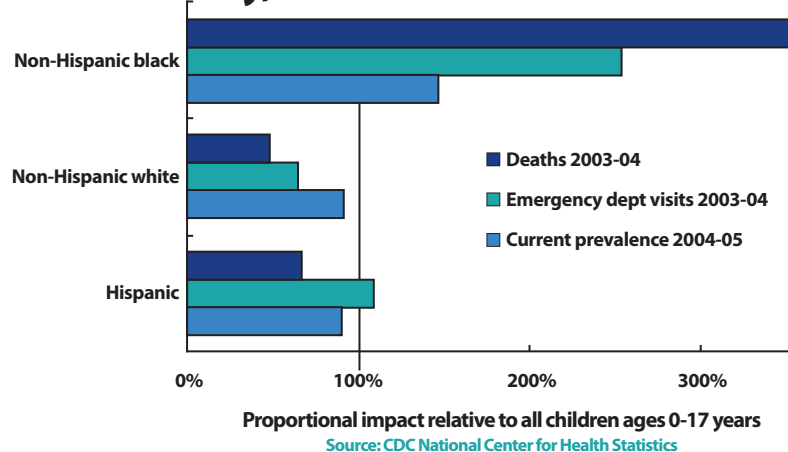
"We're in a temporary apartment while we rebuild our home, and there's a lot of mold here," says Rhonda Brown. "It is one of the boys' asthma triggers, so I want to know more about it. If we can eliminate the triggers where we live, we won't have to go to the hospital so much."

For Dr. Malveaux, the HEAL project is a critically important area of research on childhood asthma diagnosis, treatment, and control. He would like to bring similar programs to relieve childhood asthma everywhere.

"Childhood asthma is a major public health problem," he says, "and a significant burden on children, families, and society. Low-income and medically underserved populations, especially ethnic minorities and children living in inner cities, suffer disproportionately from asthma."

He also notes that asthma is the leading cause of chronic illness among children, the third leading cause of childhood hospitalization, and the number one cause of school absenteeism due to chronic conditions. Nearly 15 million days of school are lost each year due to childhood asthma.

Proportional Impact: Asthma Burden by Race/Ethnicity, 2003-2005



Non-Hispanic blacks have disproportionate rates of deaths and emergency department visits when compared to the current prevalence rates for all Americans.

Dr. Malveaux is at the forefront of medical professionals who want to bring "evidence-based interventions" to strengthen clinical care. Simply put, evidence-based interventions are programs proven to work.

"Asthma is manageable when children and their families have access to quality health care services," he states. "There are programs that have already proven effective." These programs combine greater knowledge of asthma, management of care, environmental control, and lifestyle modification.

Test Your Asthma Knowledge

1. True or False? Asthma is caused by an inflammation of the inner lining of the bronchi of the lungs.

2. Which of the following can make asthma worse?

- a. Household dust mites
- b. Pollen and outdoor mold
- c. Secondhand smoke
- d. All of the above

3. True or False? Dust mites can be eliminated simply by washing sheets in warm water.

4. True or False? A peak flow meter records how many asthma attacks you have had.

5. True or False? Treating chronic asthma usually involves taking medication.

6. True or False? Until more is known, asthma patients can do little to help themselves.

ANSWERS

1. True: This inflammation results in fibrosis and narrowing of the bronchi. This can make breathing difficult, particularly expiration (exhaling) and can cause a feeling of tightness in the chest.
2. Answer: D. All of these can make asthma worse. But some things that make asthma worse for some people are not a problem for others.
3. False: In homes, high levels of mites can be found in mattresses, pillows, bed linens, carpets, drapes, upholstered furniture, and stuffed toys. Mites can be controlled by reducing indoor humidity to less than 50 percent and temperature to 70 degrees or less, and by washing items in water temperatures of 130 degrees or higher, or by dry cleaning them.
4. False: Peak flow meters measure how well air moves out of your lungs.
5. True: Medication can decrease the inflammation of the bronchial tubes, relax the muscles of the bronchial tubes, and decrease the sensitivity of the lungs to allergens.
6. False: Significant advances in understanding and treating asthma have been made in recent years. Knowing about the disease and its treatment options has helped asthma patients live healthier lives.

For More about Asthma: <http://www.nlm.nih.gov/medlineplus/tutorials/asthma/htm/index.htm>

Easing Chronic Pain

Better Treatments and Medications

What Is Pain?

You know it at once. It may be the fiery sensation of a burn moments after your finger touches the stove. Or it's a dull ache above your brow after a day of stress and tension. Or you may recognize it as a sharp pierce in your back after you lift something heavy. In its most benign form, pain warns us that something isn't quite right, that we should take medicine, or see a doctor. At its worst, however, pain robs us of our productivity, our well being, and, ultimately, our very lives.

In 1931, the French medical missionary Dr. Albert Schweitzer wrote, "Pain is a more terrible lord of mankind than even death itself." Today, pain has become the universal disorder, a serious and costly public health issue, and a challenge for family, friends, and health care providers who must give support to the individual suffering from the physical as well as the emotional consequences of pain.

Pain is a feeling triggered in the nervous system. Pain may be sharp or dull. It may come and go, or it may be constant. You may feel pain in one area of your body, such as your back, abdomen, or chest, or you may feel pain all over, such as when your muscles ache from the flu.

Pain can be helpful. Without pain, you might seriously hurt yourself without knowing it, or you might not realize you have a medical problem that needs treatment. Once you take care of the problem, pain usually goes away. However, sometimes pain goes on for weeks, months, or even years. Fortunately, there are many ways to treat pain. Treatment varies depending on the cause of pain.

It is useful to distinguish between two basic types of pain, acute and chronic, and they differ greatly.

- **Acute pain**, for the most part, results from disease, inflammation, or injury to tissues. This type of pain generally comes on suddenly. For example, pain may occur after trauma or surgery, and may be accompanied by anxiety or emotional distress. The cause of acute pain can usually be diagnosed and treated, and the pain is confined to a given period of time and severity. In some rare instances, it can become chronic.
- **Chronic pain** is widely believed to represent disease itself. It can be made much worse by environmental and psychological factors. Chronic pain persists over a longer period of time than acute pain and is resistant to most medical treatments. It can—and often does—cause severe problems for patients.

How is Pain Treated?

Whatever the treatment method, it is important to remember that pain is treatable. Here are some common pain treatments.

Treatment	Used for
Drugs	Examples are aspirin, acetaminophen, and NSAIDs (non-steroidal anti-inflammatory drugs, such as ibuprofen.) These pain relievers, also called analgesics, treat anything from minor aches to arthritis. Other drugs that are sometimes used for pain include anticonvulsants, antidepressants, antimigraine drugs, COX-2 inhibitors, and narcotics.
Chemical injections or applications	Examples include capsaicin, a chemical found in chili peppers used in pain-relieving creams; nerve blocks with drugs or chemicals to interrupt relay of pain messages between the brain and other parts of the body; and enzymes injected into lumbar disks.
Physical methods	Common treatments include physical therapy, biofeedback, acupuncture, electrical stimulation, R.I.C.E. (Rest, Ice, Compression, and Elevation, for muscle and bone conditions), and exercise to improve blood flow and oxygen to muscles and relieve stress.
Psychological methods	These include counseling, hypnosis, and cognitive-behavioral therapy—a treatment that involves a wide variety of coping skills and relaxation methods to help prepare for and cope with pain.
Surgery	Although not always an option, surgery may be required to relieve pain, especially pain caused by back problems or serious musculoskeletal injuries.

Fighting Chronic Pain

There are many types of pain in the body, but they all can be classified as acute (short-term) or chronic (long-term). Although the acute pain of a broken leg or a cut is fairly simple to diagnose, health care professionals and scientists know that chronic pain is very complex. Below are some of the major types and sources of pain where they appear in different parts of the body.

Traumatic: Pain from injuries, including sprains and sports injuries and pain following surgery

Skin: Burns, rashes, and inflammation

Heart/Blood Vessels: Heart attack, angina, leg pain from clogged arteries

Stomach/Digestive: Gallstones, intestinal obstruction, diverticulitis, ulcers, severe indigestion, severe gas pain, inflammatory bowel disease, colitis

Urinary/Reproductive: Kidney stones, pelvic pain, vulvodynia, menstrual cramps

Disease-Related Pain: Various cancers, ALS (Lou Gehrig's Disease), tuberculosis, HIV-AIDs, and others

Head/Neck: Migraine, headaches, jaw pain (TMJ), earache, toothache, sore throat, sinus pain, facial numbness

Muscles and Bones: Arthritis, back pain, bone pain from spread of cancer, fibromyalgia, chronic fatigue syndrome

Neurologic: "Phantom limb" pain after amputation, nerve pain from diabetes



Prescription Pain Medicines— An Addictive Path?

Many Americans may have been startled last summer when an Associated Press (AP) analysis of U.S. Drug Enforcement Administration statistics showed that retail sales of five major painkillers rose 90 percent from 1997 to 2005.

The report revealed that ever-increasing amounts of prescription painkillers called opioid analgesics are being used on a daily basis. These drugs, which can become habit-forming over time if not strictly monitored by a health professional, are readily available with a prescription.

Now, researchers funded by the National Institute on Drug Abuse (NIDA) have launched the first large-scale national study evaluating a treatment for addiction to these drugs, which include codeine, morphine, oxycodone (OxyContin), hydrocodone (Vicodin), and meperidine (Demerol). The study is a direct response to the growing national problem of prescription drug abuse in this country.

According to the 2005 National Survey on Drug Use and Health, the incidence of new nonmedical users of pain relievers is now at 2.2 million Americans aged 12 and older. This is greater than the number of new marijuana abusers (2.1 million). In 2005, more than six million Americans reported current (in the past month) nonmedical use of prescription drugs. That is more than the number of people abusing cocaine, heroin, hallucinogens, and inhalants, combined.

“The abuse of prescription opiates continues to be unacceptably high, producing steep increases in emergency room admissions,” says NIH Director Dr. Elias A. Zerhouni.

“This trial is part of our ongoing commitment to develop better treatment approaches for drug abuse and addiction, so devastating to millions of Americans and their families.”

The study will test the effectiveness of buprenorphine/naloxone tablets, marketed as Suboxone, along with different models of drug counseling in patients addicted to prescription painkillers. Buprenorphine works by acting on the receptors in the brain affected by heroin, morphine, and prescription painkillers. The tablets relieve drug cravings without prompting the same intense high or dangerous side effects. When combined with naloxone, buprenorphine’s abuse potential is further limited, since those who try to inject it to get high experience severe withdrawal symptoms, while no adverse effects occur when it is taken orally, as prescribed. This medication has been approved for prescribing by specially trained physicians, greatly expanding the treatment options available for opiate addiction.

“This study is important because most of the research to date has been done on treatment for those addicted to heroin, not prescription pain medications,” says Roger Weiss, M.D., clinical director of McLean’s Alcohol and Drug Abuse Treatment Center and lead investigator for the study. “It also isn’t clear whether people who started taking these medications for legitimate reasons will respond to the same treatment in the same way as those who use pain medications solely on an illicit basis.”

For more information about the study, go to: www.drugabuse.gov/CTN/protocol/0030.html

Block That Pain!

New NIH Research Points to Childbirth and Surgical Pain Relief

For those who suffer from any form of unrelieved chronic pain, new research from NIH-supported investigators holds promise. That is especially so for pain from childbirth and surgical procedures.

The NIH animal study used a combination of capsaicin—the substance that makes chili peppers hot—and a drug called QX-314. This combination produces a unique effect, blocking pain-sensing neurons without impairing signals from other cells. In contrast, most pain relievers used for surgical procedures block activity in all types of neurons. This can cause numbness, paralysis, and other nervous system disturbances.

“The Holy Grail in pain science is to eliminate pain without

impairing thinking, alertness, coordination, or other vital functions of the nervous system,” says Story C. Landis, Ph.D., director of the National Institute of Neurological Disorders and Stroke (NINDS) at the NIH. NINDS funds the investigators’ research, along with the National Institute of Dental and Craniofacial Research (NIDCR) and the National Institute of General Medical Sciences (NIGMS).

This finding shows that a specific combination of two molecules can block only pain-related neurons. It holds the promise of major future breakthroughs for the millions of persons who suffer with disabling pain.



Photo: Bill Branson

The Team Approach to Pain Relief

By **Shana Potash**

Christe Roberts says there was a time when her cancer caused her so much pain it hurt to hug her children. Now, she says, her life has changed dramatically since coming to the NIH Clinical Center.

Roberts, a 29-year-old mother of two young children, has a rare blood cancer called cutaneous t-cell lymphoma (CTCL) that affects her skin, lymph nodes, and blood. In Roberts' case, it can cause her skin to crack, bleed, and peel off. When she was diagnosed in 2005, Roberts searched the Internet for information about her form of CTCL. She found the NIH Clinical Center and became a patient participating in clinical trials.

Her story is an example of a relatively new team approach to pain treatment, especially for cases of chronic pain. Teams of health care professionals are treating Roberts' cancer and have brought her pain under control. The NIH Clinical Center's Pain and Palliative Care Service worked with Roberts and her physicians to help manage her pain through medication and alternative therapies.

"It takes a team to take care of a patient," says Ann M. Berger, M.D., chief of the NIH Clinical Center's Pain and Palliative Care Service. The service brings together people from a variety of disciplines to help patients manage their symptoms and relieve their physical, emotional, and spiritual suffering.

"We're the quality-of-life team; that's how I introduce ourselves

Christe Roberts (seated center), a patient with a rare form of cancer, says that the NIH Clinical Center's Pain and Palliative Care Service helped bring her pain under control. Roberts is seen here with some of the team members, (left to right) Dr. Berger, Jacques Bolle, RN, Ph.D.; Daniel Handel, M.D.; Eva Cummings, program coordinator; Karen Baker, C.R.N.P.

to our patients," says Dr. Berger. "This is the first truly integrative approach to pain management."

The pain medications that Roberts took before coming to NIH made her extremely tired and barely functional. A consultation with the Pain and Palliative Care Service produced a medication plan that eased her pain without interfering with her quality of life, and acupuncture brought relief from severe shoulder pain.

"I'm functional again. That's the best way I can describe it," Roberts says. "Before, I couldn't stay awake long enough to be with my family. Now I can interact with my children and I can hug my kids."

Since pain, especially chronic, long-term pain, is prevalent across so many different diseases and conditions, the NIH created a Pain Consortium to help study all aspects of pain prevention and treatment. This interdisciplinary Consortium is composed of 18 different Institutes and Centers and helps coordinate planning for key research opportunities in every aspect of pain.

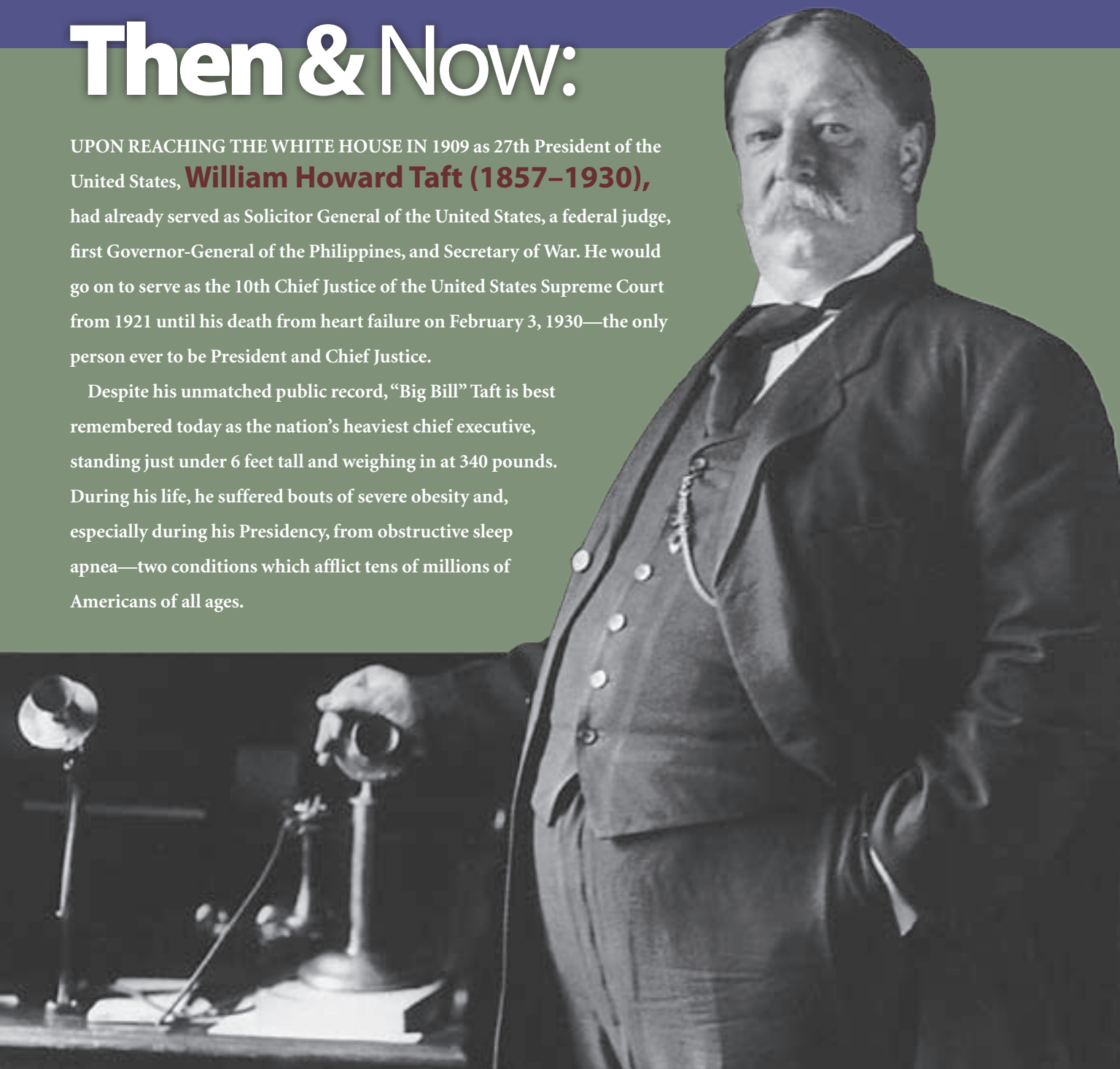
To Find Out More

To get information on taking part in clinical research at the NIH Clinical Center, go to <http://clinicalcenter.nih.gov>. Or call 1-866-999-1112 (TTY 1-866-411-1010).

Then & Now:

UPON REACHING THE WHITE HOUSE IN 1909 as 27th President of the United States, **William Howard Taft (1857–1930)**, had already served as Solicitor General of the United States, a federal judge, first Governor-General of the Philippines, and Secretary of War. He would go on to serve as the 10th Chief Justice of the United States Supreme Court from 1921 until his death from heart failure on February 3, 1930—the only person ever to be President and Chief Justice.

Despite his unmatched public record, “Big Bill” Taft is best remembered today as the nation’s heaviest chief executive, standing just under 6 feet tall and weighing in at 340 pounds. During his life, he suffered bouts of severe obesity and, especially during his Presidency, from obstructive sleep apnea—two conditions which afflict tens of millions of Americans of all ages.



Medical Research Pays Off for All Americans

William Howard Taft—Then & Now

Taft's Condition	Treatment Then	Treatment Today
Obesity—“Obesity” refers to excessive body fat. Men with more than 25 percent body fat and women with more than 30 percent are obese. More than 65 percent of U.S. adults are overweight or obese. The average male is 5'9.2" tall and weighs 189.8 pounds; the average female, 5'3.8" and 162.9 pounds. Serious medical conditions linked to obesity include type 2 diabetes, heart disease, high blood pressure, cancers of the colon, rectum, or prostate in men; cancer of the gallbladder, uterus, cervix, or ovaries in women. Emotional suffering may be one of its most painful results.	Strict dieting, which Pres. Taft managed successfully—for a time—and proudly described: <i>“I have dropped potatoes entirely from my bill of fare, and also bread in all forms. Pork is also tabooed, as well as other meats in which there is a large percentage of fat. All the vegetables except potatoes are permitted, and of meats, that of all fowls is permitted. In the fish line I abstain from salmon and bluefish, which are the fat members of the fish family. I am also careful not to drink more than two glasses of water at each meal. I abstain from wines and liquors of all kinds, as well as tobacco in every form.”</i>	The method of treatment depends on the level of obesity, overall health condition, and readiness to lose weight. Treatment may include a combination of diet, exercise, behavior modification, and sometimes weight-loss drugs. In some cases of extreme obesity, bariatric surgery may be recommended. For more on obesity and treatment, including bariatric surgery: www.medlineplus.gov www.win.niddk.nih.gov
Sleep Apnea—Sleep apnea is a common, sometimes serious disorder. There are two types. Obstructive sleep apnea (OSA), which President Taft had, is caused by relaxation of soft tissue in the back of the throat that blocks passage of air. Central sleep apnea (CSA) is caused by irregularities in the brain's normal signals to breathe. Most people will have a combination of both. Breathing stops or gets very shallow from 10 to 20 seconds or more and can occur 20 to 30 or more times per hour. It is more likely in men than women, and in the overweight or obese. People with sleep apnea often snore loudly. However, not all snorers have sleep apnea. The disorder's hallmark is excessive daytime sleepiness. Additional symptoms include restless sleep, morning headache, trouble concentrating, irritability, forgetfulness, mood or behavior changes, anxiety, and depression. People with even a few of these symptoms should visit their doctor for evaluation. Untreated, it can be life threatening. It also appears to be a risk for stroke and transient ischemic attacks (TIAs, also known as “mini-strokes”), and for coronary heart disease, heart failure, irregular heartbeat, heart attack, and high blood pressure.	According to physician and Taft scholar Dr. John G. Sotos, M.D., writing in <i>Chest, the Journal of the American College of Chest Physicians</i>: “It was years before Taft's aides realized his sleepiness was a sign of sickness. Taft refused their advice to see a physician “Taft weighed over 300 pounds his entire Presidency. He could sleep anywhere, anytime. He fell asleep during conversations with the Speaker of the House and with the Chief Justice of the Supreme Court. He publicly slept in church, at the theater, and at a funeral. He fell asleep while playing cards, while signing documents, and while eating. He became sleepy playing golf. He could sleep standing up. “... He made so many political errors that he was called ‘Taft the Blunderer’ and ‘Mr. Malaprop.’ “The election of 1912 took the Presidency from the 55-year-old Taft, but saved his life. Free from the strains of the White House, he dropped his weight from 340 pounds to 264 in a year. He stayed there, approximately, for the rest of his life. His decade-long sleepiness vanished. His blood pressure fell. In the last nine years of his life he was extremely effective and productive as Chief Justice on the Supreme Court. . . .”	Although there is no cure for sleep apnea, there are a variety of treatments, depending on an individual's medical history and the severity of the disorder. Most treatment regimens begin with lifestyle changes, such as avoiding alcohol and medications that relax the central nervous system (for example, sedatives and muscle relaxants), losing weight, and quitting smoking. Some people are helped by special pillows or devices that keep them from sleeping on their backs, or oral appliances to keep the airway open during sleep. If these conservative methods are inadequate, doctors often recommend continuous positive airway pressure (CPAP), in which a face mask is attached to a tube and a machine that blows pressurized air into the mask and through the airway to keep it open. There are also surgical procedures that can be used to remove tissue and widen the airway. Some individuals may need a combination of therapies to successfully treat their sleep apnea. Recent studies show that successful treatment can reduce the risk of heart and blood pressure problems. For more on sleep apnea and its treatment: www.medlineplus.gov www.ninds.nih.gov



Talking Turkey . . .

1. 45 million turkeys are eaten each Thanksgiving, 22 million at Christmas.
2. The heaviest turkey ever raised was 86 pounds, about as big as a large dog.
3. Eating turkey doesn't make you sleepy; it's the carbohydrates in the rest of your holiday dinner that do.
4. The average American consumes about 17 pounds of turkey a year.
5. Turkey is low in fat and high in protein.
6. White meat has fewer calories and less fat than dark meat.
7. Only male turkeys (toms) gobble; female turkeys (hens) click.
8. Minnesota, North Carolina, Arkansas, Virginia, Missouri, and California are the nation's top turkey producers.

(Sources: National Center for Health Statistics; National Turkey Federation; U.S. Department of Agriculture)

4 Steps to Making Sense, Safely, of Turkey and "All the Fixin's"

The U.S. Food and Drug Administration (FDA) encourages consumers to pay special attention to holiday food handling and preparation. Most at risk from food borne illnesses are the elderly, people with weakened immune systems from cancer and other causes, pregnant women, and children. To reduce the risk, the FDA advises the following steps:

1. **Keep Clean:** Frequently wash hands and all surfaces touching food. Bacteria can spread throughout the kitchen onto cutting boards, knives, counter tops, sponges, and brushes.
2. **Separate Foods:** Don't cross-contaminate by letting bacteria spread from one food to another. Especially keep raw meat, poultry, seafood, and their juices away from fresh vegetables, such as carrots, and other foods that are ready to eat.
3. **Cook Thoroughly:** Food is properly cooked when it is brought to an internal temperature long enough to kill the harmful bacteria which cause food borne illness. Use a food thermometer to measure internal temperature of foods.
4. **Chill Properly:** Refrigerate foods promptly to prevent most harmful bacteria from multiplying. Refrigerators should be set at 37 degrees Fahrenheit, freezers at 0 degrees Fahrenheit. Occasionally check settings with a thermometer.

5 Top Information Sources for Your Holiday Courses

1. www.foodsafety.gov
Gateway to all federal government food safety programs
2. www.cfsan.fda.gov
In-depth information on preventing food borne illness
3. www.ndep.nih.gov
Healthy holiday eating for people with diabetes
4. www.fsis.usda.gov
Safe handling of take-out foods—and much more
5. www.medlineplus.gov
Trusted, consumer-friendly information on 740 conditions, diseases, wellness topics, and more

"But Baby It's Cold Outside..."

At holiday time, when the weather outside may be frightful and the fire inside so delightful, it's hard not to overindulge: in everything except exercise! The newest research shows people of all ages and physical conditions benefit from exercise and physical activity.

8 "Greats" for Seniors from Regular Exercise

Older people become sick or disabled more often from not exercising, so staying active and exercising regularly can:

1. **Improve mood and relieve depression**
2. **Help prevent or delay many diseases and disabilities, including some types of cancer, heart disease, and diabetes**
3. **Improve health in the frail or those with diseases that accompany aging**
4. **Increase strength—carry groceries, climb stairs**
5. **Improve balance—prevent falls**
6. **Restore flexibility—speed recovery from injury**
7. **Build endurance—walk farther, dance longer**
8. **Improve quality of life**



Children Benefit, Too!

Most children need at least an hour of physical activity every day.

Regular exercise helps them to:

1. **Feel less stressed**
2. **Feel better about themselves**
3. **Feel more ready to learn in school**
4. **Keep a healthy weight**
5. **Build sturdy muscles, bones, and joints**
6. **Sleep better at night**

As kids spend more time watching TV, they spend less time running and playing. Parents should limit TV, video game, and computer time. Parents can set a good example by being active themselves. Exercising together can be fun for everyone. Competitive sports can help kids stay fit. Walking or biking to school, dancing, bowling, and yoga are some other ways for kids to get exercise.

5 Good Links to Excellent Exercise Info

1. www.win.niddk.gov
Tips to help you start—and stay—active
2. www.nihseniorhealth.gov
Comprehensive guide to exercise for older Americans
3. www.kidshealth.org
Great source for parents and kids alike
4. www.nlm.nih.gov/medlineplus/exerciseforchildren.html
Covers everything from the basics to the latest research
5. www.aaaai.org
Comprehensive information on asthma, including exercising in cold weather



NIH Experts Answer Students' Drug Questions

On October 12, thousands of students at more than 200 U.S. schools found answers to their questions about drugs and drug use from experts at the National Institute on Drug Abuse during their first Drug Facts Chat Day.

The questions poured in...

High School Student: *Can doing drugs at a young age screw up your life?*

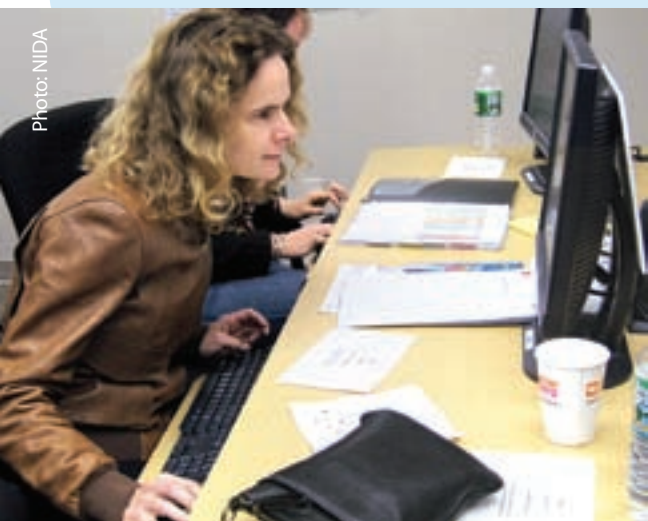
Eve Reider: *There is a lot we still don't know about who becomes addicted, why, and after how much drug exposure. We do know that each person is different, so it's a little like playing "Russian Roulette" if you choose to use drugs. But, if you do, the earlier you stop, the more likely you will be to avoid addiction and the harmful brain changes that lead to it. For more information, see <http://www.drugabuse.gov/scienceofaddiction/addiction.html>.*

High School Student: *How long do you think the average person can live if they smoke cigarettes?*

Ivan Montoya: *The lifetime of a person depends on many factors, but what is known is that a person who smokes cigarettes has a lower life expectancy. That is because of all the medical complications associated with smoking, such as cancer, cardiovascular diseases, respiratory problems, etc. A person who smokes has a chance of a shorter life. For more information about smoking, go to: www.smoking.drugabuse.gov.*



Photo: NIDA



Dr. Nora Volkow, director of the National Institute on Drug Abuse, answers a student's e-mail as part of the Drug Facts Chat Day.

Students throughout the U.S. submitted questions through e-mail for the National Institute on Drug Abuse's (NIDA) Drug Facts Chat Day. Top NIDA scientists were online to answer questions about drugs and their impact on the teen brain and body, and about illicit drug use and abuse of prescription drugs.

NIDA received more than 35,000 questions; close to 700 were answered immediately and the remainder were grouped into categories and added to NIDA's Frequently Asked Questions page. Questions focused on topics such as smoking, marijuana, and alcohol. Many students were also interested in tips to help friends in trouble with drugs and to find out what are the most dangerous drugs. All participants needed to join in the chat was a computer with an Internet connection.

NIDA will also stay in contact with the more than 200 schools that participated in the chat by providing them with new materials about drug abuse as they are developed. A full transcript of the Drug Facts Chat Day questions and answers is available on the NIDA Web site at www.nida.nih.gov/chat/2007.

NIH Quickfinder

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

Institutes

- **National Library of Medicine (NLM)**
www.nlm.nih.gov 1-888-FIND-NLM
- **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
(919) 541-3345
- **National Institute of General Medical Sciences (NIGMS)** www.nigms.nih.gov
(301) 496-7301
- **National Institute of Mental Health (NIMH)**
www.nimh.nih.gov niminfo@nih.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)**
www.ninr.nih.gov (301) 496-0207

Centers & Offices

- **Center for Information Technology (CIT)**
www.cit.nih.gov (301) 594-6248
- **Center for Scientific Review (CSR)**
www.csr.nih.gov (301) 435-1115
- **Fogarty International Center (FIC)**
www.fic.nih.gov
- **National Center for Complementary and Alternative Medicine (NCCAM)**
www.nccam.nih.gov 1-888-644-6226
- **National Center on Minority Health and Health Disparities (NCMHD)** www.ncmhd.nih.gov
(301) 402-1366
- **National Center for Research Resources (NCRR)**
www.ncrr.nih.gov (301) 435-0888
- **NIH Clinical Center (CC)**
www.cc.nih.gov
- **Office of Research on Women's Health (ORWH)**
http://orwh.od.nih.gov (301) 402-1770

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