

Alzheimer's disease and other dementias – In pursuit of a cure

The Alzheimer Society is a leading funder of dementia research and training in Canada, investing \$32 million in the past 20 years. In 2010, the Society and its partners awarded just over \$2.9 million for biomedical and quality of life research. Until a cure is found, we will continue to support Canadian researchers, who rank among the world's top dementia scientists.

Alzheimer's disease and other dementias: what's the difference?

Alzheimer's disease is an irreversible disease that destroys brain cells. It's the most common form of dementia, representing 64 per cent of all cases in Canada today.

Other irreversible dementias include Vascular dementia, Lewy body dementia, Frontotemporal dementia (including Pick's disease), Creutzfeldt-Jakob disease, as well as Parkinson's and Huntington's diseases.

The symptoms of Alzheimer's disease and other dementias are not a normal part of aging. They include memory loss, difficulty performing familiar tasks, problems with language and changes in mood and behaviour. Symptoms grow worse over time.

Risk factors

Researchers believe dementia occurs when a combination of risk factors overwhelms our body's ability to repair damaged brain cells. Risk factors include age and certain genes, as well as modifiable factors such as environment, high blood pressure, high cholesterol, diabetes, chronic depression and head trauma.

Biomedical research

Biomarkers

A biomarker is a physical or chemical change in a body that indicates whether that person has a disease and how far along it is. It's a good tool for making an early diagnosis because biomarkers sometimes appear before symptoms do. Markers include changes in the brain and changes in the levels of certain proteins in the cerebrospinal fluid, a fluid that covers the brain and spinal cord.

Alzheimer vaccine

Researchers are working on a vaccine for Alzheimer's disease that would immunize against a protein called "beta amyloid," or "A-beta." A-beta is a normal brain protein, but people with Alzheimer's disease have too much of it, causing it to accumulate in the brain in deposits called "plaques." Even before plaques form, rising A-beta levels become toxic and damage brain cells.

Researchers are testing vaccines containing non-toxic versions of A-beta to stimulate the production of antibodies against the protein. This is called active immunization. Researchers are also testing passive immunizations - ready-made antibodies created in animals or in immune cells.

The first human vaccine trials began in 2000 following positive results in mouse models. But they were halted two years later because some participants developed dangerous complications such as inflammation of the brain. Researchers are now testing different vaccines designed to avoid brain inflammation. These tests involve more than 40 clinical trials and some 20,000 participants.

Studies are also underway to produce a vaccine targeting the chemical reactions that cause "tangles" inside brain cells. Tangles are made from a protein called tau, which, like A-beta, is a normal brain protein. In Alzheimer's disease, tau is chemically altered and builds up in thread-like tangles, impairing its role in keeping brain cells healthy.

Reducing A-beta levels in the brain

The most common experimental approach for reducing levels of A-beta in the brain is to inhibit an enzyme that snips the potentially threatening A-beta from a much larger "parent" protein called APP. Today, researchers are conducting dozens of clinical trials of drugs designed to achieve this. They expect results within three to five years.

Other drugs in clinical trial are designed to prevent the individual A-beta molecules from sticking together to form the toxic aggregates known as "oligomers."

Alzheimer's disease and diabetes

Diabetes is a risk factor for Alzheimer's disease. Certain diabetes drugs, such as Rosiglitazone, seem to help maintain brain function in people with Alzheimer's. New evidence suggests people with the disease may have a sort of diabetes of the brain. Researchers believe that some people's brain cells become resistant to insulin and that lower levels of insulin are produced in their brains.

When this happens, the brain can't use glucose properly. In a recent study, researchers gave insulin to people with Alzheimer's disease and found that memory and cognition



in some participants had improved. Researchers hope to design new therapies for people who don't have conventional diabetes, but may have "diabetes of the brain."

Emerging issues

Many researchers believe in a controversial theory called "amyloid cascade" hypothesis. The theory is that A-beta accumulates first, and that this in turn triggers tangles. This is important because it affects whether we should target plaques or tangles.

Researchers are also grappling with the fact that plaques and tangles have been found in the brains of people who didn't have dementia. Some of these individuals were very old and had died from other causes. Others were in their late 30s or 40s and had been diagnosed only with "Mild Cognitive Impairment (MCI)." Also puzzling is that when participants in the discontinued vaccine studies later died, they had fewer plaques in their brains, but they still had dementia.

Promoting brain repair

Once a successful treatment for dementia is found, we will still need to repair brain damage caused by the disease. Scientists believe substances called "growth factors" might allow brain cells to grow new connections with other brain cells.

One critically important growth factor is called Nerve Growth Factor (NGF). Early studies show its promise in preventing brain cells from dying and in improving cognition.

The Brain-Derived Neurotrophic Factor (BDNF) is another important growth factor. Animal studies suggest exercise, which reduces the risk of dementia and slows its progress in the early stages, leads to an increase in the levels of BDNF in the brain. Increased socialization, which has the same effect on the disease, may also lead to increased levels of BDNF.

Quality of Life research

Quality of Life research - aimed at the physical, psychological, emotional, social and spiritual needs of people living with dementia and their caregivers - has become one of the fastest-growing areas of dementia research. Quality of Life research funded by the Alzheimer Society focuses on how to enhance memory, language and daily living for people with dementia, how to lessen the impact of the disease on family caregivers, how to meet the needs of people with dementia living in the community, how to improve support of people with dementia in care facilities and how communities can support people with dementia.

Knowledge translation and exchange

There is sometimes a gap between what research shows is effective and the way we care for those with dementia. While many researchers and clinicians have learned important things about dementia care, they don't always communicate their knowledge.

That's why the Alzheimer Society works closely with the Canadian Dementia Knowledge Translation Network (CDKTN). This important partnership supports knowledge translation for doctoral students and postdoctoral fellows conducting dementia research.

For more information, or to donate to the Alzheimer Society Research Program, visit www.alzheimer.ca or call 1-800-616-8816.

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Fact sheet: Alzheimer's disease and other dementias

Alzheimer's disease and other dementias

Dementia is an umbrella term for a variety of brain disorders. It is not a normal part of aging.

Symptoms include loss of memory, judgment and reasoning, difficulty performing familiar tasks, problems with language and changes in mood and behaviour. These become worse over time.

Brain function is affected enough to interfere with a person's ability to function at work, in relationships or in everyday activities.

Alzheimer's disease is the most common form of dementia. Other dementias include Vascular dementia, Frontotemporal dementia (including Pick's disease), Creutzfeldt-Jakob Disease and Lewy body dementia.

No cure currently exists for these diseases but medication and lifestyle changes can slow symptoms.

Researchers are confident that within seven to 10 years they will have treatments that target the disease itself, not just the symptoms.

Dementia is most often diagnosed in people 65 and older, but it can begin to develop well before signs appear – as early as age 40.

Several conditions produce symptoms similar to dementia. These can include depression, thyroid disease, infections or drug interactions. Early diagnosis is essential to make sure that people with these conditions get the right treatment.

If the symptoms are caused by dementia, an early diagnosis gives people:

- Access to medication that may help manage symptoms
- Time to plan for the future support
- Knowledge about the disease process and information about supports available.

What the numbers say

More than half a million Canadians are living with dementia today.¹ Approximately 71,000 of them are under age 65.

Within a generation, the number of Canadians with dementia will more than double to 1.1 million.¹

This year alone, more than 103,000 Canadians will develop dementia. This is equivalent to one person every five minutes. By 2038, this will become one person every two minutes, or more than 257,000 people per year.

Economic impact

In 2010, the cost of dementia in Canada was about \$22 billion. This includes direct health costs, opportunity costs and costs of unpaid care. If nothing changes, this number will reach \$153 billion a year within a generation.

In the next 25 years, the cumulative cost of dementia (in 2010 dollars) is expected to exceed \$872 billion.¹



Impact on caregivers

One in five Canadians aged 45 and older provides some form of care to seniors living with long-term health problems.³

A quarter of all family caregivers are seniors themselves; a third of them (more than 200,000) are older than 75.³

For dementia alone, the number of family caregiving hours is expected to more than triple, from 259 million hours in 2010, to 756 million hours by 2038.¹

The physical and psychological toll on family caregivers is severe. Up to 75 per cent will develop psychological illnesses; up to 32 per cent suffer from depression.⁴

Global impact of dementia

As of 2010 more than 35.6 million people worldwide are living with dementia, or more than the total population of Canada.⁴

The global prevalence of dementia will double every 20 years to 65.7 million in 2030, and 115.4 million in 2050.

In 2010, the total health-care cost for people with dementia exceeds one per cent of the global gross domestic product (GDP), or US \$604 billion.

The time to act is now

In 2011 the first wave of the baby boomers turned 65.

The risk for dementia doubles every 5 years after age 65.

Without fundamental changes in research investment and service delivery, dementia has the potential to overwhelm Canadian families and our health-care system.

Canada needs a national dementia strategy, including improved education, care and service delivery and increased funding for research.

The Alzheimer Society calls on all levels of Canadian government to join the growing number of countries that have already implemented a national dementia strategy.

For more information, please visit www.alzheimer.ca.

Footnotes:

1. *Rising Tide: The Impact of Dementia on Canadian Society, 2010*, Alzheimer Society of Canada
2. *Baby Boomer Survey: Alzheimer's disease... it's more than you think, 2010*, Alzheimer Society of Canada
3. *Eldercare: What We Know Today*. Statistics Canada, October 2008
4. *World Alzheimer Report 2010, The Global Economic Impact of Dementia*, Alzheimer's Disease International (ADI), 2010

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About the Alzheimer Society

The Alzheimer Society is the leading nationwide health charity for people living with Alzheimer's disease and other dementias. Active in more than 150 communities across Canada, the Society:

- Offers information, support and education programs for people with dementia, their families and caregivers
- Funds research to find a cure and improve the care of people with dementia
- Promotes public education and awareness of Alzheimer's disease and other dementias to ensure people know where to turn for help
- Influences policy and decision-making to address the needs of people with dementia and their caregivers.

We depend on donations and volunteers, with the majority of funds coming from the public.

In pursuit of a cure

- Since 1989, the Alzheimer Society Research Program (ASRP) has contributed about \$32 million to Alzheimer research in Canada. In 2009/2010, the Society and its partners funded 30 new grants and training awards totalling \$2.9 million.
(Source: Accountability Report 2011)
- The Program supports both biomedical and Quality of Life research, with a new emphasis on funding Doctoral and Post-Doctoral trainees and Young Investigators to encourage work in this field.
- The Alzheimer Society, along with partners, has helped advance research and put Canadian scientists on the leading edge of international discovery. While research is critical to finding a cure, it is significantly underfunded in relation to the economic impact of dementia.

The Alzheimer Society is a leading source of support, information and education for people living with Alzheimer's disease and other dementias, their families and caregivers as well as for physicians and other health-care professionals.

- The Society offers information, education and peer support to people living with dementia, as well as to caregivers and family members. We provide extensive resource materials, workshops, seminars and hundreds of support groups. The Society is also a leader in community-care programs for health-care professionals.
- The Society's Safely Home® Registry helps police find people with dementia when they are missing. People can register for Safely Home® at www.safelyhome.ca. Free and downloadable training courses for health-care and search and rescue professionals are also available.
- First Link® connects newly diagnosed individuals and their families to information and support. First Link also provides guidance to health-care professionals on challenging ethical issues.
- The Alzheimer Society's website www.alzheimer.ca is a one-stop source of current information and practical resources, including discussion forums for people with Alzheimer's disease and other dementias, their families and caregivers.



The Alzheimer Society advocates for change within local, provincial and federal governments. We work to influence health and social programs and services that directly affect people living with dementia to make a positive difference in their lives.

- Dementia has the potential to overwhelm the Canadian health-care system if fundamental changes are not made in research funding and care delivery.
- In January 2010, the Alzheimer Society released *Rising Tide: the Impact of Dementia on Canadian Society*. This landmark study projects the increasing prevalence and economic impact of dementia in Canada. It also shows how intervention can help lessen the tide.
- The Alzheimer Society calls on the Government of Canada to develop a national dementia strategy in support of research, diagnosis, treatment and care delivery.

The Alzheimer Society is a partner in a larger worldwide movement dedicated to improving the quality of life for people with dementia and their families.

- The Society is one of four founding members of Alzheimer's Disease International (ADI), an international federation of more than 70 Alzheimer associations from around the world.
- Through ADI, the Society is working to make dementia a global health priority, to raise awareness and increase investments in research. The most recent example is the release of the 2011 World Alzheimer Report, which summarizes the global economic and social impact of dementia and calls on world governments to tackle its growing scope and scale.

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