Fulfilling the Promise

Making Inroads into Alzheimer’s Disease

Alzheimer’s disease devastates the people who have it and their families. It robs individuals of their memories and causes progressive problems with language and behavior. It is the most common cause of dementia among people over age 65, affecting an estimated 4.5 million Americans, according to the National Institutes of Health (NIH).

The risk of developing Alzheimer’s disease doubles every five years after age 65—and the disease is on the rise. Researchers at Rush-Presbyterian-St. Luke’s Medical Center in Chicago estimate that the number of older people with Alzheimer’s will dramatically increase as the population ages—rising to 13.2 million by 2050.

Until recently, the prognosis for patients with Alzheimer’s was grim. President Ronald Reagan’s slow demise from the disease spotlighted the private battle lost by so many Americans each year.

But the tide is turning on this disease, because of research supported by the NIH at U.S. medical schools and teaching hospitals. Scientists are working to delay the onset of Alzheimer’s, slow its progress, and even prevent it altogether. Today, five drugs are available to help control symptoms of the disease.

Research on Alzheimer’s disease supported by the NIH is divided into three broad, overlapping areas: causes/risk factors, diagnosis, and treatment/caregiving.

Cause/Risk Factors

To thoroughly understand what causes Alzheimer’s disease, scientists are delving into the basic biology of the aging nervous system, studying how nerve cells lose their ability to communicate with each other. Other investigators are studying factors that may play a role in disease risk.

- An intriguing finding by researchers at Washington University School of Medicine in St. Louis suggests that Alzheimer’s disease may be due to abnormalities in the regions of the brain involved in the process of daydreaming by young, healthy people. The NIH-supported study was published in 2005.

- University of Rochester Medical Center researchers found in 2005 that a gene called Meox2 is underactive in the brains of Alzheimer’s patients. By restoring the gene’s activity in human brain cells, the NIH-supported researchers stimulated new blood vessels and boosted the level of a protein that removes the toxins that build up in the brain tissue of Alzheimer’s patients. These results have opened the door to testing this approach as a potential new treatment.
Exercise slows development of Alzheimer’s-like brain changes in mice, according to NIH-supported research published in 2005 at University of California, Irvine, College of Medicine.

Loss of body mass over time appears to be strongly linked to older adults’ risk of developing Alzheimer’s disease, and the greater the loss, the greater the chance of a person developing the disease, according to a 2005 NIH-supported study at Rush University Medical Center.

Diagnosis

Most current treatments work best at the earliest stages of disease. A wave of research, therefore, has been aimed at early detection of Alzheimer’s disease. With NIH support, researchers at medical schools and teaching hospitals around the country are looking for new markers and improving neuro-imaging technologies to identify the first brain changes that eventually result in Alzheimer’s disease.

In 1988, the University of Washington School of Medicine researchers developed, with NIH support, the Clinical Dementia Rating, used worldwide in the diagnosis of Alzheimer’s disease.

In 2004, NIH-supported researchers at the University of Pittsburgh School of Medicine discovered a novel tracer they could use with positron emission tomography (PET) to visualize amyloid plaques in individuals with Alzheimer’s disease. This new technique should help researchers learn how and when the disease originates and to evaluate new therapies.

Researchers at the New York University (NYU) School of Medicine used NIH support to develop a new computer program in 2005 to show that the region of the brain called the hippocampus is the very first region to be affected by Alzheimer’s—years before symptoms occur.

NIH-supported scientists from Northwestern University and Rush University Medical Center are using nanotechnology to develop a clinical test capable of diagnosing Alzheimer’s in its earliest stages. They can identify miniscule amounts of a toxic protein in human cerebrospinal fluid—which is detectable before the memory-robbing plaques appear in the brain.

Treatment/Caregiving

Researchers are working hard to discover and develop therapies that may help treat symptoms or slow the progress of the disease. Many of these interventions are now being tested in clinical trials. Scientists and many health care professionals are also seeking better ways to help people with Alzheimer’s disease and their caregivers cope with the decline in mental and physical abilities and the difficult behaviors that accompany the disease.

In 1997, NIH-supported scientists at the University of California, Irvine, College of Medicine completed the first study to show that vitamin E and an anti-Parkinson’s drug called selegiline can significantly delay the progress of Alzheimer’s disease.
• In 2004, researchers at the University of South Carolina College of Medicine discovered a class of drugs that blocks activation of inflammatory cells, which may be used to treat Alzheimer’s disease, multiple sclerosis, stroke and spinal cord injury.

• A 2004 NIH-supported study by researchers at the University of Miami School of Medicine and Mount Sinai Medical Center suggests that people with early Alzheimer’s disease are more capable of learning than previously thought. They can still be taught to recall important information and better perform daily tasks.

• Researchers at the University of Minnesota Medical School in Minneapolis, with NIH support, were able to reverse memory loss in mice with significant brain degeneration for the first time. This 2005 breakthrough suggests that perhaps, in the future, the same process could be used for Alzheimer’s patients.

• Short-term intensive counseling in conjunction with readily available support can significantly reduce the long-term risk of depression among husbands and wives caring for spouses with Alzheimer’s disease, according to research from the NYU School of Medicine.

On the Horizon

The research discoveries highlighted above are helping scientists focus on the key issues in the prevention, detection and treatment of Alzheimer’s disease. Additional NIH-supported research currently underway at the nation’s medical schools and teaching hospitals holds promise for future breakthroughs on this disease. For example:

• Misfolded proteins are implicated in several degenerative diseases, including Alzheimer’s disease. Scientists at Yale University School of Medicine are studying mechanisms that help proteins fold into their active, functional state.

• Researchers at the University of Pennsylvania School of Medicine are using NIH support to develop drugs that bind to and stabilize microtubules, protein structures found within cells. Their research suggests that microtubule-stabilizing drugs may help correct the problems caused by clumped tau proteins in the nerve cells of mice and, as a result, could be used to treat Alzheimer’s and other related diseases in humans.

• At Weill Medical College of Cornell University, scientists have encouraging evidence that antibodies derived from human plasma can capture the beta-amyloid protein in blood and may be able to improve patients’ thinking abilities. Beta-amyloid is a central component of the senile plaque in the brains of Alzheimer’s patients, and its toxicity against brain cells is believed to be a prime cause of the illness.

For more information about how medical schools and teaching hospitals are fulfilling the promise of medical research, go to: www.aamc.org/research/ftp