

# Memory Impairment

## Making a Difference Today

Memory is easy to take for granted. Until you lose it.

Alzheimer's disease, one of the most frightening memory-robbing disorders, hampers the lives of some 4 to 5 million older Americans. Individuals with Alzheimer's disease may have trouble recalling addresses, major events, or the name of the President. Making meals and managing finances can become difficult. Over time problems with memory and thinking get even worse. Alzheimer's disease costs the United States at least \$100 billion in medical care and lost productivity each year.

Many other people without a diagnosis of Alzheimer's disease suffer from mild cognitive impairment (MCI), where memory problems may result in their forgetting names and misplacing items. The memory loss in this condition is greater than the slight memory loss that many people experience during normal aging and may be a very early stage of Alzheimer's disease.

### Research Equals New Treatments

Fortunately research funded by the National Institutes of Health (NIH) has helped generate new treatments that can aid memory loss. Studies determined that the brain afflicted with Alzheimer's disease contains decreased levels of acetylcholine, which suggests that normally this chemical aids memory and thought. Based on this idea, researchers developed several medications now available, termed cholinesterase inhibitors, which attempt to maintain normal levels of acetylcholine and can aid memory, thinking, and functional abilities in some people with Alzheimer's disease. Improvements allow some patients to resume normal routines in life. For relatives it can feel like the person they knew is back.

These drugs may also help MCI. Early findings from a study suggest that one of the medications benefited memory and other thinking abilities in patients with the condition. NIH funding has also helped researchers develop another drug, memantine, which targets a different brain system. Recently approved for Alzheimer's disease, research indicates that the drug also can slow memory deterioration and functional loss in some patients.

What's more, new research suggests that a cholinesterase inhibitor taken together with memantine produces even greater benefits than the use of a cholinesterase inhibitor alone.

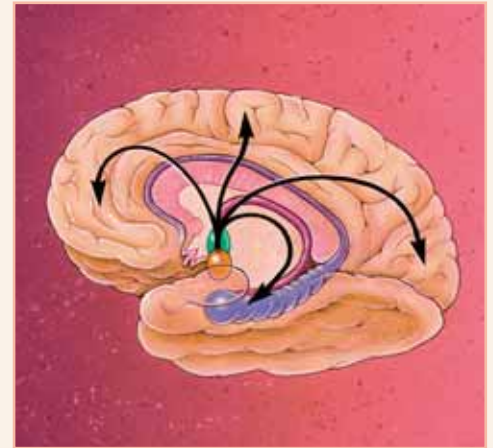
### Lower Costs

In addition to helping people directly affected by memory-impairing ailments, these treatments help cut financial costs to society and the government. Research determines that cholinesterase inhibitors slash caregiver time and health-care costs for those with Alzheimer's disease, resulting in many thousands in savings. A study also indicates that use of memantine in Alzheimer's disease saves society money by lowering institutionalization rates and reducing caregiver time.

### Expanding Benefits

Although great strides have been made, many still experience either little or no benefit from available medications. Research, however, indicates that the outlook could further improve. For example, studies in animals and humans have identified new ways to target brain mechanisms and enhance memory. With the help of NIH funding, scientists could capitalize on these discoveries and develop additional treatment options that would aid a wider range of people.

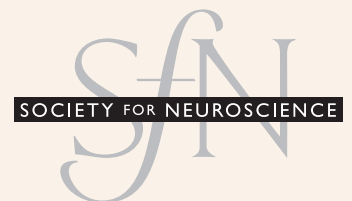
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The popular memory enhancers known as cholinesterase inhibitors maintain normal levels of acetylcholine. Researchers believe the brain normally releases this chemical in the pathways shown above in order to aid memory processes. The recently available medication, memantine, and other new drugs in development target completely different biological pathways, which, following years of basic science research, have also been implicated in memory. With continued study, scientists believe a variety of improved treatments will be able to aid more people with memory impairments for longer periods of time.

### Continued funding for research could lead to:

- New treatments that aid more people with memory-impairing disorders, like Alzheimer's disease, for longer periods by targeting different components of the brain's natural memory system.
- New treatments that target underlying abnormalities discovered in Alzheimer's disease, which could preserve memory circuits and brain function in these patients.
- New techniques to enhance memory in those patients experiencing some impairment but without a diagnosed medical condition.



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# Memory Impairment

## Making a Difference Tomorrow

The battle against memory loss has gained significant ground in recent years, but the advances are not enough for those affected by the condition. Many people find either little or no relief from available therapies and are eventually overcome by memory impairments. Did you know that:

- The devastating memory-impairing disorder Alzheimer's disease affects an estimated 4 to 5 million Americans alone.
- By the year 2040, Alzheimer's disease is predicted to affect approximately 14 million individuals in the United States.
- The national annual cost of caring for individuals with Alzheimer's disease in the United States is at least \$100 billion.
- Alzheimer's disease costs American businesses \$61 billion annually.
- In 2000, Medicare and Medicaid costs for Alzheimer's disease exceeded \$50 billion.

With continued NIH funding for research, scientists could develop new ways to treat memory-impairing conditions and cut society's burden.

### Research Equals Hope for the Future

Studies funded by the NIH and others have already identified promising new memory-enhancing techniques. For example, studies found that a brain cell component termed the AMPA receptor aids the brain's memory system. A compound that targets the component produced benefits in animals and is now being tested in patients with Alzheimer's disease and patients with mild cognitive impairment (MCI). This more minor memory-impairing condition may be a very early stage of Alzheimer's disease.

Researchers also determined that another brain cell component, the GABA B receptor, can suppress the memory process. Early findings indicate that a compound that blocks the receptor's activity improves the memory of patients with MCI. Researchers also may soon test it for Alzheimer's disease. Additional targets in the brain's memory system show promise as well.

Moreover, great progress has been made in understanding the brain abnormalities that underlie Alzheimer's disease, thanks to research involving genetics, biochemistry, and cell biology. Researchers are on the threshold of developing new treatments that target these flaws in an effort to preserve brain circuits and help maintain memory function in patients with Alzheimer's disease.

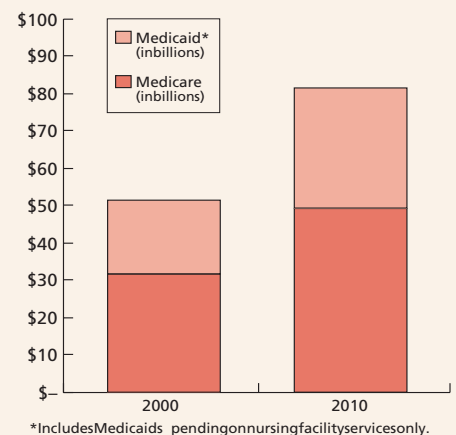
### Widespread Gains

In addition to aiding Alzheimer's disease and MCI, techniques that enhance memory function may benefit those without a diagnosed medical condition. For example, many people who are otherwise healthy can experience subtle changes in memory and other skills in old age. A study found evidence that an AMPA receptor compound could aid these individuals. Possibly memory enhancers also might assist the military during special operations. One preliminary study found that pilots who took one of the cholinesterase inhibitors used to boost memory in patients with Alzheimer's disease retained flight training better than those who did not take the drug.

The far-ranging payoffs from new medications, however, can only be attained with continued investments in research.

For more information please email [brss@sfn.org](mailto:brss@sfn.org).

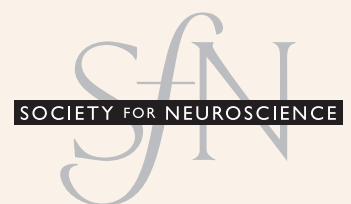
### Annual Spending on Alzheimer's Disease



Memory-impairing disorders like Alzheimer's disease cost billions. And these numbers will continue to grow without new treatments. By 2010, Medicare costs for beneficiaries with Alzheimer's disease are expected to increase more than 50 percent from about \$31 billion in 2000 to about \$49 billion. Medicaid expenditures on nursing facility care will increase 80 percent from about \$18 billion to \$33 billion, according to projections.

### Already research has led to:

- Development of medications that help relieve memory impairments in some individuals, such as cholinesterase inhibitors and memantine.
- Financial savings for society and the government.
- Insights into the biological basis of memory, which helped researchers identify new methods that show promise in treating memory impairment.



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