

# MIND OVER MATTER<sup>®</sup>

**CANNABIS:**  
BRAIN DRAIN OR  
BRAIN BOOST

**MILLENNIAL**  
**MENTAL HEALTH**  
CHALLENGES

ARE YOUR BAD HABITS  
**IMPACTING**  
YOUR BRAIN HEALTH?

**THE STIGMA**  
ASSOCIATED WITH AN  
ALZHEIMER'S DIAGNOSIS

YOU MAY BE THE **KEY TO**  
**FINDING A CURE** FOR  
ALZHEIMER'S DISEASE

**GENDER GAP**  
IN CAREGIVING

Insight into the latest research findings to combat brain aging diseases and what you need to stay **brain healthy longer.**



Women's Brain  
Health Initiative

# WITH GRATITUDE



THIS EDITION OF MIND OVER MATTER® WAS MADE POSSIBLE THANKS TO THE ONGOING GENEROUS SUPPORT AND ENCOURAGEMENT OF OUR PARTNER BRAIN CANADA FOUNDATION AND HEALTH CANADA.

The Brain Canada Foundation is delighted to participate in this special issue of Mind Over Matter®, which celebrates the fifth anniversary of the founding of the Women's Brain Health Initiative (WBHI). As a non-profit dedicated to advancing Canadian brain research to benefit all Canadians, we firmly believe in the WBHI's mission, and we are proud to have joined forces to accelerate the pace of progress.

Since 2012, WBHI has advocated for the importance of including sex and gender considerations in brain research, and has dramatically raised awareness about women's brain health, in Canada and globally. This is critical work because while women represent almost 70% of all Alzheimer's patients, are at a higher risk for stroke, and are more susceptible to several other brain conditions, research continues to be done predominantly on male subjects. In addition, women frequently play the role of caregiver to aging parents and children living with debilitating brain disorders.

WBHI is also emphasizing the importance of prevention. Knowing that you can take steps today to prevent cognitive decline in the future is an empowering message for people who want to take control of their health. WBHI saw a gap in the availability of reliable and accessible information about prevention measures, and has become a trusted resource. The success of this magazine is a testament to the need for good information based on the latest science—not on hype. And it is never too early to start prevention measures. With this thinking, as part of our partnership with WBHI, we are supporting a series of events called Engaging Millennial Minds. These events are aimed at encouraging

millennials to start looking after their brain health now, to improve the chances of preventing or delaying the onset of dementia or Alzheimer's. They also put a focus on looking after one's mental health and reducing stress, through diet, exercise, social interaction, for example. The research community has long understood the value of investing in prevention—rather than focusing only on treatments and cures. Brain Canada, with financial support from Health Canada and numerous partners and donors, is currently funding 25 projects in the area of Alzheimer's and dementia, totalling more than \$32 million; of this total, nearly \$16 million has been directed to prevention and early detection research.

Brain Canada's involvement with WBHI has inspired us to reflect on the role of a funder in providing leadership in areas that need greater attention. As we learned more about sex and gender imbalances in research, we began to put this lens on our work. We took concrete measures such as asking researchers applying for grants through the Canada Brain Research Fund (Brain Canada's partnership with Health Canada) to describe how they incorporate sex and gender considerations in their research in the early planning stages of their projects. We are striving for gender balance on our peer review panels and other meetings that we convene. We are also directly funding research on sex and gender differences in brain disorders, including a project focused on understanding how pain processing differs between sexes - work that has important implications for the nearly 1 in 5 Canadians living with chronic pain (Moulin, Clark et al. 2002;

Schopflocher, Jovey et al. 2010). Another project focuses on the effect of natural and surgical menopause on sleep, cognition, and inflammation, while a project that we have just selected for funding looks at how pregnancy and motherhood might contribute to increased Alzheimer's risk in women.

Since 2012, Brain Canada, in partnership with Health Canada, has allocated a total of \$186.1 million in research grant funding to 195 projects, involving more than 800 researchers at 112 institutions across Canada. This includes more than \$1.2 million invested with the WBHI to support knowledge dissemination activities, including those described above. You can visit us at [braincanada.ca](http://braincanada.ca) to learn more.

On behalf of everyone at Brain Canada, we congratulate WBHI on five remarkable years—for being a trailblazer and trusted advocate and champion for women's brain health, and ultimately the health of all Canadians. We look forward to growing our partnership in the years ahead as we chart new territory in the immense brain space. 🧠



*Naomi Azrieli*  
Naomi Azrieli  
Chair, Brain Canada Foundation



*Inez Jabalpurwala*  
Inez Jabalpurwala  
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# EDITOR'S LETTER

*"THE MOST COMMON WAY PEOPLE GIVE UP THEIR POWER IS BY THINKING THEY DON'T HAVE ANY."*

~ ALICE WALKER

My friend Bonnie may not have been as eloquent as Alice Walker, or use exactly the same words as her, but her advice to me in May of 2011 was equally profound and sparked a new and rewarding phase in my life. Bonnie told me that I had the ability to effect change, even if it was in an unfamiliar field.

We were talking about women's brains and aging. I had been volunteering as a fundraiser for a major brain health facility located in Toronto, Ontario and in the process was learning some troubling facts. My education came from caregivers, clinicians, and researchers alike who told me that women suffered more from brain disorders than men, that dementia affects our gender at a much higher rate, and that new patients with Alzheimer's disease will overwhelmingly be women. Yes, it is true that women tend to live longer lives than men, but this fact alone does not fully explain the discrepancy. Even more disconcerting, research dollars do not reflect this gender imbalance.

I knew that this was wrong and needed to change. Bonnie challenged me to do something about it, even though I am not a doctor, researcher, nor caregiver. From the seed of an idea, nourished by the encouragement of my family and friends, and given life by an ever-expanding band of donors, supporters, and volunteers, Women's Brain Health Initiative (WBHI) has grown into an important contributor to the international discussion on dementia and other brain-aging disorders.

Now that WBHI has reached the milestone of its fifth anniversary, I reflect on how far we have come and how much remains to be done. In this issue of Mind Over Matter®, we discuss the launch of a long-overdue national strategy on dementia in Canada and how the vital work of WBHI should and will inform the process.

We all need to learn more about how to keep our brains healthy - not just the Baby Boomers, but Millennials and the latest generation too. Research funding should be significantly increased overall, and should be directed at appropriate levels towards projects that explore the differences between men and women.

On our fifth anniversary, I must extend my deepest gratitude to our passionate and dedicated donors, Board of Directors, and volunteers. You are making a difference. We live in challenging, tumultuous, and troubling times. Now, more than ever, women's voices need to be heard. And they will be heard. Let us take inspiration from the words of Alice Walker and believe in our power.

WBHI always welcomes new contributors and supporters. I invite you to learn more about our mission through the pages of Mind Over Matter® or to visit our website at [womensbrainhealth.org](http://womensbrainhealth.org).



*Lynn Posluns*  
Lynn Posluns  
Founder and President,  
Women's Brain Health Initiative

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### AMY CHAPLICK // CONTRIBUTING EDITOR

Amy is a real estate lawyer at DelZotto, Zorzi LLP, one of Canada's top real estate boutique law firms. "Although many people think of dementia as a disease that affects older adults, the disease begins to impact the brain decades before symptoms are even noticed. WBHI is inspiring a new generation of women to take care of our brain health today, since research shows the earlier you protect your brain, the better the cognitive outcome."



### VITINA BLUMENTHAL // CREATIVE DIRECTOR

Vitina is creative to her core. An adventurous soul with a passion for travel, a healthy lifestyle (especially all things yoga), and sharing her love of mindfulness with others. She runs a wellness travel business, Wanderwell, which focuses on the intersection between well-being and creating unforgettable, transformational experiences. Through WBHI's Young Person's Cabinet, she encourages Millennials to start taking care of their mental and brain health.



### STEPHANIE HAHN // WRITER

Stephanie is a writer and yoga instructor living in Waterloo Region, Ontario. It was through the "gift" of back pain that Stephanie learned to slow down, listen to her body and rediscover the joys of moving. "Writing for this magazine allowed me to merge my love of writing with my love of spreading the word that stress relief is critical for health."



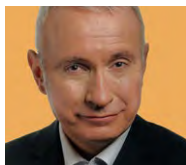
### MARGI OKSNER // WRITER

Margi is the principal of Margi Oksner & Associates, a full service consulting firm that offers strategic, creative, and business planning in the philanthropic sector. "My mother's Alzheimer's journey gave me an insight into this horrific disease and the motivation to help others. Working with WBHI is my way of learning more and sharing that knowledge with others. Thank you Lynn Posluns for the opportunity to do both."



### DILIA NARDUZZI // WRITER

Dilia is a writer and editor living in Hamilton, Ontario. She's been interested in healthy eating and a balanced lifestyle for almost twenty years. She studied gender dynamics while doing graduate work at McMaster University and was really honoured to write the article on how men and women metabolize drugs differently. "I want the medical profession and all women to know that women's bodies require specialized medical care."



### SEAN MALLEN // WRITER

Sean Mallen is a Toronto-based communications consultant, journalist, and writer. His book *Falling For London* is expected to be published by Dundurn Press in the fall of 2018. Having seen family members deal with dementia, he is a strong supporter of the mission of WBHI.



### SUSANNE GAGE // WRITER

Susanne is a marketing/communications agency and events professional, with a solid appreciation for smart thinking. A believer in life balance and healthy body and mind, Susanne is also a passionate advocate for giving back. "As a business woman, wife, mother, daughter and friend, I am inspired by the impact of WBHI and the collaborative opportunities to make a real difference."



### RENU AND ROOP DHILLON // ON THE COVER

Firm proponents of women's empowerment, Renu and Roop are thrilled to stand by the Women's Brain Health Initiative community! The mother-daughter duo are each other's best friends, biggest supporters, and most honest critics. Renu has instilled the importance of good health in her three daughters from a young age, always maintaining that good health is about having a healthy mind, body, and soul.

COVER PHOTO: JAYLYN TODD

# YOUR HEALTH IS MORE INTERDEPENDENT THAN INDEPENDENT

## The Importance of Staying Socially Connected

In developed countries, it has been widely documented that women live longer than men by an average of six to eight years, and that women centenarians largely outnumber men centenarians. However, in the mountainous village of Ogliastra (situated in central Sardinia, Italy) there are ten times as many 100-year-old men as there are in mainland Europe.

In fact, Ogliastra is one of the few places in the world where women do not outlive men, on average. Despite leading physically demanding lives as shepherds, farmers, and labourers, the residents of this hilltop village outlive their fellow citizens →

in Europe and North America by as many as two to three decades. Amazingly, many of these individuals remain active throughout their lives, working well into their 90s and living in their own homes.

Award-winning author and psychologist Susan Pinker visited the village of Ogliastra in the hopes of discovering the secret to its residents' astonishing longevity. She found that the villagers were constantly surrounded by extended family, friends, and neighbours, and that the interwoven alleys and tightly-spaced houses meant that the villagers' lives invariably intersected.

In her book, *The Village Effect: How Face-to-Face Contact Can Make Us Healthier, Happier, and Smarter*, Pinker suggests that

## FACE-TO-FACE CONTACT IS CRUCIAL FOR LEARNING, HAPPINESS, RESILIENCE, AND LONGEVITY.

Just as we require food, water, and sleep to survive, we all need genuine human contact. Although it is difficult to determine whether the longevity of the villagers is solely the result of their closely-knit relationships (as opposed to a combination of less stress, family caregiving, or genetics, for instance), Pinker indicates that human connections are a driving factor in health and longevity.

"Social activities have a profound effect on preserving your happiness and your memories," Pinker says. "We consider it intangible because it doesn't bring us any money, it doesn't improve our social status, but it has a concrete effect on our health - if you have a stroke, you're better protected by your relationships than by medication."

The research to date is consistent with Pinker's assertion. For instance, a 2008 study published in the *American Journal of Public Health*, conducted by Dr. Karen Ertel et al., examined the association between social interaction and memory loss in a large, representative sample of elderly U.S. residents.

## THE RESEARCHERS FOUND THAT INDIVIDUALS WHO WERE SOCIALLY ISOLATED HAD TWICE THE COGNITIVE DECLINE OF THOSE WHO HAD TIES WITH THEIR FAMILY, FRIENDS, AND COMMUNITY.

Likewise, a meta-analytic review led by Dr. Julianne Holt-Lunstad at Brigham Young University in Utah, published in the 2010 issue of *PLOS Medicine*, found that individuals with stronger social rela-

tionships had a 50% increased likelihood of survival than those with poor or insufficient social relationships. Data collected from over 300,000 individuals, followed for an average of seven and a half years, indicated that social relationships were the greatest predictor of reduced risk of mortality. The second predictor was maintaining strong relationships and social support (i.e. having people in your life who you can rely on). Being a non-smoker or quitting smoking was the third predictor, followed by being a moderate drinker or quitting drinking, then flu vaccination, cardiac rehabilitation, exercise, weight (i.e. lean vs. obese), drug treatment for hypertension and, lastly, air pollution.

Finally, in a study published in the May 2010 issue of *Neuroimage*, Dr. Elizabeth Redcay and her colleagues collected functional magnetic resonance imaging (fMRI) while participants engaged in either a live interaction with the experimenter or watched a recorded video of the same interaction. During the live interaction, as compared with the video replay of the experimenter, greater activation was seen in brain regions involved in social cognition, attention, and reward processing.

In light of the foregoing, it appears that one of the primary reasons why females, on average, live longer than their male counterparts is that the former are more likely to prioritize and nurture face-to-face relationships over their lifespans.

## FRESH EVIDENCE INDICATES THAT THESE IN-PERSON FRIENDSHIPS CREATE A BIOLOGICAL FORCE FIELD AGAINST DISEASE AND DECLINE.

The same is true for baboons: females who have close bonds with other females live longer and have greater reproductive success. A 2016 study published in *Royal Society Open Science*, conducted by Dorothy L. Cheney and Robert M. Seyfarth of the University of Pennsylvania and Joan B. Silk of Arizona State University, took a closer look at those "friendships" between female baboons to understand what types of bonds rendered the greatest benefit. Using social network analysis to probe a massive dataset of wild baboons' social interactions, they found that females reaped the greatest benefit from friendships with individuals who themselves had close, stable bonds with other females in the group (as opposed to those who are relatively isolated within a small clique).

Indeed, our health is more *interdependent* than *independent*. Face-to-face contact provides stunning benefits, yet almost one quarter of the population report feeling that they have no one to talk to. Social isolation is one of the greatest public health risks of our time. As Pinker details in the *Village Life*, we all need close social bonds and uninterrupted face-time with our families, friends, and communities in order to thrive - even to survive. 🌐

# COGNITIVE RESILIENCE

## Challenge Your Brain to Stave off Dementia

Not all individuals who have physical damage to their brains exhibit symptoms of impaired cognitive performance. Several studies have reported that up to 25% of older adults with unimpaired cognitive function prior to death were found, after death, to have damage in their brains at levels that met the criteria for Alzheimer's disease. Thus, it appears that there is not a direct relationship between degree of brain damage and level of cognitive impairment. To explain why this is the case, researchers have proposed the concept of "cognitive reserve."

The cognitive reserve theory suggests that certain cognitively stimulating experiences throughout our lives may build resilience, which counteracts the typical effects of amyloid beta and tau accumulation in the brain - hallmarks of Alzheimer's disease. In other words,

**AN INDIVIDUAL'S COGNITIVE RESERVE MAY PROVIDE A BUFFER AGAINST THE EFFECTS OF DEMENTIA-RELATED BRAIN DAMAGE, SUCH THAT A GREATER AMOUNT OF DAMAGE MUST BE PRESENT IN THE BRAIN BEFORE SYMPTOMS EMERGE.**

### WAYS TO BUILD COGNITIVE RESERVE

Several types of mentally stimulating activities that build cognitive reserve have been extensively studied, including education and occupational status, leisure activities, and formal cognitive training.

### THE IMPACT OF EDUCATION & EMPLOYMENT

A large-scale study, led by researchers at the University of Exeter and published in the March 2017 issue of *PLOS Medicine*, explored the theory that mentally challenging experiences in early- or mid-life result in higher cognitive reserve. The researchers examined data →

## THE POWER OF MENTALLY-STIMULATING LEISURE ACTIVITIES

Numerous studies have reported a relationship between the level of engagement in mentally stimulating leisure activities and the rate of cognitive decline, including the following:

➤ A 2010 review conducted by Stern et al. and published in the *International Journal of Evidence-Based Healthcare* analyzed data from 13 studies involving participants aged 60 years and older. The researchers concluded that actively participating in cognitive leisure activities during mid- or late-life may be beneficial in preventing the risk of Alzheimer's disease or other dementias in the elderly. However, the researchers noted that the evidence to date is not strong enough to infer a direct causal relationship.

➤ In a chapter published in the 2012 textbook, *Principles and Practice of Geriatric Medicine*, author Dr. Joe Verghese from the Albert Einstein College of Medicine in Bronx, New York reviewed several observational studies about mental stimulation and dementia. Dr. Verghese found that these studies pointed to a link between increasing levels of participation in mentally stimulating activities and reduced risk of cognitive decline and dementia.

➤ In 2013, the *American Academy of Neurology* published the findings of a study conducted by Wilson et al. that tested the hypothesis that cognitive activity across the life span is related to the rate of cognitive decline. At the commencement of the study, 294 older individuals rated their current and past frequency of participation in cognitively stimulating activities such as reading books, visiting the library, and writing letters. Participants then partook in annual testing of their cognitive abilities for an average of 5.8 years until their deaths (at an average age of 89), at which point their brains were examined for physical signs of dementia. The researchers found that **more frequent cognitive activity in childhood, middle age, and old age was associated with slower late-life cognitive decline.** Interestingly, some of the participants who regularly participated in mentally challenging activities did not exhibit cognitive symptoms of Alzheimer's disease, even though their brains had physical signs of the disease. This finding suggests that more frequent cognitive activity can offset the cognitive loss typically associated with dementia-related damage in the brain – consistent with the cognitive reserve theory.

from more than 2,300 mentally healthy individuals aged 65 years and older from the Cognitive Function and Ageing Study Wales (CFAS-Wales) cohort. After controlling for age, sex, and chronic conditions, it was found that cognitive and social activity, physical activity, healthy diet, and light to moderate alcohol consumption were positively associated with cognitive function. Cognitive reserve, indexed by education and occupational complexity, was an important mediator of this association. **The participants with higher levels of cognitive reserve were more likely to stay mentally healthy for longer than those with lower levels of cognitive reserve.**

### WHAT ABOUT COGNITIVE TRAINING?

Given that participation in mentally stimulating life experiences appears to have a positive impact on the brain, there is great interest in creating structured programs to formally “train” the brain in order to boost cognitive function and stave off dementia. However, research findings about the effectiveness of formal cognitive training are mixed, in part because of variation in what is considered cognitive training, and differences in how “success” is defined.

Some cognitive training interventions are conducted in labs or clinical settings, while others involve home-based, online training (such as the programs offered by Luminosity). While some researchers measure success by the improvement in participants' performance of the trained tasks over time, others suggest that participants should experience improvements in general cognition and daily functioning.

### COGNITIVE TRAINING FOR HEALTHY OLDER ADULTS

In March 2009, *The American Journal of Geriatric Psychiatry* published a report by Dr. Michael Valenzuela and Dr. Perminder Sachdev that reviewed the results of seven clinical trials, which examined the effect of cognitive exercise on cognitive performance in healthy elderly individuals. The authors concluded that cognitive exercise training has a strong and persistent protective impact on cognitive performance. Transfer of these effects to dementia-relevant domains, such as general cognition and daily functioning, has also been reported in some studies.

More recently, Dr. Michelle E. Kelly and her colleagues reviewed 31 studies involving healthy older adults and concluded that cognitive training can improve performance of the trained tasks, that the effects are transferable to untrained tasks and everyday functioning, and that the effects have lasting impact (for up to six months). The results of this study were published in the May 2014 issue of *Ageing Research Reviews*.

However, not all research has produced positive results, particularly when it comes to whether the benefits of training are transferable to other untrained tasks. For instance, in a study conducted by Owen et al., published in the June 2010 issue of *Nature*, the

### WHAT ARE SOME EXAMPLES OF MENTALLY STIMULATING LEISURE ACTIVITIES?

Any activity that challenges your brain, going beyond what is easy or comfortable, would be considered mentally stimulating. Examples include reading, writing, knitting, doing crossword or Sudoku puzzles, playing a musical instrument, playing chess or bridge, and visiting a museum. Research indicates that the more challenging the task, the higher the positive impact on the brain.

researchers examined the effectiveness of computerized brain-training programs. The six-week study involved more than 11,000 participants who trained several times a week on cognitive tasks. **Although improvements were observed in all of the cognitive tasks that were trained, no evidence was found for transfer effects to untrained tasks, even when those tasks were cognitively closely related.** Likewise, Dr. Joe Verghese reported in the *Principles and Practice of Geriatric Medicine* that while some studies have demonstrated that the benefits of training can be retained for several months, no study has “conclusively prove[n] that the improvement in any of the cognitive domains can be transferred to real-world situations.”

Additionally, a review of 52 studies involving computerized cognitive training (CCT) in cognitively healthy older adults found small to moderate effects for certain aspects of memory, as well as processing speed and visuospatial skills. However, no significant impact was noted for executive function or attention. The researchers concluded that efficacy varied across cognitive domains and was largely determined by design choices. In particular, they found that unsupervised, at-home training (when compared to group-based training) and training more than three times per week were ineffective. Further research is therefore required to enhance efficacy of the intervention. This study was conducted by Lampit et al. and published in the November 2014 issue of *PLOS Medicine*.

### COGNITIVE TRAINING FOR INDIVIDUALS WITH MILD COGNITIVE IMPAIRMENT OR DEMENTIA

Researchers have also investigated the potential for cognitive training interventions to assist individuals who already have mild cognitive impairment (MCI) or dementia.

In one study conducted by Gates et al., published in the September 2011 issue of *BMC Geriatrics*, the researchers analyzed ten cognitive training trials with a collective total of over 300 individuals with MCI. The researchers found that cognitive exercises can have a moderate to large effect on memory-related outcomes and may slow cognitive decline for individuals with MCI.

Research also suggests that cognitive training may continue to benefit individuals even after symptoms of dementia are present. A program of mental stimulation for nursing home residents with Alzheimer's disease not only had cognitive benefits for the participants, but also improved quality of life as well. Participants in the intervention group took part in a 45-minute training session twice each week for seven weeks while the control group received the usual care. At follow-up, the treatment group showed improvements in measures of cognition, as well as quality of life. They also got significantly higher scores on the Mini-Mental State Examination, the Alzheimer's Assessment Scale–Cognition, and the Quality of Life–Alzheimer's Disease Scale compared to the control group. This study was published in 2003 in the *British Journal of Psychiatry*.

### MENTAL STIMULATION CAN HAVE DIRECT PHYSICAL BENEFITS FOR YOUR BRAIN

Building cognitive reserve is one good reason for engaging in mentally stimulating activities throughout your life. But another way that challenging your brain may be beneficial is through direct physical impact, by reducing the accumulation of amyloid beta deposits.

A study reported in the 2012 issue of *Archives of Neurology* assessed the link between cognitively stimulating activities across the lifespan and amyloid beta deposits in the brain. The researchers asked 65 cognitively healthy adults (aged 60 and over) to rate how frequently they participated in mentally engaging activities such as going to the library, reading books or newspapers, and writing letters. The participants then completed comprehensive neuropsychological testing to assess memory and other cognitive functions, and underwent positron emission tomography (PET) scans using a tracer that can view amyloid beta.

The researchers then compared the participants' brain scans to those of individuals diagnosed with Alzheimer's disease, as well as healthy individuals in their 20s. The researchers found a significant association between higher levels of cognitive activity over a lifetime and lower levels of amyloid beta in the brain. However, the researchers did not find a strong connection between amyloid beta deposition and levels of current cognitive activity alone, suggesting that **a whole lifetime of engaging in mentally-stimulating activities has a greater effect than being cognitively active just in older age.** The researchers pointed out, though, that this study does not negate the benefits of partaking in these activities in later years.

### FLEX YOUR MENTAL MUSCLES

It is never too late (or too early) to challenge your brain. According to a study conducted by Karp et al., published in the 2006 issue of *Dementia and Geriatric Cognitive Disorders*, individuals who engage in leisure activities involving two or more components (e.g. mental, physical, social) enjoy the most beneficial impact on the brain. So choose a broad spectrum of activities and start flexing your mental muscles! 🧠



# STAYING TWO STEPS AHEAD OF MEMORY LOSS

The Many Benefits of Dancing for Your Brain Health

Dancing is often thought of as a recreational activity and, as such, is frequently overlooked for its positive physical, mental, and social health qualities. Indeed, it was not until relatively recently that scientists began to examine the neurological effects of dancing that arise, in part, from the complex mental coordination that dance requires.

**MOUNTING EVIDENCE NOW SUGGESTS THAT DANCING IS NOT ONLY BENEFICIAL FOR OUR BODIES, BUT ALSO FOR OUR BRAINS, AND MAY EVEN REDUCE THE OCCURRENCE OF ALZHEIMER'S DISEASE AND OTHER FORMS OF DEMENTIA.**

One of the first studies to report dancing's advantageous effects on the brain appeared in the 2003 issue of the *New England Journal of Medicine*. Researchers at the Albert Einstein College of Medicine in New York City sought to investigate how particular leisure activities impact the risk of dementia in the elderly over a long period. They examined the effects of 11 different types of physical activity, including cycling, golfing, swimming, and playing tennis, but found that only dancing lowered the participants' risk of dementia. Neurologists have posited that dancing stimulates the release of a crucial protein called the brain-derived neurotrophic factor (BDNF) that promotes the growth, maintenance, and plasticity of neurons necessary for learning and memory. →

Dancing's quantifiable effect on the brain has also been observed among ballet dancers. According to research published in the 2015 issue of *Cerebral Cortex*, ballet dancers develop differences in their brain structures that allow them to perform rapid and repeated pirouettes without feeling dizzy. Magnetic resonance imaging (MRI) scans revealed that years of dance training actually altered the brain of the ballet dancers. For instance, the cerebellum - the part of the brain linked with dizziness - was smaller among ballet dancers than the non-dancer participants.

More recently, research published in the March 2017 issue of *Frontiers in Aging Neuroscience* found that dancing might bolster a part of the brain that is partly responsible for memory known as the fornix. As one of the most important anatomical structures related to memory, changes in the fornix have been connected to progression from mild cognitive impairment to Alzheimer's disease, and even from cognitively normal individuals to Alzheimer's disease. The degree of alteration to the fornix appears to be correlated with the degree of memory impairment, indicating the potential for the use of the fornix as a marker of dementia risk. Importantly, Dr. Aga Burzynska, an Assistant Professor of Human Development and Family Studies at Colorado State University, and her colleagues have now established a link between the integrity of fornix and dancing.

The researchers examined participants between the ages of 60 and 79 who were randomly assigned into four groups: one that participated in aerobic walking, one that participated in aerobic walking and took daily nutritional supplements, one that attended stretching and balancing classes, and one that engaged in dance classes. The research team found that engaging in any moderate to vigorous physical activity, coupled with less time engaged in sedentary activities, was better for the brain health of the participants. Interestingly enough, though, the dancing group was the only group of participants where the integrity of the fornix actually increased. This result may be because "dance is more of an immersive experience," explains Dr. Burzynska. Dancing incorporates physical activity, social interaction, and learning. What's more, "dance is more enjoyable than just walking in a gym."

Various studies have also discovered a connection between dancing and mood enhancement. Researchers from Poland found that recreational ballroom dancers (compared to competitive ballroom dancers) enjoyed a boost in mood after dancing, suggesting that

WHEN AN INDIVIDUAL ENGAGES  
IN DANCING FOR PLEASURE,  
THE BENEFITS TO HIS OR HER  
MOOD ARE GREATER.

### POPULAR STYLES OF DANCE

Ready to give dance classes a try? The following is a primer on some of the most popular styles of dance:

1. **Salsa:** A seductive style of dance that is typically performed to salsa music, which is a form of Latin American dance music that incorporates elements of jazz and rock.
2. **Country Dancing:** A traditional type of social English dance in which couples face each other in long lines.
3. **Zumba:** An aerobic fitness program featuring movements inspired by various styles of Latin American dance and performed primarily to Latin American dance music. A small-scale study out of Minot State University found that Zumba improved some cognitive skills, including visual recognition and decision-making.
4. **Ballroom:** Formal social dancing in couples, popular as both a recreational type of dance and for competitive activity. The ballroom dance repertoire includes dances developed from old European folk dances such as the waltz and minuet, Latin American dances such as the tango, rumba, and cha-cha, and dances of 20th-century origin such as the foxtrot and quickstep.

Similarly, in a study published in the April 2014 issue of the *Journal of Health Psychology*, researchers found that elderly participants - both with and without Parkinson's disease - experienced an overall reduction in total mood disturbance and a specific reduction in anger after partaking in dance sessions over a ten-week period. Finally, research out of Columbia University suggests that participating in structured dance classes twice a week improves the symptoms of depression in older adults. According to the study's author, Ray Marks, "dance therapy appears to confer beneficial mood changes on the older population, and without the damaging side effects of medications."

With the foregoing benefits in mind, it is perhaps time to dust off your dancing shoes and take advantage of the brain-boosting effects of dancing. 🌟

# WHAT DREAMS ARE MADE OF

## Many Aspects of Sleep Impact Brain Health

A good night's sleep is one of life's greatest pleasures for many people, and for good reason - it leaves you feeling refreshed and energized in the morning. The way you feel when you wake up is not the only reason to love sleep, though; sleep is critically important for the healthy functioning of every part of your body, including your brain. Yet, as many as 50% to 60% of adults aged 60 years and older experience insufficient and/or disrupted sleep. A growing body of research indicates that sleep deprivation has deleterious effects on our brain health.➔

**Sleep apnea** is a serious sleep disorder characterized by pauses in breathing or periods of shallow breathing during sleep. Each pause can last for a few seconds to a few minutes, and may occur occasionally or up to several hundred times a night. This means that the brain (and the rest of the body) experiences significant drops in blood oxygenation.

## THE IMPACT OF POOR SLEEP

A study conducted by Lim et al., published in the July 2013 issue of *Sleep*, examined the effects of sleep fragmentation on a group of 737 older individuals without dementia over a period of up to six years.

### THE RESEARCHERS FOUND THAT HIGHER LEVELS OF SLEEP FRAGMENTATION WERE LINKED WITH HIGHER RATES OF COGNITIVE DECLINE AND AN INCREASED RISK OF DEVELOPING ALZHEIMER'S DISEASE.

Sleep fragmentation also affects the size of the brain. Individuals experiencing the most fragmented sleep were found to have the smallest brain volume in their frontal lobes - the part of the brain that controls important cognitive skills, such as emotional expression, problem solving, memory, language, judgment, and sexual behaviour.

Other studies specifically looking at respiratory disturbance during sleep (such as sleep apnea) have found that the presence of sleep-disordered breathing is linked to an earlier age of onset for cognitive decline, and that sleep-disordered breathing can lead to dementia. Each time that an individual with sleep apnea stops breathing, he or she experiences intermittent hypoxia (i.e. significant decreases in blood oxygenation). This oxygen deficiency has substantial adverse effects on cognition since neurons in the brain have a high demand for oxygen. Hypoxia has also been found to increase production of amyloid beta (A $\beta$ ) in the brain, which is one of the major pathological hallmarks of Alzheimer's disease.

Sleep-disordered breathing not only affects healthy brains, but also appears to accelerate cognitive decline in existing dementia patients. A study conducted by Aoki et al. and published in the *Journal of Sleep Research* in 2014 examined how the cognitive function of over 100 individuals already diagnosed with dementia was impacted by respiratory disturbance during sleep. The researchers found a strong association between the severity of sleep-disordered breathing and the severity of dementia. Interestingly enough, the results indicated that participants younger than 80 years old were more susceptible to cognitive dysfunction associated with sleep-disordered breathing than those over 80 years of age.

## LEARNING MORE ABOUT POOR SLEEP AND COGNITION

This past summer, Western University's Brain and Mind Institute in London, Ontario launched what it envisions will become the world's largest sleep-and-cognition study that will examine the effects of sleep and sleep deprivation on the brain. "The ability to function on just a few hours of sleep is a socially-acceptable point of pride for many people, symbolic of their ability to push through fatigue to get lots accomplished," observed the lead researcher for the study, neuroscientist Dr. Adrian Owen. "Yet those people fail to realize that sleep is essential for health and productivity."

The study already has thousands of participants from around the world, and Dr. Owen and his colleagues are hopeful that more than 100,000 individuals will sign up to be a part of the research. Broadly, the study aims to determine what constitutes adequate sleep for most individuals and what are the short- and long-term effects of insufficient sleep on brain health.

Study participants track their sleep over a three-day period and play a series of online games that test the brain's cognitive ability and concentration. If they are interested, participants can review their scores and see how their performance compares to other participants. Researchers then analyze the collective data and share the results within approximately six months.

"Some early participants have completed the brain-game tests and been monitored with functional MRI scans when well rested and after a sleepless night. Since that type of extensive testing is impossible to do with large numbers of people, we designed the current online study to draw out equivalent information on an exponentially larger scale," explained Dr. Owen.

### "THE INTERNET ALLOWS US THIS UNPRECEDENTED OPPORTUNITY TO INVOLVE THE PUBLIC IN SCIENTIFIC RESEARCH."

If you are interested in participating in this study, visit <http://worldslargestsleepstudy.com> and click on "Enroll Now" to register.

## THE EFFECTS OF TOO MUCH SLEEP

Just as our brain health is negatively impacted by insufficient or disrupted sleep, research suggests that getting too much sleep can be problematic as well. In one study of more than 2,700 individuals in their 60s and 70s, the researchers found that **those who slept nine hours or more each night had a more rapid decline in their cognitive function than those who slept between six and eight hours.** The participants were divided into three categories: the so-called "normal" sleepers (who slept six to eight hours each night), the "long" sleepers (who slept for more than nine hours each night), and the "short" sleepers (who slept five hours or

less each night). While scores of cognitive function declined in all three groups over the three-year study, the long sleepers experienced nearly double the amount of cognitive decline as the normal sleepers. This decline is often observed in mild cognitive impairment, a risk factor for dementia. These results were published in the *Journal of Psychiatric Research* in December 2013.

A more recent study conducted by Westwood et al., published in the February 2017 issue of *Neurology*, found that prolonged sleep may predict dementia risk. The researchers examined data from the Framingham Heart Study and discovered that individuals who consistently slept more than nine hours a night had double the risk of developing dementia in ten years compared to those who slept less. They also found that the "long sleepers" had smaller brain volumes. It is important to note, though, that these results only suggest a link between sleep duration and dementia risk, as opposed to cause and effect. Accordingly, more research is needed to determine whether dementia may be caused by excessive sleep, or whether excessive sleep is a symptom of dementia. Nevertheless, the researchers concluded that prolonged sleep duration may be an early indicator of neurodegeneration, and therefore could be a useful clinical tool for doctors to identify those individuals who are at a higher risk of developing dementia.

## THE EFFECT OF SLEEPING POSITION

In addition to the duration and quality of sleep, it appears that an individual's sleeping position may have a significant effect on his or her neurological health. An international team of scientists, led by researchers at Stony Brook University, has discovered that sleeping in the lateral (or side position), as compared to sleeping on one's back or stomach, may more effectively remove brain waste and help reduce the chances of developing Alzheimer's disease and other neurological diseases.

The brain has a complex system for clearing wastes and other harmful substances - including amyloid beta (A $\beta$ ) and tau proteins, both associated with Alzheimer's disease - known as the glymphatic pathway. This pathway is the most active during sleep or anesthesia. For this study, the researchers used magnetic resonance imaging (MRI) to observe the glymphatic pathway in anesthetized rats when placed in different sleeping positions. They found that waste removal, including the clearance of A $\beta$ , was most efficient in the lateral position. These findings, which were published in the August 2015 issue of the *Journal of Neuroscience*, have not been replicated in humans yet.

## WOMEN AND MEN DIFFER WHEN IT COMES TO SLEEP

Research now indicates that sex and gender differences cause men and women to sleep differently and may underlie the differential risk for sleep disorders. An article published in the *Journal of Women's Health* in 2014 noted that among "normal" sleepers in the general population, women and men differ in sleep latency

(women take longer to fall asleep than men), sleep duration (older women report sleeping 20 minutes less than men), and feelings of sleepiness (women over the age of 55 report more sleepiness than men). Additionally, among individuals with sleep disorders, women are 40% more likely to develop insomnia and twice as likely to have restless leg syndrome, whereas men are twice as likely to experience obstructive sleep apnea. The researchers noted that these differences may not only be driven by biological factors, but also by differences in the ways in which women and men report their symptoms.

Not surprisingly, then, the researchers suggested that the general treatment of sleep disorders should be different for men and women. As Dr. Monica P. Mallampalli and her colleagues observed, "understanding sex differences in sleep and sleep disorders will allow for better diagnosis, treatment, and eventually prevention of these disorders in women." 🌐

### TO BOOST DEEP SLEEP AND MEMORY, TRY "PINK NOISE"

Researchers at Northwestern University have found that gentle sound stimulation - such as the rush of a waterfall, waves lapping on the shore, or rustling leaves - synchronized to the rhythm of brain waves significantly enhanced deep sleep in older adults and improved their scores on a memory test. For this study, 13 participants between the ages of 60 and 84 received one night of acoustic stimulation (pulses of pink noise delivered during the rising portion of each slow brain wave oscillation) and one night of "sham stimulation" (no noise). Participants completed a memory test at night and again in the morning, for both the real and sham stimulations, that assessed their ability to recall words.

The researchers found that acoustic stimulation enhanced deep sleep for the participants - an important benefit since deep sleep tends to decrease substantially starting in middle age, yet is critical for memory consolidation.

While recall ability after the sham stimulation generally improved on the morning test by a few percent, the average improvement was three times greater after pink-noise stimulation. These results, which were published in the March 2017 issue of *Frontiers in Human Neuroscience*, led the researchers to believe that this method could be a viable intervention for longer-term use in the home.



# CARDIOVASCULAR DISEASE

An Equal-Opportunity Killer

## CARDIOVASCULAR DISEASE IS A SERIOUS PROBLEM FOR WOMEN

Cardiovascular disease - which includes heart disease and stroke - is often thought of as a problem primarily impacting men. However, according to an American Heart Association (AHA) Scientific Statement released in 2016, cardiovascular disease is actually an "equal-opportunity killer" of men and women. The researchers noted that cardiovascular disease is the leading cause of death among American women and that the annual cardiovascular disease mortality rate has remained greater for women than men since 1984. In Canada, cardiovascular disease is the second-most common cause of death for both women and men after cancer. Statistics Canada data for 2011 indicates that nearly equal numbers of women and men died from cardiovascular disease that year (30,437 and 30,473, respectively). Clearly, cardiovascular disease is not exclusively a man's disease.

## CARDIOVASCULAR DISEASE IS DIFFERENT FOR WOMEN

While both women and men suffer from cardiovascular disease in large numbers, their experiences with the disease vary significantly. For starters, **women tend to have worse outcomes than men.** The 2016 AHA Scientific Statement indicates that more women than men die within one year of their first heart attack (26% versus 19%), and these percentages worsen with time: within five years of having a first heart attack, 47% of women will die compared to 36% of men.

Women's **symptoms** are often different as well. As with men, women's most common heart attack symptom is chest pain or discomfort. Women's symptoms, however, tend to be subtler and more ambiguous. Women often experience less severe chest pain than men, which may be described as pressure or tightness, and they are more likely than men to exhibit symptoms unrelated to chest pain such as pain or discomfort in one or both arms, the neck, back, jaw, or stomach, as well as shortness of breath (with or without chest discomfort), unusual fatigue, and/or nausea, vomiting, or lightheadedness. These symptoms may develop slowly over hours or day, and even come and go.

## THESE DIFFERENCES IN SYMPTOMS CAN IMPACT THE TIMELY IDENTIFICATION OF HEART DISEASE IN WOMEN, FIRST BY THE WOMEN THEMSELVES AND LATER BY HEALTH PROFESSIONALS.

When symptoms are subtle, they are easier to overlook, misdiagnose, or ignore altogether. Women often incorrectly assume that their symptoms are the result of non-life-threatening conditions such as acid reflux, the flu, or normal aging. Consequently, women tend to wait much longer than men before seeking emer-

**ATTENTION WOMEN:** If you experience some or all of the symptoms described in this article, call for emergency help immediately. Do not downplay your symptoms and/or delay seeking assistance as you could be wasting critical time. Remember that the symptoms of heart disease are often subtler for women than men.

gency medical services, putting women at greater risk for adverse outcomes. One study found that the median time women waited before seeking care when experiencing heart attack symptoms was 53.7 hours, compared to just 15.6 hours for men. Other studies have suggested that the median delay times range from two to five hours - exceeding AHA's recommendation by hours, not minutes. Once women have arrived at the hospital, it can take them **longer to be diagnosed** than men, or their **condition may be missed entirely** and they are sent home.

Not only do men and women experience heart disease differently, research suggests that they can also develop it differently. Medical professionals may initially overlook some women's cardiovascular disease symptoms because they suffer from a condition that is difficult to detect known as **coronary microvascular dysfunction**. This condition causes plaque to accumulate evenly in the small arteries of the heart, narrowing the arteries such that blood flow is restricted, but not completely blocked. Coronary microvascular dysfunction reduces oxygen flow to the heart, and can create pain similar to that experienced by individuals with blocked arteries, but it is not detected by standard diagnostic procedures such as angiograms. As a result, this condition often goes undiagnosed and untreated. →

**Coronary microvascular dysfunction** is a condition in which blood flow to the heart is impeded by cholesterol that has been deposited evenly in tiny blood vessels, or by damage to the inner wall of these small arteries that causes spasms. This condition has also been referred to as coronary microvascular disease or syndrome, non-obstructive coronary disease, microvessel disease, small vessel disease, small artery disease, or Cardiac Syndrome X. It differs from coronary heart disease (also known as coronary artery disease), which involves plaque accumulation in major arteries that blocks blood flow. Coronary microvascular dysfunction is predominantly a women's heart disease - one that is often overlooked and under-diagnosed.

Coronary microvascular dysfunction occurs frequently in women, and is far more common in women than men. Pepine et al. reported in the October 2015 issue of the *Journal of the American College of Cardiology* that approximately 60% to 70% of women undergoing coronary angiography to further evaluate suspected heart disease were found to have coronary microvascular dysfunction. By comparison, approximately 30% of men had similar results from their angiograms. A Canadian study found the difference between women and men was even more pronounced, reporting that women with heart attack symptoms undergoing angiography were three times more likely to be found “angiographically normal” than men.

The effects of coronary microvascular dysfunction on women’s health are substantial. It is estimated that between two and three million women in the U.S. have coronary microvascular dysfunction, and there are approximately 90,000 new cases each year. There are currently no reliable estimates of the prevalence of coronary microvascular dysfunction among Canadian women, according to a 2012 academic review conducted by Arthur et al. published in the *Canadian Journal of Cardiology*. Nevertheless, the Canadian researchers estimate that the incidence rate (i.e. the number of new cases each year) is likely between 1,586 and 4,756 women in Ontario alone. If these estimates are extrapolated for the entire country, “the potential number of patients with this complex and costly problem (in both human and financial terms) is of significant importance to cardiac care.”

Dr. C. Noel Bairey Merz, a leading researcher on women’s heart health and Director of the Barbra Streisand Women’s Heart Center in Los Angeles, explained, “When a diagnosis of coronary microvascular dysfunction is missed and women do not receive treatment, they remain at risk for having a heart attack. Many of these women whose angiograms indicate they have no blockages will continue to experience symptoms, a declining quality of life, and repeated hospitalizations and tests.” She continued, “That is why it’s so important to continue studying women’s uniqueness when it comes to cardiovascular disease, and to develop better tools for diagnosing and treating heart disease in women.”



## STEPS WOMEN CAN TAKE TO PREVENT CARDIOVASCULAR DISEASE

Women and men are both affected by many of the same risk factors for developing cardiovascular disease, including hypertension, obesity, unhealthy diet, lack of physical activity, excessive alcohol consumption, stress, high blood pressure, and high cholesterol levels. However, some risk factors affect women more strongly than men such as tobacco abuse, type 2 diabetes, and psychosocial factors (for instance, depression and stress). The good news is that all of the aforementioned risk factors are considered “potentially modifiable”, meaning that individuals can make healthy lifestyle choices and/or seek medical treatment to potentially eliminate some or all of these risk factors or decrease their impact.

Research suggests that the majority of women need to take proactive steps to prevent cardiovascular disease. It is estimated that only approximately 20% of young and middle-aged women in the U.S. would currently be considered “low-risk” (because they have favourable levels of all five major risk factors - smoking, hypertension, diabetes, serum cholesterol, and body mass index). In other words, approximately 80% of these women have at least one or more of these risk factors.

## GOOD SLEEP HABITS MAY ALSO HELP WOMEN KEEP THEIR HEARTS HEALTHY.

In the previous article in this issue of *Mind Over Matter*®, we examine the importance of sleep and its effect on brain health. Sleep has the potential to also impact cardiovascular health, particularly for women. Researchers at Duke University Medical Center located in Durham, North Carolina found that poor sleep is associated with greater psychological distress, as well as higher levels of biomarkers associated with elevated risk of heart disease and type 2 diabetes. They also found that these links were significantly stronger in women than in men. “Poor sleep” was measured by the total amount of sleep, the degree of awakening throughout the night, and most importantly, how long it took to get to sleep. For women, poor sleep was associated with higher levels of C-reactive protein and interleukin-6, measures of inflammation that have been associated with increased risk of heart disease, and higher levels of insulin. Interestingly enough, it appears that it is not the overall poor sleep quality that is associated with greater risk of heart disease, but rather the length of time it takes a person to fall asleep. Women who took 30 minutes or longer to fall asleep had the worst risk profile. These results were reported in the August 2008 issue of *Brain, Behavior, and Immunity*.

# FIRST STEPS TO BETTER BRAIN HEALTH

## Walking and Your Brain: More Connected Than You Might Think

It is well established by medical research that walking is good for your physical health. From heart disease and diabetes, to asthma and arthritis, a moderate amount of walking on a regular basis has been proven to prevent disease or improve symptoms. Since we know that walking is good for the body, the question arises as to whether walking has similar benefits for our cognitive health while we are younger and as we age. According to recent research, the answer is a resounding yes.

THERE IS A GROWING BODY OF SCIENTIFIC EVIDENCE THAT SUGGESTS THAT WALKING AFFECTS THE BRAIN FOR THE BETTER. →

Researchers from New Mexico Highlands University (NMHU) have found that the foot's impact during walking sends pressure waves through the arteries that significantly modify and increase the supply of blood to the brain. Until relatively recently, the blood supply to the brain (cerebral blood flow or CBF) was considered an involuntary action that was unaffected by changes in blood pressure caused by exercise or exertion. However, "new data now strongly suggest that brain blood flow is very dynamic," said researcher Dr. Ernest R. Greene and his colleagues at NMHU. Improved blood flow to the brain is vital to brain function and can help the brain regulate and heal itself, as well as promote better overall wellbeing.

Walking has also been found to facilitate positive affect (emotional feelings), and can override the effects of other emotionally-relevant events, such as boredom and dread. According to a recent study conducted by psychologists Dr. Jeffrey Miller and Dr. Zlatan Krizan, the mere act of putting one foot in front of the other for a few minutes has a significant beneficial impact upon our mood, regardless of where or why we do it. Dr. Miller and Dr. Krizan's study, published in the August 2016 issue of the journal *Emotion*, is the first to demonstrate that walking is a powerful mood booster in and of itself. In other words, the mood-enhancing effect of walking occurs even without the many confounds typically associated with exercise research (such as social contact, fresh air, nature, the satisfaction of reaching fitness goals, and the expectation of the activity being beneficial).

## MOUNTING RESEARCH ALSO SUGGESTS THAT WALKING CAN HELP IMPROVE QUALITY OF LIFE FOR INDIVIDUALS WITH A HISTORY OF DEPRESSIVE SYMPTOMS.

Having found in previous research that exercise and walking can improve the physical and emotional health of women who are not suffering from depression, Dr. Kristiann Heesch from the Queensland University of Technology (QUT) decided to investigate whether this association applies to older adults with poor mental health. Dr. Heesch and her colleagues analyzed data collected from nearly 2000 women born between the years 1946 and 1951 who all reported having symptoms of mild to moderate depression. The researchers found that women who averaged 150 minutes of moderate exercise (golf, tennis, aerobics classes, swimming, or line-dancing) or 200 minutes of walking every week had more energy, socialized more, felt better emotionally, and were not as limited by their depression when the researchers followed up after three years. Not surprisingly, then, the women experienced greater psychological benefits the more they walked.

Walking has also been proven to promote creative ideation in real time and shortly thereafter. A study out of Stanford University, published in the *Journal of Experimental Psychology: Learning, Memory, and Cognition*, found that the creativity levels of participants were consistently and substantially enhanced for those walking compared to those sitting. Interestingly, walking indoors or outdoors similarly boosted creative inspiration. The act of walking itself - and not the environment - was the determinative factor.

As we age, brain function can diminish for a variety of reasons, but research published in *Frontiers in Aging Neuroscience* found that aerobic exercises such as walking "improved the aging brain's resting functional efficiency in higher-level cognitive networks," and the results were specific to the "two brain networks central to brain dysfunction in aging." It is important to note that consistency is key: the researchers observed the positive effects of walking only after a twelve-month period. Similarly, a study of nearly 20,000 women between the ages of 70 and 81, published in the *Journal of the American Medical Association*, found that

## "LONG-TERM REGULAR PHYSICAL ACTIVITY, INCLUDING WALKING, IS ASSOCIATED WITH SIGNIFICANTLY BETTER COGNITIVE FUNCTION AND LESS COGNITIVE DECLINE IN OLDER WOMEN."

Exciting new research out of the University of British Columbia's *Aging, Mobility, and Cognitive Neuroscience Laboratory*, published in the April 2017 issue of the *British Journal of Sports Medicine*, suggests that walking can even help individuals who are already experiencing cognitive decline. The study observed 38 individuals who were diagnosed with vascular cognitive impairment (VCI) - the second most common form of dementia after Alzheimer's disease. The term VCI refers to impaired brain function due to blood vessel damage in the brain. In some cases, the cognitive decline occurs after an individual suffers from several "convert" strokes (i.e. strokes that do not produce any obvious symptoms but nevertheless have an impact upon the brain and can be observed incidentally on brain scans).

When the participants were assigned to a treatment or a control group, the treatment group showed that walking at a moderate intensity for three hours per week over a six-month period improved cognitive function. In addition, both groups had functional magnetic resonance imaging (MRI) scans to indicate level of brain activity, with only the treatment group showing increased activity levels. In particular, the MRI scans indicated that the treatment group "became more efficient with their brain, such

that while they were performing better on cognitive tasks - their brains were working less hard. Specifically the brain scans showed that

## COMPARED WITH THE CONTROL GROUP, WALKERS DIDN'T HAVE TO RECRUIT AS MUCH OF THE BRAIN TO GIVE THE BETTER LEVEL OF PERFORMANCE,"

said the study's senior author Dr. Teresa Liu-Ambrose. These findings are particularly encouraging in light of the general understanding that the brain compensates for cognitive decline by using additional brain regions to achieve or maintain cognitive performance. When compensating no longer works, "that's when you start noticing the actual deficits in performance," explained Dr. Liu-Ambrose. While this small-scale study does not confirm that walking can prevent VCI, this form of exercise appears to be a promising strategy for improving blood vessel health in the brain and keeping further damage from occurring.

As Dr. Liu-Ambrose observed, "Brain health doesn't stop at the neck. The brain is highly dependant on how healthy your heart, lungs, and muscles are," and walking can be a safe and effective way to maintain your physical and cognitive health. Importantly, research indicates that it is never too late to reap the benefits of walking, even if you have been sedentary for the majority of your life. One recent study conducted by Dr. John R. Best and his colleagues (including Dr. Liu-Ambrose), alongside lead investigators of the Health, Aging, and Body Composition (a longitudinal cohort of over 3,000 men and women in the U.S. between the ages of 70 and 79), found that walking during late life can protect against negative changes in the micro- and macro-structure of the brain, especially within cortical gray matter. The researchers discovered that these effects were independent of baseline walking levels. Thus, even initially inactive older adults may benefit from increasing or maintaining physical activity over time. Accordingly, as long as you are able, it is never too late (or too early) to put on your walking shoes and get moving. 🚶



## WALKING SPEED MAY PREDICT DEMENTIA RISK: A SLOWING GAIT LINKED TO POOR COGNITIVE HEALTH

Research now suggests that a slowing gait (a person's manner of walking) may be linked to a decline in mental acuity. With very few diagnostic tools available to predict the onset of dementia or Alzheimer's disease, changes in a person's gait is increasingly becoming a key warning sign for the disease. This past summer, the journal *Neurology* published the results of a 14-year study conducted by scientists at the University of Pittsburgh Graduate School of Public Health. The researchers assessed 175 older adults (ages 70 to 79) who, at the beginning of the study, were all in good mental health when originally tested for their mental acuity. Multiple times over the course of the study, the participants were timed as they walked an 18-foot stretch of hallway at what they deemed a "normal" walking pace. At the conclusion of the study, the participants were tested again for their mental acuity and received brain scans.

As previous studies have demonstrated, slowing in the participants' gait was associated with cognitive impairment. However, this research further determined that participants with a slowing gait and cognitive decline also experienced shrinkage of their right hippocampus, an area of the brain important to both memory and spatial orientation.

## "THE HYPOTHESIS IS THAT THERE ARE CHANGES IN THE BRAIN THAT LEAD BOTH TO CHANGES IN OUR WALKING AND CHANGES IN OUR THINKING,"

said the study's lead author, Dr. Andrea Rosso. Changes in gait are usually observable sooner than cognitive decline through cognitive testing, explained Dr. Rosso, and therefore testing individuals for gait changes may lead to earlier diagnoses of brain dysfunction (although some individuals with healthy brains will nevertheless experience a slowing gait due to a variety of factors, such as muscle or joint weakness).

The hope is that earlier diagnosis will lead to better management of symptoms or perhaps, in time, prevent the disease altogether.

# "I'M SORRY, COULD YOU PLEASE REPEAT THAT?"

## The Impact of Hearing Loss on Cognitive Health



For many of us, hearing loss is considered a typical part of the aging process and no great cause for alarm. However, studies from Johns Hopkins University have discovered links between hearing loss, cognitive decline, and dementia.

"Hearing loss shouldn't be considered an inconsequential part of aging," said Dr. Frank Lin, assistant professor at Johns Hopkins and an otologist and epidemiologist who studies the effects of hearing loss on older adults. In one study involving nearly 2,000 men and women between the ages of 75 and 84, Dr. Lin and his colleagues found that over a six-year period,

**COGNITIVE ABILITIES (INCLUDING MEMORY AND CONCENTRATION) OF THOSE WITH HEARING LOSS DECLINED 30 TO 40% FASTER THAN IN INDIVIDUALS WITH "NORMAL" HEARING.**

A 2011 study of approximately 600 older adults found that those with hearing loss at the beginning of the study were more likely to develop dementia than adults without hearing loss. In fact, the more severe the hearing loss, the more likely the individuals were to develop dementia. Participants with mild, moderate, and severe hearing loss were, respectively, two, three, and five times more

likely to develop dementia than those without hearing impairment.

Another study conducted by Dr. Lin and his colleagues found accelerated rates of brain atrophy in individuals with impaired hearing compared with those who had normal hearing. Additionally, the researchers linked hearing loss to "deep episodes of stress, depression or bad mood," as well as a heightened risk of hospitalization and an increased risk of falls.

Dr. Richard Gurgel, assistant professor of Otolaryngology - Head and Neck Surgery at University of Utah Health Care, studied more than 4,400 men and women aged 65 and older and found that those with hearing loss at the commencement of the study developed dementia earlier and at a higher rate than those without hearing loss. Dr. Gurgel, Dr. Lin, and other researchers are now focused on determining whether hearing loss may cause dementia or is related to dementia. "Dementia has so many causes. I think hearing loss could be a very important component, but there are certainly a lot of factors that play into dementia," Dr. Gurgel said.

The first hypothesis that explains why hearing loss may be associated with the development of dementia is referred to as the "cognitive load theory". If the brain is constantly coping with degraded sounds, its resources are dedicated to processing those sounds to the detriment of other processes (such as memory and thinking).

The second theory involves brain atrophy. Hearing impairment may directly contribute to accelerated rates of atrophy in parts of the brain that process sound. Those parts of the brain do not work in isolation, according to Dr. Lin; rather, they also "play roles in memory and sensory integration and have been shown to be involved in the early stages of mild cognitive impairment and Alzheimer's disease."

The third explanation is social isolation. Individuals who have difficulty hearing often tend to withdraw from society because they find it challenging to communicate with others. Numerous studies have found that a loss of engagement and loneliness are both risk factors for cognitive decline.

Although estimates on the number of individuals suffering from hearing loss vary, the National Institute on Deafness and Other Communication Disorders estimates that

**NEARLY 25% OF THOSE AGED 65 THROUGH 74, AND AS MUCH AS 50% OF THOSE AGED 75 AND OLDER, HAVE DISABLING HEARING LOSS.**

Approximately 26 million individuals living in the U.S. between the ages of 20 and 69 have high-frequency hearing loss due to noise exposure. While millions of individuals could benefit from the use

*The Lancet Commission on dementia, published on July 20, 2017, identified nine potentially modifiable health and lifestyle factors from different phases of life that, if eliminated, could prevent dementia. One of these factors is hearing loss. While the recognition of hearing loss as a potential risk is still new, and the research is at an early stage, if hearing loss is eliminated, the Commission estimates a 9% reduction in new dementia cases. Intervention for hearing loss could, in fact, push back the onset of dementia for many people for years.*

of hearing aids, fewer than one in three adults aged 70 and older who suffer from hearing loss use them. Even fewer adults between the ages of 20 and 69 who could benefit from hearing aids use them (approximately 16%).

A new long-term study published in the October 2015 edition of the *Journal of the American Geriatric Society* showed that **wearing hearing aids reduces cognitive decline associated with hearing loss**. The study was conducted over a period of 25 years and followed 3,670 men and women, aged 65 and older. The study included three groups of participants: those who did not report hearing loss (considered the control group); those with hearing loss who did not use hearing aids; and those with hearing loss who did use hearing aids. The researchers compared the rate of cognitive decline among these groups and found no differences between the control group and those who used hearing aids, but did find that those with untreated hearing loss had lower scores on a test of cognitive function.

Dr. Gurgel and his colleagues are currently examining whether treating an individual's hearing loss will improve cognition. Likewise, Dr. Lin and his team are planning a study that they hope will indicate whether the treatment of hearing loss can reduce the risk of dementia. The five-year study will follow 800 older adults and measure cognitive decline. Some participants will receive state-of-the-art hearing treatment, while others will simply receive "wellness advice." As Dr. Lin explained, if "we look at risk factors for cognitive decline that are modifiable, and hearing loss is one of them, that could be tremendously exciting. [Hearing loss] is really common, and theoretically the treatments we have are no risk. That makes it very exciting as a public health target."

According to Rex Banks, the Director of Audiology at the Canadian Hearing Society, "[a]ll signs and research are pointing towards hearing aids being a treatment for dementia but we are just not there yet to say that this is definitively true." Importantly, though, research is ongoing in this area. 🌐

# A COMPLICATED RELATIONSHIP

## Cancer vs. Alzheimer's Disease



There is a curious, and for many people surprising, relationship between cancer and neurodegenerative diseases such as Alzheimer's disease. While the exact nature of the association between the two is still unknown, the findings thus far are fascinating and are pointing researchers in innovative directions as they seek treatments and cures for dementia and other brain-aging disorders.

### AN INVERSE LINK BETWEEN CANCER & ALZHEIMER'S DISEASE

Given that cancer and Alzheimer's disease both affect the elderly in great numbers, one may expect that there would be significant overlap between the two conditions (i.e. that many older individuals would be affected by both diseases). However, much research has discovered lower rates of cancer in dementia patients, particularly among those with Alzheimer's disease (compared with cognitively-intact individuals), as well as lower rates of Alzheimer's disease among cancer survivors (compared with individuals without cancer). Below are some examples of studies that have found an inverse association between cancer and Alzheimer's disease.

- A study of 1,278 participants conducted by Driver et al. as part of the Framingham Heart Study in the U.S. revealed that cancer survivors had a lower risk of Alzheimer's disease than those without cancer, and individuals with Alzheimer's disease were found to have a lower risk of cancer. The risk of Alzheimer's disease was lowest among survivors of smoking-related cancers. These results were published in the March 2012 issue of the *British Medical Journal*.
- Research in Northern Italy involving more than one million residents—conducted by Musicco et al. and published in *Neurology* in July 2013—found that the risk of cancer in patients with Alzheimer's disease was halved, and the risk of Alzheimer's disease in patients with cancer was 35% lower.
- A 2014 article by Ma et al., published in the *Journal of Alzheimer's Disease*, reviewed research conducted between 1966 and 2013 and found six studies to include in their meta-analysis (a statistical procedure for combining data from multiple research studies). They, too, found an inverse association between cancer and Alzheimer's disease. Their results showed that individuals with Alzheimer's disease have a 42% less chance of subsequent cancer, while those with a history of cancer had a 37% less chance of developing Alzheimer's disease.

Other researchers, however, have come to different conclusions. One study conducted by Frain et al., presented at the 2013 Alzheimer's Association International Conference, found there is **an inverse link between Alzheimer's disease and some kinds of cancers, but not others**. Using data on nearly 3.5 million individuals who were part of the U.S. National Veterans Health System Cohort, the researchers investigated the relationship between Alzheimer's disease and 19 types of cancer.

They discovered that most types of cancer, including pancreatic, lung, and liver, were associated with decreased risk of Alzheimer's disease (the degree of reduced risk varied from 10% to 51%). Exceptions to this pattern were found for cancers that are commonly screened for, such as prostate cancer and melanoma. These types of cancer were associated with increased risk of

Alzheimer's disease (14% for melanoma and 11% for prostate cancer). Other types of cancer were found to have no significant association with Alzheimer's disease, including colorectal, stomach, bladder, genital, thyroid, sarcoma, and brain. When the researchers analyzed all 19 cancers combined, the overall result was a 3% increase in the risk of Alzheimer's disease. This number was largely driven by prostate cancer, the most common cancer in the veteran cohort.

However, **perhaps there is no true relationship between cancer and Alzheimer's disease at all**. Freedman et al. reported in the 2016 issue of *Cancer Medicine* that their findings do not support a relationship between cancer and Alzheimer's disease. These researchers examined whether the cancer-Alzheimer's disease association found in previous epidemiologic studies may be the result of "ascertainment bias" (as opposed to biological mechanisms), which occurs when the results or conclusions of a trial are systematically distorted due to the way in which the data is collected.

The researchers hypothesized that an alternative explanation of the inverse association finding is that Alzheimer's disease is less likely to be diagnosed in individuals with cancer and vice versa. To explore this possibility, Freedman and his colleagues analyzed data from a large group of U.S. Medicare patients and used an innovative "negative control" group (one in which no response/effect is expected): individuals with injuries from automobile accidents.

Like many previous studies, the researchers discovered reduced risk of cancer among Alzheimer's patients (specifically, a 14% lower risk). However, that risk reduction was comparable to the cancer risk reduction they found after automobile accident injuries.

The researchers did not expect that there would be an association between cancer and automobile accident injuries since there is no known biological relationship between the two. Yet, they did find an association, which supports the idea that ascertainment bias is at least part of the reason why researchers are finding an inverse link between cancer and Alzheimer's disease. It appears that cancer is less likely to be diagnosed in patients with Alzheimer's disease or other serious medical conditions. In other words, it is possible that cancer is, in fact, present among these individuals but is simply not being diagnosed.

### THERE ARE MANY REASONS WHY CANCER MAY BE UNDER-DIAGNOSED AMONG ALZHEIMER'S PATIENTS,

including the tendency for individuals with severe cognitive impairment to under-report symptoms and the fact that such individuals are less likely to participate in common screening tests for cancer. Additionally, sometimes individuals with suspected cases of cancer are not referred for diagnostic testing by their doctors and therefore are not included in cancer statistics. For instance, a survey of elderly care physicians in the Netherlands explored —→

non-referral of suspected breast cancer cases and discovered that end-stage dementia was cited as a reason for non-referral by 57% of the participants. (This study, conducted by Hamaker et al., was published in the *Journal of the American Medical Directors Association* in 2012.)

When it comes to assessing the risk of cancer patients subsequently developing Alzheimer's disease, "selective mortality" can be a factor that further complicates matters. It is possible that cancer survivors appear to have a lower risk of Alzheimer's disease simply because these individuals are more likely to pass away before Alzheimer's disease develops.

#### POTENTIAL IMPLICATIONS FOR DEMENTIA TREATMENT

Clearly there is no consensus at this point about the link, if any, between cancer and Alzheimer's disease. Nevertheless, studying the potential association between cancer and dementia is intriguing for researchers, in part, because a deeper understanding of the relationship between the two may assist in the development of new treatments for dementia. Indeed, some researchers have been exploring the possibility of **repurposing cancer drugs to treat dementia**.

Several studies are **testing anti-cancer drugs on mice** and examining the effects on their brains and cognitive functioning. For example, epothonilone D (EpoD), a drug used in the treatment of cancer, showed promise as a potential treatment for Alzheimer's disease in a study conducted by Zhang et al. from the University of Pennsylvania. The study involved "PS19" mice that were genetically modified to experience Alzheimer's-like changes later in life (e.g. developing widespread tau tangles and experiencing age-associated cognitive impairment).

Aged PS19 mice that received low doses of EpoD for three months experienced positive physical changes in their brains, as well as improved cognitive performance, with no negative side effects. The researchers concluded that EpoD could be a candidate for clinical testing (i.e. trials to determine whether it is safe and effective for humans). These findings were shared in the March 2012 issue of *The Journal of Neuroscience*.

Another example is the anti-cancer drug, dibenzoylmethane, which was found to restore memory and reduce brain shrinkage in mice with a type of genetic dementia during a study conducted by Halliday et al. The drug also restored protein production in the brains of the mice, an indication that neurodegeneration was being halted. The researchers concluded in their paper—published in *Brain: A Journal of Neurology* in June 2017—that this compound could represent a potential new disease-modifying treatment for dementia.

It is necessary to keep in mind, though, that while animal experiments offer hints of possible treatments, they often fail to accurately predict what will happen in human trials.

#### PROMISING RESULTS IN ANIMAL STUDIES DO NOT NECESSARILY TRANSLATE INTO SUCCESSFUL TREATMENT OUTCOMES IN STUDIES OF HUMANS.

Importantly, some **human trials** are also underway that are examining the effectiveness of repurposed cancer drugs for treating dementia. For example, leuprolide acetate (Lupron Depot)—a drug used to treat advanced prostate cancer and severe endometriosis—was given to women with mild to moderate Alzheimer's disease as part of a 48-week study by Bowen et al., the results of which were reported in the January 2015 issue of the *Journal of Alzheimer's Disease*.

The researchers found that cognitive function was preserved in women treated with a high dose of Lupron Depot, provided that they were already using an acetylcholinesterase inhibitor (such as Aricept, which can improve mood in people with Alzheimer's disease but does little to slow memory loss). These women had almost no decline in scores on the Alzheimer's Disease Assessment Scale—Cognitive (ADAS-cog), which is used to test memory. The researchers indicated that this combination therapy (acetylcholinesterase inhibitors and Lupron Depot) appears promising and warrants testing in early and late stages of Alzheimer's disease.

#### POTENTIAL COGNITIVE CONSEQUENCES OF CANCER TREATMENT

Research from the early 2000s suggested that up to 75% of individuals treated for cancer experience cognitive impairment afterwards—a condition sometimes referred to as "chemo brain" or "chemo fog," even though chemotherapy itself may not be the cause (stress and depression may also affect cancer patients' performance on cognitive tests, for instance). This phenomenon of "chemo brain" led researchers to wonder whether cancer treatments may increase the risk of developing dementia.

An academic review, published in the 2013 edition of *Aging Health*, noted that the issue of whether cancer treatment is leading to dementia "has been studied and the results in published literature have been mixed." Despite the inconsistent results, the researchers suggested that there is increasing evidence that most types of treatment for cancer do have a negative impact on cognition.

Other research presented that same year at the Alzheimer's Association International Conference (conducted by Frain et al. from Boston, Massachusetts) found that among patients treated for cancer, chemotherapy treatment further reduced the risk of Alzheimer's disease.

#### MUCH MORE TO LEARN

Consistent with virtually all aspects of dementia, there is much left to learn—in this case, about the relationship between cancer and dementia. Given the vast numbers of individuals facing these two deadly diseases, the need for this research is imperative. 🌐

# MILLENNIAL MENTAL HEALTH CHALLENGES

## How Gen Ys can Improve Their Brain Health

Studies continue to demonstrate that depression is a risk factor for many other conditions, including heart disease and dementia. Millennials, in particular, are reporting higher rates of depression than any other generation. In fact, nearly 40% of millennials report that their stress is increasing, according to a recent article in *WebPsychology*.

With millennials now comprising the largest sector of the workforce, these statistics are creating new challenges in work culture and mental health treatment. As the article notes, "one in five young workers has experienced on-the-job depression, compared to only 16 percent of Gen X'ers and Baby Boomers." →

## SOME OF THE REASONS WHY MILLENNIALS HAVE HIGHER DEPRESSION RATES:

➤ Increased pressure and more competitive processes for graduate and post-graduate programs;

➤ Entering the workforce at a time of economic uncertainty;

➤ Stress of employment;

➤ High cost of living; and

➤ Social and environmental pressures.

## SOME OF THE IMPACTS OF MENTAL HEALTH ON MILLENNIAL JOBS AND JOB PERFORMANCE:

➤ Lack of motivation;

➤ Impaired concentration;

➤ Depression-related exhaustion (lack of sleep, loss of appetite);

➤ Higher rates of absenteeism;

➤ Feelings of guilt for taking time off from work for mental health; and

➤ Fear of being judged for having a mental health issue.

All of the above-noted factors are intensified by the pressure to counter the common perception that this demographic is self-entitled, narcissistic, less motivated, and even lazy compared to other generations.

Compared to men, women are twice as likely to develop depression. The reasons for this gender difference are not entirely clear, but are thought to be partly biological (women may have a stronger genetic predisposition to developing depression and are much more subjected to fluctuating hormone levels), partly psychological (women tend to be more involved in personal relationships than men and suffer more when they are disrupted), and partly sociocultural (women experience additional stress in their demanding roles as wives, mothers, and possibly caregivers).

While working to prove themselves in their homes, their careers, and amongst their peers, some women millennials may inadvertently find themselves functioning at a level that adversely impacts their health. In a 2016 article in *NewsMaxHealth*,

## “HELICOPTER PARENTING” PARTLY TO BLAME FOR MILLENNIAL MENTAL HEALTH PROBLEMS

According to a 2013 study published in the *Journal of Child and Family Studies*, “helicopter parenting” – the tendency to take an overprotective or excessive interest in the life of a child – may lead to negative outcomes in children, including higher levels of depression and anxiety. The study demonstrated that college students with overbearing parents were more likely to be depressed, use antidepressant medications, and feel less satisfied with their lives. Additionally, children of overinvolved parents felt more dependent, less competent, and less able to manage life and its stressors. The researchers thus noted that “parents should keep in mind how developmentally appropriate their involvement is and learn to adjust their parenting style when their children feel that they are hovering too closely.”

Allard E. Dembe, a professor of Public Health at the Ohio State University’s College of Public Health, noted that “career women have steep demands on their time, but expanding their work hours beyond the traditional 40 a week can have a devastating impact on their health.

A study from Ohio State University found that women who work 60 hours a week for the bulk of their careers triple their risk of heart disease, cancer, and diabetes. The risk begins to mount when women work more than 40 hours a week for 30 years, and escalates when they work more than 50 hours a week.” Dembe, the lead author of the study, continues,

“PEOPLE DON'T THINK THAT MUCH ABOUT HOW THEIR EARLY WORK EXPERIENCES AFFECT THEM DOWN THE ROAD ... WOMEN IN THEIR 20s, 30s, AND 40s ARE SETTING THEMSELVES UP FOR PROBLEMS LATER IN LIFE.”

Dr. Leonaura Rhodes, a Health and Happiness Coach and Corporate Wellbeing Consultant, reports that in 2008, serious mental illness was estimated to cost the U.S. economy \$193.2 billion in lost earnings per year. She also notes **by 2020, depression will be second only to heart disease in the causes of worldwide disability.**

Clearly, it is imperative that we take control of our cognitive destiny and explore our options for treating, supporting, and improving our mental health – and preferably when we are younger, rather than in our later years, said Dr. Johanna Jarcho in an interview with Women’s Brain Health Initiative (WBHI). Dr. Jarcho is a postdoctoral fellow at the National Institute of Mental Health who studies the differences in brain development of healthy individuals compared with those who experience mental health problems, with a focus on anxiety.

“The vast majority of mental health disorders do emerge during one’s adolescence or early 20s. If you’re going to have an anxiety disorder as an adult, there’s a 90% chance that you’ll have had it as an adolescent. Basically, you’re not going to develop an anxiety disorder as an adult. You’re going to develop it as a kid and then it’ll carry through to adulthood. Emerging research suggests that this is because adolescence is a time when the brain is changing to a great degree. We once thought that the brain didn’t change that much after earlier childhood, but what we’ve seen is that the brain continues to undergo really profound changes up until your early 20s. It’s still quite malleable, so being exposed to different influences in your social environment can really have a profound impact on the way that your brain continues to develop.”

Dr. Jarcho told WBHI that the most important thing that you can do to mitigate the effects that any kind of psychopathology may have is to

## SEEK TREATMENT EARLIER AND WHEN YOU ARE YOUNGER.

“It’s like how habits are formed,” she explained, “they get strengthened over time and once they’re established they become biological, in a way. It’s much more difficult to break them and they stick around for a long time. If you think there’s something that may be wrong, you should try to get help before things become a crisis, before you feel like it’s having profound effects on your life.”

Dr. Jarcho’s message is encouraging and suggests that mental health can be improved in the early stages before it becomes disabling. →



# SEVEN STEPS TO BETTER MENTAL HEALTH

Dr. Leonaura Rhodes highlights seven key steps to improving, optimizing, and stabilizing our mental health.

**1 BE HEALTHY:** Like any other organ in your body, a healthy lifestyle improves the health and function of the brain. Factors such as diet, exercise, sleep, hydration, and avoidance of poisons (like cigarettes and excessive alcohol) are essential to improving your mental health.

**2 BE CONNECTED:** Humans are social animals, and we thrive when we surround ourselves with positive people. Take notice of which relationships make you feel good and those that sap your energy. Spend more time with those positive people, limit time with toxic people or, if they are close to you, look for ways to improve the relationship. People love helping others, so if you are suffering, reach out to those positive people and ask for support. They will gain as much from helping you, as you will gain from their help - it is a win-win.

**3 BE INQUISITIVE:** Science has shown that the brain is constantly rewiring itself, and new learning keeps it healthy. Learn a new hobby, skill, sport, art, instrument, or language, or delve deeper into an area of interest. The "flow-state" that is achieved when we are highly focused on a meaningful task that we enjoy is medicine for our minds.

**4 BE GENEROUS:** When we give our time, energy, support, or money to others, it is good for our brain and mind. Whether you are giving to your children, your community, a cause, religious group or charity, it is all beneficial to you and to them.



**5 BE POSITIVE:** Neuroscience research demonstrates that negative thinking is bad for your brain and body. If you are a "glass half empty" person, you would benefit from learning to shift the direction of your thoughts. Negative thinking is a habit that can be overcome by introducing and practicing an alternative habit of positive thinking. While this may sound obvious, it can be challenging to do. An expert coach or therapist may be able to assist you.

**6 BE MINDFUL:** There is an increasing body of evidence of the benefits of mindfulness practice to both our physical and mental health. Mindfulness is the practice of becoming aware of the flow of your thoughts and energy, and then learning to exert some control over them. Practices range from diaphragmatic breathing, gratitude journaling, meditation, prayer, and yoga to simply taking a mindful walk in nature. Short periods of mindfulness give you a brief, yet significant, break from the stresses of the day.

**7 BE PLAYFUL:** It is difficult to be sad or anxious when you are having fun or laughing, as this gives you a boost of powerful endorphins, the so-called "happy" chemicals. Take time daily to laugh, have fun, be silly and playful. Watch your favourite movie, play with your children or your pet, dance around the kitchen to your favourite song, or take a zumba class with your best friend.

The quality of your mental health is essential to the quality of your life. Do not wait until depression, anxiety, or dementia strike. Take control of your brain with some positive action today. 🧠

# GENDER GAP IN CAREGIVING

## The Unique Impact of Caregiving on Women

Taking care of someone with Alzheimer's disease and other forms of dementia is not an easy task. Caregiving is a long-term endeavour that is mentally, emotionally, physically, and financially demanding, and is a role that is most frequently taken on by women. The National Alliance for Caregiving estimates that between 60% to 70% of informal care for Alzheimer's patients is provided by women.

Dementia caregivers usually assist with an extensive range of tasks that expands as the disease progresses, including helping with household chores (such as cooking, cleaning, and managing finances) to assisting with personal needs such as feeding, bathing, and using the toilet. A recent research report published by the National Alliance for Caregiving, in partnership with the Alzheimer's Association, estimates that dementia caregivers, on average, spend 28 hours per week providing care.

**FOR MANY CAREGIVERS, THIS IMMENSE UNDERTAKING IS IN ADDITION TO COMPETING DEMANDS FOR THEIR TIME SUCH AS WORKING FULL-TIME AND, FOR 26% OF DEMENTIA CAREGIVERS, CARING FOR CHILDREN OR GRANDCHILDREN.**

According to the World Alzheimer Report →





### TOTAL WORLDWIDE COSTS OF DEMENTIA

The total cost of dementia includes the value of **informal care** (i.e. unpaid care provided by a spouse, partner, family member, friend, or neighbour, calculated by using an opportunity cost approach, valuing hours of informal care by the average wage for each country), as well as **direct medical costs** (US\$159.2 billion worldwide in 2015) and **direct social sector costs** (i.e. care provided by community care professionals and in residential home settings), which amounted to US\$327.9 billion worldwide in 2015.

2015, *The Global Impact of Dementia: An analysis of prevalence, incidence, costs and trends*, the total cost of informal (unpaid) care worldwide in 2015 amounted to an astonishing US\$330.8 billion. More recently, a report published by the Alzheimer Society of Canada estimates that the cost of informal care in Canada alone is conservatively valued at \$1.2 billion. In 2011, family caregivers provided approximately 19.2 million hours of informal care for loved ones with dementia. The amount of informal care is expected to double in Canada by 2031.

In addition to the opportunity cost associated with informal care, there are many direct costs involved in caring for individuals with dementia, including ongoing medical treatment, safety-related expenses, prescription drugs, personal care supplies, adult daycare or in-home care services, and full-time residential care. Depending upon the country of residence and the type of insurance or work benefits that the individual with dementia receives, some of these costs will be covered, but many are typically out-of-pocket expenses paid by the family. Not surprisingly, then, the abovementioned research report published by the National Alliance for Caregiving and the Alzheimer's Association indicates that nearly one in five dementia caregivers (19%) experience "high financial strain due to caring for their loved one." Women are particularly vulnerable. A study conducted by Yang et al., published in the 2015 issue of *Women's Health Issues*, revealed that

### WOMEN FACE HIGHER RISKS OF FINANCIAL DRAIN FROM CARING FOR LOVED ONES WITH ALZHEIMER'S DISEASE THAN MEN.

Research suggests that when women act as caregivers, they

may spend as much as 50% more time providing care than their male counterparts. Women are estimated to provide informal Alzheimer's disease care worth 20 times the care provided by men across the entire Baby Boom generation. Moreover, women tend to assume the most physically and mentally challenging roles in caregiving such as bathing and feeding, whereas men often handle less stressful tasks such as reading and transportation. Providing such high-level care can significantly impact a woman's career choices and opportunities, and may result in lost wages due to reduced work hours, prolonged absence from the workforce, or early retirement. Women caregivers are notably less likely to receive a pension and, if they do, their pension is approximately half of what men receive.

### CAREGIVING BURDEN IS EXPECTED TO GROW

With people living longer and having fewer children, and as the Baby Boomers enter into retirement, the chances of becoming a caregiver to an elderly relative increase. Additionally, Canada is expected to experience a shortage of long-term care spaces and, according to a study commissioned by the Alzheimer Society in 2010 entitled *Rising Tide: The Impact of Dementia on Canadian Society*, this will result in a significant shift from institutional care towards home/community-based care. In 2008, 55% of Canadians (aged 65 and over) with dementia were living in their own homes, most with the support of some kind of community care. It is anticipated that by 2038, approximately 62% of Canadians (aged 65 and over) with dementia will be living in their own homes. This represents an increase of over 500,000 individuals who will require family and community support in their homes to cope with dementia. Importantly, the *Rising Tide* contributes to the goal of generating a solid, evidence-based foundation upon which policymakers can build a comprehensive national plan to prepare for and mitigate the burden of dementia on Canadian society. 🌐

### NUMBER OF MALE CAREGIVERS IS ON THE RISE

Although women comprise the majority of caregivers for those with Alzheimer's disease and other dementias, the number of men providing care is on the rise. Between 1996 and 2011, the percentage of men caring for someone with dementia is estimated to have more than doubled (from 19% to 40%). This shift, reported by the Alzheimer's Association in the U.S., has likely occurred in other countries as well since it has been attributed to trends that are applicable globally: the population is aging and dementia is significantly more common among women who are therefore in need of care.

# THE TORTOISE AND THE HARE

## A National Dementia Strategy for Canada

This past summer, with the stroke of the Governor General's pen, Canada became the 30th country to launch a comprehensive national strategy to address the devastating scale, impact, and cost of Alzheimer's disease and other forms of dementia. Bill C-233, formally entitled *An Act respecting a national strategy for Alzheimer's disease and other dementias*, received royal assent on June 22, 2017 and thereby became an Act of Parliament.

The Act was first introduced to Parliament as a Private Member's Bill, brought forth by the Honourable Rob Nicholson (MP Niagara Falls) and Rob Oliphant (MP Don Valley West), and calls for **ALL LEVELS OF GOVERNMENT TO WORK TOGETHER TO COORDINATE RESEARCH, PROMOTE PREVENTION, AND IMPROVE CARE**. Then Federal Health Minister, Jane Philpott, powerfully signalled her support for Bill C-233 in the fall of 2016 when, voice cracking with emotion, she described to reporters her father's battle with dementia and declared that much more needs to be done to help Canadians living with the degenerative condition.

"I get how, how much it changes families, how much it affects people's lives and how much we don't really have great systems in place, and [my parents] live in Southwestern Ontario in a place where there should be better access to care and there isn't. So we need to do better for Canadians living with dementia," said Minister Philpott.

The legislation calls upon the Minister of Health to convene a conference within 180 days of the Act's adoption to begin developing the strategy in collaboration with representatives from the provinces and territories, health care professionals, caregivers, and various stakeholders in the field of dementia.

As a first step, the Ministry brought together several key players in the industry to an all-day meeting in Toronto in order to gain insight into some of the primary issues related to dementia research. Women's Brain Health Initiative's founder and president, Lynn Posluns, was among those invited.

### UNDERFUNDING FOR RESEARCH WAS A CENTRAL THEME OF THE CONVERSATION.

Dementia is now the third leading cause of death in Canada and is rising, while the death rates for cancer, heart disease, and stroke and HIV/AIDS have been declining. These diseases have benefitted from greater research investment than dementia research has, to date, received.

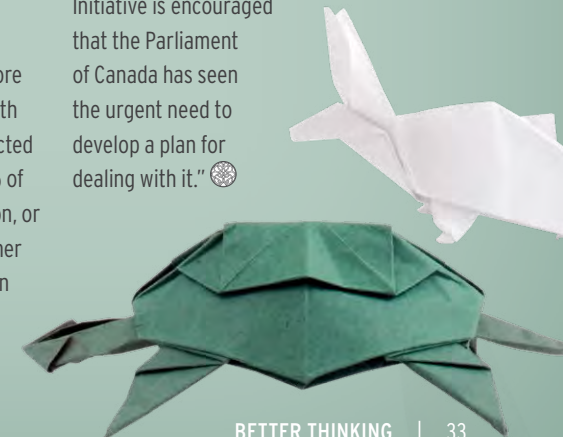
Canada currently invests approximately \$41.1 million annually in dementia research, which is significantly less than other developed countries. In comparison, cancer, heart disease and stroke, and HIV/AIDS received \$150 million, \$96.2 million, and \$49.2 million, respectively. The Standing Senate Committee on Social Affairs, Science and Technology therefore recommended that the federal government allocate 1% of Canada's direct dementia care costs (or approximately \$100 million annually) to the Canadian Institutes of Health Research's Dementia Research Strategy, as a component of the national dementia strategy. According to the Committee's recent report, this level of investment would likely permit researchers to find a disease-modifying treatment by 2025.

The need for more research and substantial investment is clear, say advocates. More than half a million Canadians are living with dementia today, and that number is expected to grow by 66% by 2023. As much as 72% of dementia sufferers are women. The reason, or reasons, for this remains unknown. Whether this is a result of women living longer than men, lifestyle differences, a consequence

of hormonal changes at menopause, a combination of these issues, or something else entirely has yet to be determined. Canada has already taken a leadership position on the international stage in ensuring that gender differences are now a core component of the ongoing discussions among researchers in this field. Importantly, delegates at the Toronto meeting all agreed that gender issues must be built into the strategy. "It was so encouraging to see because they go to the heart of what Women's Brain Health Initiative is all about," said Ms. Posluns. "It tells us that people are listening and noticing."

Those in attendance at the meeting further agreed that Canada should work to improve the dissemination of research results and, in this regard, cited Mind Over Matter® as an excellent tool for the broader public. Additionally, since the disease begins to impact the brain decades before symptoms are even noticed, it was recommended that younger audiences are also targeted - a mission that Women's Brain Health Initiative has already adopted through its Millennial Minds program.

While perhaps slow off the mark, the recent passing of Bill C-233 signifies that Canada has made dementia a priority, and commits the federal government to action with definitive timelines, reporting structures, and measurable outcomes. As Ms. Posluns observed, "Dementia is a looming public health challenge for Canada. Women's Brain Health Initiative is encouraged that the Parliament of Canada has seen the urgent need to develop a plan for dealing with it." 🌐





# YOU MAY BE THE KEY TO FINDING A CURE FOR ALZHEIMER'S DISEASE

## Volunteers Urgently Needed for Alzheimer's Disease Clinical Trials

The prevalence of dementia is expanding rapidly. According to Alzheimer's Disease International (ADI), someone in the world develops dementia every three seconds. In 2015, there were an estimated 46.8 million individuals worldwide living with dementia and this figure is believed to be close to 50 million people in 2017. The ADI reports that this number will almost double every 20 years, reaching 75 million in 2030 and 131.5 million in 2050.

There is currently no cure for dementia or treatment to stop its progression or reverse the symptoms. To date, five drugs have been approved for the treatment of

Alzheimer's disease - the most common type of dementia. Many of these medications are aimed at slowing the rate at which symptoms worsen. The benefit from these drugs is generally modest, and many patients and their families may not even notice any benefit at all. Indeed, drug development for Alzheimer's disease has proven to be very difficult.

### NO NEW DRUGS HAVE BEEN APPROVED FOR ALZHEIMER'S DISEASE SINCE 2003.

With so many individuals facing this devastating disease globally, and very limited treatment options available, the need to identify new drugs for Alzheimer's disease is urgent. Fortunately, a variety of clinical trials are underway around the world assessing ways to prevent, delay the onset, slow the progression, or cure the disease, and to impact symptoms more substantially than the currently-approved medications.

#### WHAT IS A CLINICAL TRIAL?

Clinical trials are a critical stage in the research process in which the effects of a health-related intervention (including drugs and non-drug treatments) are evaluated. During clinical trials, the medical strategy, treatment, or device is tested on humans to determine its safety and efficacy. According to ADI, **the entire drug development process takes an average of 13 years.**

Before clinical trials commence, preclinical testing is conducted in a laboratory using tissue cultures and animals to see whether a given treatment has the potential to treat the disease or illness. If an approach seems promising, clinical trials begin and proceed through three phases:

**PHASE 1 //** tests safety and tolerability of the intervention in both healthy volunteers and in volunteers with the condition under study (for safety purposes, clinical trials start with small groups of patients).

**PHASE 2 //** assesses safety, tolerability, and optimal dose, and begins to assess efficacy in the target population.

**PHASE 3 //** confirms safety, further examines side effects, and compares new treatments with other available treatment options (using larger groups of patients).

If a drug proves successful in phase 3, health regulatory authorities review the results and decide whether to approve the drug. Even after a drug is approved and is being used as a treatment, it often continues to be studied in phase 4 trials to examine whether any uncommon side effects surface as the drug is administered in greater numbers of people.

Sometimes, when a drug is being "repurposed" (meaning that its safety has already been established in association with a different disease), the drug development process can be shortened - in some instances skipping phase 1 trials and in rare instances skipping phase 2 trials.

#### CLINICAL TRIALS DEPEND ON VOLUNTEERS

Unlike the preclinical phases of research, clinical trials rely entirely on volunteer participation. As Dr. Knebl and Dr. Patki emphasize,

**"MEDICAL RESEARCH WOULD GRIND TO A HALT WITHOUT VOLUNTEER SUBJECTS."**

#### VAST NUMBERS OF VOLUNTEERS ARE REQUIRED

At the world's first G8 Summit on Dementia in December 2013, ministers from each of the participating countries agreed to set a goal to identify a cure or disease-modifying therapy for dementia by 2025. In order to reach this target, a great amount of research - proceeding at a quick pace - is necessary. In turn, vast numbers of volunteers are needed for clinical trials.

In a recent article entitled "Alzheimer's disease drug development pipeline: 2017," published in *Alzheimer's & Dementia*, Dr. Jeffrey Cummings and his colleagues reported that a total of 54,073 participants are required to take part in the 139 clinical trials that are already in the pipeline. These figures are based on the number of studies that are currently in various phases of testing, as registered on [clinicaltrials.gov](http://clinicaltrials.gov) (a U.S. government website that includes nearly all U.S. clinical trials, as well as most international studies).

While the [clinicaltrials.gov](http://clinicaltrials.gov) database is fairly comprehensive, it is not exhaustive, and this study only examined active trials of drugs and did not include non-drug or biomarker studies, which also require participants. Consequently, the actual number of trials underway and participants needed is even higher than these researchers stated. A 2016 article published on the BrightFocus Foundation website indicates that

**"MORE THAN 400 CLINICAL TRIALS ARE CURRENTLY LOOKING AT NEW TREATMENTS FOR ALZHEIMER'S DISEASE AND MANY OF THEM ARE ACTIVELY RECRUITING."**

Making matters even more difficult, **typically only between 10% and 50% of interested volunteers are eligible to participate in clinical trials.** Using the conservative rule of thumb of ten people screened for each enrolled participant, researchers will need to →

Participation in clinical trials and other studies involving individuals with Alzheimer's disease or other dementias are unique in the world of research inasmuch as most of these studies require volunteer pairs (i.e. someone with or at risk of Alzheimer's disease and a caregiver to assist as the "study partner"). In a sense, this requirement doubles the number of volunteers needed for dementia research.

recruit upward of 540,000 potential volunteers to find the number of participants noted by Dr. Jeffrey Cummings and his team.

### THE CHALLENGES OF FINDING ENOUGH VOLUNTEERS

Not surprisingly, then, recruiting volunteers is a massive undertaking. Volunteer recruitment is frequently described as the slowest and most expensive part of clinical trials. In fact, recruitment periods are often longer than the treatment component of the study. Pharmaceutical Research and Manufacturers of America (PhRMA), in its 2013 report on Alzheimer's drug development, noted that

RECRUITING AND RETAINING CLINICAL TRIAL PARTICIPANTS IS "CURRENTLY THE GREATEST OBSTACLE TO DEVELOPING NEW ALZHEIMER'S TREATMENTS."

A 2013 Research!America poll found that the majority of Americans (72%) indicate that they would likely participate in clinical trials if recommended by their doctors. However, many researchers struggle to find sufficient numbers of individuals to partake in their clinical trials. There are a variety of explanations to account for this gap between interest in participation and actual enrollment. According to the ADI, some of the major factors impeding sufficient enrollment in dementia trials include the following:

- lack of awareness of opportunities;
- low physician awareness;
- the study partner requirement;
- trial design;
- cultural and linguistic challenges; and
- coexisting conditions.

**Lack of awareness of opportunities** is one of the biggest challenges to dementia trial recruitment. Many individuals affected by dementia do not know that they can participate in clinical trials or where to find information on studies in their areas. Even those who do learn about research opportunities may not fully understand the clinical trial process.

Most individuals with concerns about their memory or cognitive function will first visit their primary care physicians, who are often thought of as a trusted source of health-related information.

### PRIMARY CARE PHYSICIANS ARE THEREFORE IN A STRONG POSITION TO INFORM PATIENTS ABOUT RESEARCH THEY MIGHT WANT TO PARTICIPATE IN.

However, like individuals living with dementia and their families, **low physician awareness** of clinical trials is a significant barrier to trial enrollment.

The ADI reports that a survey across five European countries found that only 19% of physicians, on average, were aware of a single clinical trial recruiting in their areas. Only 22% of respondents in the 2013 Research!America poll indicated that their doctors or other health care professionals had ever spoken to them about medical research. Similarly, a poll conducted by Imperial Clinical Research Services found that physicians were even less likely to bring up the topic of medical research with their patients (88% of respondents indicated that their primary care physician had never mentioned a study). Reasons for this include concerns about risks for their patients and long distance to a research site.

For many individuals living with dementia, the lack of a **study partner** is another hurdle to participation. A study partner is often mandatory in most dementia studies as they assist in the consent process, transport participants to and from trial sites, help the Alzheimer's patient comply with all research requirements (such as taking medication in the right dosage at the right time(s)), and provide feedback to the researchers on trial outcomes (such as assessing any improvements in cognitive performance, memory, and daily functioning).

Consequently, some individuals may be excluded from enrollment because they do not have access to a study partner or the study partner may not have the time or resources to provide the support needed for trial participation. Participating is often challenging, if not impossible, for those caregivers who work full-time and are not available to attend numerous lengthy appointments during the typical 9-to-5 clinic hours. Caregivers may also feel burnt-out from providing the usual everyday support and therefore perceive research participation as too significant of an undertaking.

Additionally, clinical trials are designed with specific inclusion

criteria for enrollment, which limits the number of volunteers who qualify for participation by **trial design**. Many Alzheimer's and dementia studies require volunteers to undergo diagnostic tests such as lumbar punctures or magnetic resonance imaging (MRI) scans, which may be viewed as intrusive or time consuming. **Cultural and linguistic challenges** can also hinder participation as individuals from diverse communities may be skeptical or suspicious of research and institutional settings, or the volunteers may not speak the same language as the clinicians.

Many clinical trials test interventions for a specific disease, thereby limiting the number of potential participants to those without **coexisting conditions**. Further, individuals taking medications for dementia symptoms or other health conditions may involuntarily exclude themselves from trial participation. There is also fear of the unknown. Potential participants may be unsure what to expect from a clinical trial, and may be worried that their health will suffer from participation.

Prevention trials must also overcome the unique challenge of some individuals not wanting to undergo testing to see whether they are at risk of developing Alzheimer's disease (which is a key part of determining eligibility to participate in this type of research). In spite of this, though, **more and more individuals are interested in understanding their dementia risk when they realize that they might be able to mitigate that risk through participating in a clinical trial.**

### WHO CAN PARTICIPATE IN CLINICAL TRIALS?

People with varying stages of Alzheimer's disease and those at risk of developing Alzheimer's disease are needed for clinical trials.

**If you think that you may be experiencing early symptoms of cognitive impairment, research is an option to consider.** Cognitively healthy individuals are also needed for Phase 1 trials.

### THE NEED FOR GREATER DIVERSITY AMONG VOLUNTEERS

For study findings to be applicable beyond the laboratory environment, participants must be representative of the general population of individuals with or at risk of developing Alzheimer's disease. Unfortunately, however, this is usually not the case. According to a 2014 article entitled "Facilitating Alzheimer's Disease Research Recruitment" by Dr. Joshua D. Grill and Dr. James E. Galvin, Alzheimer's disease trial participants "tend to be younger, more educated, and more often Caucasian than is typical for the general AD population."

### RESEARCHERS STRUGGLE TO FIND VOLUNTEERS FROM DIVERSE RACIAL AND ETHNIC BACKGROUNDS.

For instance, a 2007 review found that more than 90% of participants in the U.S. National Institutes of Health Alzheimer's studies and 97% of participants in industry-funded Alzheimer's studies →

### WHAT TO EXPECT IF YOU VOLUNTEER

Clinical trials typically proceed as follows:

1. There may be an initial phone screening to determine whether the interested volunteer satisfies certain criteria. Interested volunteers and their study partners may then visit the study site to meet with the study physician and staff members to learn more about the trial, including the purpose of the study, the study requirements, and the potential risks and benefits of participation. Volunteers are provided with ample time for discussion and questions.

2. Those who decide to proceed will be required to sign an informed consent form. Signing this document signifies that both the study participant and the study partner understand the risks associated with the study and, notwithstanding these risks, voluntarily agree to participate in the study. While participants and study partners are free to withdraw from the study at any time, the majority of individuals who enroll in an Alzheimer's trial are retained through trial completion. Across disease severities, these retention rates do not substantively vary (mild cognitive impairment Alzheimer's trials had an average retention rate of 71.6%, mild-to-moderate Alzheimer's trials 77.7%, and moderate-to-severe and severe Alzheimer's trials 75.4%).

3. Next, a comprehensive screening process is initiated to further determine whether the individual is eligible to participate. This may include reviewing medical history and medications, performing cognitive testing, and undergoing blood work, physical examinations, electrocardiogram (ECG), and/or MRI and positron emission tomography (PET) scans.

4. Participants who meet the eligibility criteria return to the research site for a baseline visit, at which point they are randomly assigned to a study group (i.e. active study drug or placebo). Many studies are conducted as a "double-blind" trial, which means that both the participants and the researchers do not know who has been assigned to each study group. This helps to avoid participant and investigator bias that would invalidate study results.

5. The participant and study partner will visit the study site for follow-up visits that again may involve cognitive testing, blood work, physical examinations, ECGs, MRIs and/or other scans of the brain. The procedures and number of follow-up visits vary by study.

## QUESTIONS TO ASK BEFORE ENROLLING IN CLINICAL RESEARCH

To help you make an informed decision about participating in a clinical trial, consider asking the researchers the following questions:

- ? What is the purpose of this study and why is it important?
- ? What kinds of tests and examinations are involved? How long do they take and how often will they be performed? Where will they take place?
- ? Will I need to be hospitalized during the study? If so, how often and for how long?
- ? What else are participants required to do?
- ? Do I need to have a study partner? If yes, what is he or she required to do and how much time will it take?
- ? How long will the study take?
- ? How will my participation in the study impact my current care and treatment? During the study, who will be responsible for my care?
- ? How will you keep my doctor informed about my participation in the study?
- ? What other treatment choices are available and how do they compare with the study treatment?
- ? Will the study compare the experimental treatment with “standard” care or will there be a placebo group?
- ? What are the possible side effects from participation?
- ? What happens if my memory or health decline during the study?
- ? Are there any costs associated with the study? If yes, will my expenses be reimbursed?
- ? How will my privacy be protected?
- ? Will the study results be shared with me?
- ? If I withdraw from the study, will this affect my normal care, and if so how?

were non-Latino Caucasians. Yet, in 2006, 19% of adults aged 65 or older in the U.S. were non-Caucasian. Even more concerning, many of the racial and ethnic groups that are underrepresented in clinical trials are actually at higher risk of developing dementia.

Likewise, study participants have historically been unrepresentative of the Alzheimer’s population when it comes to education level. While there has been an overrepresentation of highly-educated participants in Alzheimer’s clinical trials, epidemiological studies show that less-educated individuals (those with less than 12 years of schooling) are at higher risk for developing Alzheimer’s disease.

### REASONS PEOPLE VOLUNTEER

People volunteer to participate in Alzheimer’s research for multiple reasons, both personal and altruistic. Two of the most common reasons are (i) that the individual with or at risk of developing Alzheimer’s disease hopes to benefit personally from a new treatment and (ii) that the individual wants to help find treatments or a cure for future generations.

### LENGTH OF CLINICAL TRIALS

#### CLINICAL TRIALS TYPICALLY VARY IN LENGTH FROM THREE MONTHS TO FIVE YEARS.

The duration of the trial largely depends upon the time that it takes to recruit sufficient volunteers. Dr. Jeffrey Cummings and his colleagues reported that, on average, the duration of a trial (including recruitment and treatment period) was the shortest for phase 1 trials (at 755 days). Phase 2 trials took an average of 1,140 days to complete, while phase 3 trials averaged 1,677 days.

### HOW TO VOLUNTEER FOR A STUDY

Hopefully, going forward, primary care physicians will be more likely to provide their Alzheimer’s patients (or those at risk) with information about clinical trials. Doctor referrals have great potential to increase the number of volunteers.

## IF YOUR DOCTOR DOES NOT MENTION CLINICAL TRIAL OPPORTUNITIES TO YOU, BE PROACTIVE AND ASK ABOUT THEM.

Your inquiry may prompt your doctor to learn more and get back to you with information. Even better, ask your doctor to refer you to a clinical trial site where you will be able to receive information first hand.

There are also a variety of online tools that may be helpful in identifying a clinical trial of interest. **Clinicaltrials.gov** is one of the most comprehensive among this group of online resources.

Two websites that provide Canadian-specific information are:

- The Consortium of Canadian Centres for Clinical Cognitive Research, which provides online information about current cognitive-specific studies (<http://c5r.ca/current-studies/>); and
- The Government of Canada, which has an online form that you can complete to search for clinical trials (<https://health-prod.ucts.canada.ca/ctdb-bdec/index-eng.jsp>).

Some examples of online resources that are dementia-specific and mainly geared towards U.S. residents include:

- The U.S. Alzheimer’s Association tool, TrialMatch® ([http://www.alz.org/research/clinical\\_trials/find\\_clinical\\_trials\\_trial-match.asp](http://www.alz.org/research/clinical_trials/find_clinical_trials_trial-match.asp)), which is a free, easy-to-use service where you submit information about yourself and the tool generates customized lists of studies that you may qualify for. The database is updated regularly and contains both drug and non-drug studies being conducted at sites across the U.S. and online;
- The Brain Health Registry ([www.brainhealthregistry.org](http://www.brainhealthregistry.org)), led by researchers at University of California, San Francisco, streamlines the process for getting involved with clinical trials and helps researchers analyze the brain function of thousands of volunteers. After a simple sign-up process, volunteers provide a brief personal history and complete online brain tests (which feel like online games). A select number of volunteers will be asked if they would like to participate in clinical trials or perhaps undergo saliva or blood tests. Volunteers may choose to participate as little or as much as they like; and
- Alzheimer’s Prevention Registry (<https://www.endalznw.org/>), led by Banner Alzheimer’s Institute, focuses specifically on connecting scientists with those who are interested in participating in prevention studies. Finding individuals to volunteer for prevention studies can be especially challenging since these individuals must be cognitively normal but at risk of developing Alzheimer’s disease. Because many of these individuals do not experience any symptoms, they most likely do not know that they are at risk (and therefore are not likely to seek out research opportunities unless prompted to do so).

If you are in the Toronto area, consider volunteering for a study at Toronto Memory Program, Canada’s largest clinical trial site for testing drugs to prevent and treat Alzheimer’s disease. Dr. Sharon Cohen, Neurologist and Medical Director at Toronto Memory Program, notes that “most individuals with or at risk for Alzheimer’s disease are completely unaware of clinical trial opportu-

### WHAT IS A PLACEBO?

A placebo is a harmless substance or treatment with no active therapeutic effect, which is used as a control when testing new drugs.

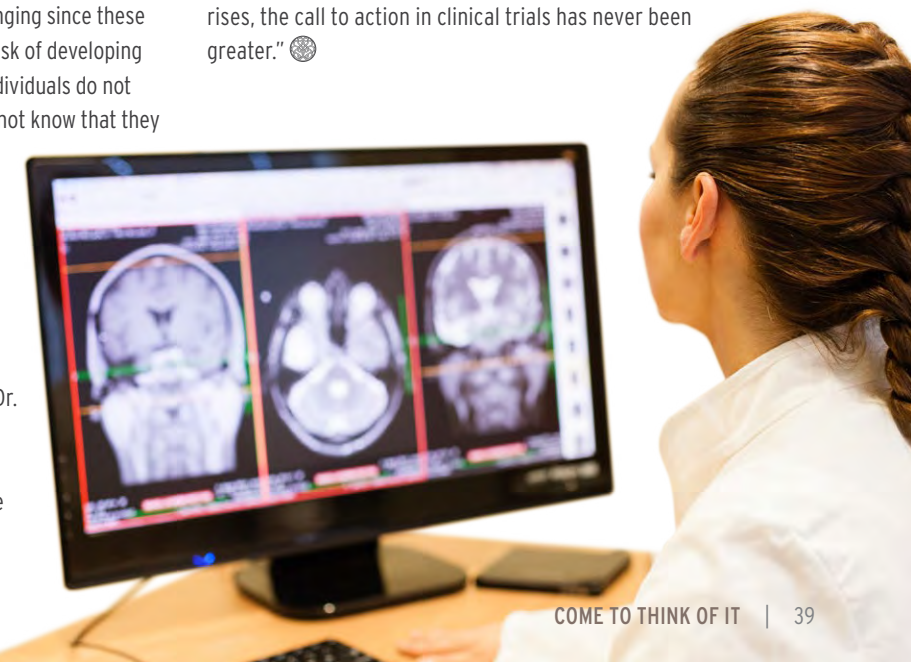
nities and are grateful to find a centre that offers the latest treatment approaches and options. At any given time, Toronto Memory Program is participating in 15 to 20 international trials and is actively recruiting participants for half of these trials.”

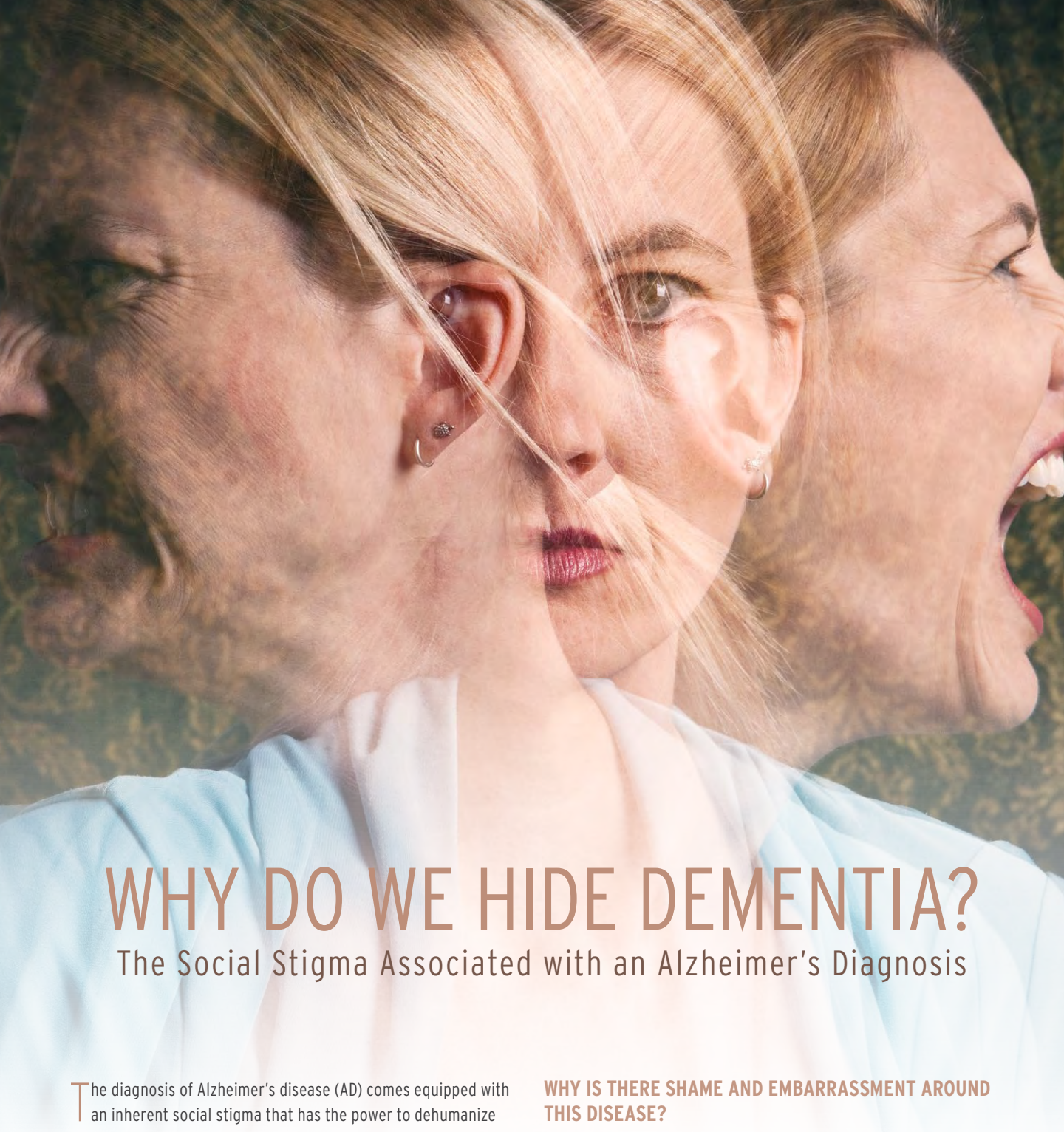
Toronto Memory Program has been internationally recognized for its excellence in clinical research and for providing research opportunities to thousands of Canadians. For more information on trials at Toronto Memory Program, visit <https://www.torontomemoryprogram.com/> or contact the Clinical Trial Educators at 416-386-9606. You may also wish to attend one of Dr. Cohen’s presentations about Alzheimer’s prevention and treatment. Details about upcoming dates and locations can be found in the “Events” section of the website.

As Dr. Cohen observes, “Clinical trials are the hope for the future and volunteers are key. Researchers cannot achieve the urgently needed breakthroughs in Alzheimer’s disease without the assistance of volunteers willing to pioneer with them.

## THE FASTER WE COMPLETE RECRUITMENT FOR CLINICAL TRIALS, THE SOONER WE WILL PUT AN END TO ALZHEIMER’S DISEASE.

It is not a matter of ‘if’ we will beat this disease but ‘when.’ As the number of individuals affected with Alzheimer’s disease rises, the call to action in clinical trials has never been greater.” 🌐





# WHY DO WE HIDE DEMENTIA?

## The Social Stigma Associated with an Alzheimer's Diagnosis

The diagnosis of Alzheimer's disease (AD) comes equipped with an inherent social stigma that has the power to dehumanize even the most vivacious person. Research has demonstrated that, when it comes to medical concerns, the fear of developing AD (and other forms of dementia) exceeds the fear of every other type of health condition.

Dementia currently represents one of the greatest challenges to our economic, health, and social care landscape. To date, there is no known cure for AD and attempts to impede its progress have had little effect. Once a person starts demonstrating signs of AD (such as memory loss and problems with learning, judgment, and communication), there are no treatments that can stop or reverse these symptoms.

### WHY IS THERE SHAME AND EMBARRASSMENT AROUND THIS DISEASE?

The impact that dementia has on a person is not limited to the practical effects of the condition.

**AN INDIVIDUAL RECENTLY DIAGNOSED WITH DEMENTIA IS LIKELY TO EXPERIENCE A COMPLEX RANGE OF EMOTIONS, WHICH MAY INCLUDE GRIEF, LOSS, ANGER, SHOCK, FEAR, DISBELIEF, AND EVEN RELIEF.**

Some people may struggle to deal with these emotions and they may oscillate between emotions as they adjust. They may feel afraid about the future, scared about moments of confusion and forget-

fulness, and upset about the impact that dementia has on those around them. Some individuals report feelings of humiliation, rejection, and distress, and the perception that they have let down those they love by developing dementia. There are many factors that contribute to this sense of shame:

#### Blame

*There are so many things that I should have done to reduce the risk of dementia.*

*If only I had been more proactive about my lifestyle, then this may not have happened.*

#### Loss of friends

*My friends don't know what to say or how to say it. I feel abandoned.*

#### Fear of being discredited

*I have nothing to contribute to a conversation.*

*My professional expertise is not sought out because people assume that I no longer have executive functions.*

#### Losing the right to make decisions

*I have lost my independence and must rely upon others.*

*Even my doctors talk to those around me, and not to me directly.*

#### Stereotyped

*It is as if people think that suddenly I am incapable of speaking and need to be treated like a child.*

As the International Longevity Centre - UK (ILC-UK) reports, we know that in many societies there are strong associations with aging and stigma, and for those with dementia, it seems that many are subject to a "double jeopardy." While this stigma, to a degree, is acknowledged and recognized in some communities, we still have much to understand about why dementia remains outside the realm of acceptable everyday conversation, even as the profile of dementia rises.

#### HOW DO WE COUNTER THESE ISSUES?

There is no shame or blame in Alzheimer's disease. Dementia is not your fault. It does not erase who you are or all of the things that you have accomplished over the years - your parenting, your teaching, your career, your youth, your faith, your identity. Dementia is not you and that is a truth that should not be hidden.

Dr. Pamela Rutledge, a prominent media psychologist and director of the Media Psychology Research Center in California, says that in terms of influencing public opinion and altering stigmas, allowing

individuals to discuss their own experiences is the most potent form of storytelling. As Dr. Rutledge explains, "[p]eople telling their own stories will be 100 times more powerful than telling their stories for them." She points out that a person's views about a topic are most likely to change if he or she is able to really connect with a narrative. Stories are authentic human experiences that transcend generations, engage us through emotions, and connect us to others. Through stories we share passions, sadness, hardships, and joys. Stories are the common ground that allows individuals to communicate, overcoming our defenses and our differences. They allow us to understand ourselves better and to find our commonality with others. If a narrative is self-relevant, it will appear more real and truthful.

#### REWRITING THE NARRATIVE

Aboriginal writer Thomas King reminds us that stories are both wondrous and dangerous things; wondrous because they have the power to connect individuals across differences, but also dangerous because of their potential to create barriers. Nigerian-born novelist Chimamanda Adichie warns about the danger of the "single story," which represents individuals in only one way and, when told repeatedly, becomes how individuals are identified. She reminds us that the single story "creates stereotypes, and the problem with stereotypes is not that they are untrue, but that they are incomplete. They make one story become the only story." In order to remove the social stigma surrounding AD and other forms of dementia, we must move past the single story and replace it with a multiplicity of stories that proliferate individuals' voices and diverse experiences.

If we, collectively, start listening to the narratives of individuals living with Alzheimer's disease, as well as the narratives of their families and caregivers, and begin sharing their stories (told by these individuals in their own words), communicating the facts, and encouraging open and direct discussions, then perhaps a diagnosis will no longer be whispered in the corner of a room or ignored altogether.

The International Longevity Centre - UK (ILC-UK), in collaboration with various partners and stakeholders, has published a compendium of essays entitled "New perspectives and approaches to understanding dementia and stigma," which examines the social stigma surrounding dementia. The report sheds light on the impact that the fear around dementia has on those living with the condition, their families, and their caregivers. On the next page, we have reproduced an excerpt of an essay that displays two individuals' unique experiences of living with Alzheimer's disease.

## SYLVIA AND BOB KAHN'S STORY: OVERCOMING THE STIGMA OF DEMENTIA

*Sylvia is a retired solicitor and Bob is a medical writer. They have five grown-up children and 14 grandchildren, one of whom is a Dementia Champion. Since 2012, they have made approximately 15 joint presentations about living with dementia.*

**B:** Sylvia, what has been your experience of stigma during these last seven years as you have moved through Mild Cognitive Impairment to vascular dementia to Alzheimer's disease in January 2011, confirmed by several brain scans?

**Sylvia:** I don't think that people can tell that I have Alzheimer's by looking at me or talking to me. I don't.

**B:** That's true for short conversations, but your style of walking and the expressions on your face are distinctive. I looked up the origin of the word "stigma" and found it comes from the Greek word *stizien* meaning "to mark with a tattoo," and in that sense you are not marked with dementia. However, the dementia is certainly affecting how you live.

**S:** Yes, I chose to give up my job as a solicitor; and I was required by the driving license authority to give up my absolutely clean driving license, which was fair enough, because you can't have those of us with dementia driving along the road not being able to control their vehicles properly.

**B:** Not working and not driving are consequences of dementia, but not, I think, part of the stigma of having dementia.

**S:** Well, I think in a way they are part of the stigma of dementia. In this culture, not working and not driving are often viewed as a shame or social disgrace—which is precisely the definition of stigma.

**B:** OK, fair enough. Perhaps the first kind of stigma that people with dementia encounter is the fear of others to relate to them in any way.

**S:** Yes, those of us with Alzheimer's are often deeply hurt when people are afraid to talk to us. Perhaps during the conversation we will repeat ourselves. So what? That's life. You can still talk to us; and you may be surprised by how incisive some of us can be.

**B:** Agreed. We can each discover the reasons behind the behaviour and emotions of people with dementia. Being with you, the question in my mind is often "When in time are you in your relationship to your past?"

**S:** Well, when you ask a question, I can no longer give a quick, coherent answer. I have to think about it much more. I do live in a general muddle, but it's spasmodic; and I'm never sure when a particular muddle is going to erupt.

**B:** Precisely, and that is the behaviour that leads those of us who do not yet have dementia to stigmatize those of you who do.

**S:** Why should you stigmatize us? We didn't ask for the dementia. It's not a crime. Earlier, I was sitting looking at the raindrops on the windowpane. They were large drops which distorted my view of the houses on the opposite side of the road. That is my experience of dementia - a blurring of reality, yet reality is still there, even if I am not fully aware of it.

**B:** Right, in my opinion you still have the ability to distinguish between reality and unreality. However, in the late afternoon and early evening as the sun goes down the distinction between the past and the present can become blurred. You do often experience "sundowning."

**S:** Sniff!

**B:** What do you mean, "sniff"?

**S:** Well, you have to be honest and become aware of time changes, especially if they are starting to affect you.

**B:** Yes, your usual honesty is helpful, because other people need to know that in the late afternoon and early evening people with a moderate level of Alzheimer's do experience considerable confusion about what is in the past and what is in the present.

**S:** It would be helpful if people knew more about "sundowning" and the experience of having Alzheimer's, but most people don't want to know. They turn away (or in your case, pick up a book) and continue with their lives, ignoring you.

**B:** Hum! Perhaps the most difficult stigma associated with dementia is the stigma that people with dementia experience within themselves—that they are (to use your phrase) "no good"—that they can no longer make a significant contribution to society.

**S:** Yes, I do want to help others and to make a contribution to society, if possible.

**B:** These conversations can help others. I am confident that both of us can overcome the stigma of dementia, both within ourselves and within other people.

**S:** The fact is that you give me a lot of strength because you are confident that I can manage to live well with dementia and not let it dominate our lives.

**B:** That is a beautiful response. I do try hard to communicate to you that we can still live lives of considerable purpose, overcoming both dementia and the stigma of dementia. 🌿

The relationship between cannabis and the brain is complex, and there remains much to learn about the interconnection between the two. The negative effects of cannabis have received much publicity for decades and one of the main messages communicated to the public has been that using cannabis can impair cognitive function. While this may be true in the context of recreational use of the plant,

**RESEARCH NOW SUGGESTS THAT CANNABIS MAY HAVE A POSITIVE IMPACT ON THE BRAIN - ACTING AS A NEUROPROTECTANT AND ANTI-INFLAMMATORY -**

and can perhaps even prevent, stop, or reverse brain disease.

### CANNABIS & COGNITIVE FUNCTION

According to Health Canada, the long-term effects of cannabis use on the brain can include harm to memory, concentration, IQ, and the ability to think and make decisions. Health Canada's website explains that these effects appear to worsen for individuals who start using cannabis earlier on in life and for those who partake frequently and for a lengthy duration. Health Canada further warns that the long-term effects of cannabis on the brain may not be fully reversible when cannabis use ceases.

However, new research suggests that cannabis may sometimes positively impact cognitive function. Preliminary results from the very first study of medical marijuana's effect on cognitive performance were published in the 2016 issue of *Frontiers in Pharmacology*. The researchers found that "medical marijuana may not impair, and in many cases, may actually improve executive functioning in adults." These results were based on 11 participants who, in general, performed better on certain cognitive tasks after receiving three months of medical marijuana treatment. Specifically, the participants experienced some improvement on measures of executive functioning, including the Stroop Color Word Test and the Trail Making Test, mostly

# LIVING THE HIGH LIFE

## Cannabis: Brain Drain or Brain Boost?



## TERMINOLOGY

**Cannabis** is a plant genus with three species of flowering plants—*Cannabis sativa*, *Cannabis indica*, and *Cannabis ruderalis*. It has been used for thousands of years throughout the world for its medicinal effects. However, its popularity as a therapeutic declined as newer drugs were discovered and the potential for abuse and addiction was realized, and eventually it became an illegal substance in many countries including Canada and the U.S. In recent years, though, cannabis has been resurging as a legal therapeutic in many places, and is also being legalized as a recreational drug in certain parts of the world, including in Canada (by July 2018, if the proposed Cannabis Act (Bill C-45) receives parliamentary approval and royal assent).

**Cannabinoids** are the bioactive components of the cannabis plant that affect the cannabinoid receptors in the body. There are at least 85 different cannabinoids that each have varying effects. The most well-known examples are THC (tetrahydrocannabinol) and CBD (cannabidiol). THC is the most abundantly available cannabinoid in the plant and is responsible for the psychoactive effects or the “high.” CBD is the second most prevalent cannabinoid in cannabis. It produces a physical effect without the “high;” in fact, it is thought to dampen down or offset the psychoactive effects of THC.

**Marijuana/Marihuana** is the term for female cannabis plants or their dried flowers, which contain a high percentage of cannabinoids. This term is commonly associated with cannabis that is used recreationally as an intoxicant.

**Dronabinol** and **Nabilone** are medical marijuana medications in pill form, comprised of synthetic cannabinoids.

reflected as increased speed in completing tasks without a loss of accuracy. It is possible that the improvement in cognitive function was related to alleviation of the primary physical or psychological symptoms that the medical marijuana was used to address (such as pain or anxiety).

Dr. Staci Gruber, Director of the Marijuana Investigations for Neuroscientific Discovery (MIND) program at McLean Hospital in Belmont, Massachusetts and the lead researcher involved in the

study, provided several possible reasons why these findings appear to contradict the widely publicized negative effects of cannabis. As Dr. Gruber explained, the age of the participants, the differences in chemical composition of recreational versus medical marijuana, and the ways in which the products are used may account for the study’s findings. The researchers further noted that improvements in cognitive performance may also be related to patients’ reduced use of conventional medications, such as opiates, that can result in “cognitive fog.” As Dr. Gruber cautioned, though, while these results are intriguing,

**“IT’S IMPORTANT TO REMEMBER THAT THESE INITIAL FINDINGS ARE PRELIMINARY AND BASED ON A SMALL SAMPLE SIZE.**

[The] study will continue for at least two years and [the researchers] will eventually have data on a much larger group of participants.”

More recently, a study conducted by German and Israeli researchers, published in the May 2017 issue of *Nature Medicine*, examined the impact of delta-9-tetrahydrocannabinol (THC) - a major bioactive compound in cannabis - on memory performance and cognitive functioning in mice. The researchers administered a low dose of THC to young, mature, and aged mice over a period of four weeks. Thereafter, they tested learning capacity and memory performance in the animals - including, for instance, orientation skills and the recognition of other mice. The young mice treated with THC performed slightly worse on behavioural tests of memory and learning than the control group (i.e. those mice that received a placebo). As expected, the elderly mice that only received a placebo displayed natural age-dependent learning and memory losses. In contrast, the cognitive functions of the elderly mice treated with THC closely resembled that of the young, untreated mice. In fact, the treatment completely reversed the loss of cognitive performance in the elderly mice.

When the researchers examined the brains of the treated elderly mice for an explanation, they noticed that neurons in the hippocampus (a brain area critical for learning and memory) had sprouted more synaptic spines, the points of contact for communications between neurons. Surprisingly, the molecular signature of the elderly mice no longer corresponded to that of the untreated, elderly mice but was instead very similar to that of the young, untreated animals. As the researchers observed, it appeared as though the THC treatment “turned back the molecular clock.” While many experts have praised this study, they have cautioned against extrapolating the findings to humans. Further research is required in order to determine whether small doses of THC will affect human brains in a similar way.

These positive findings about the impact of cannabis on cognitive function may be explained, at least in part, by dosage. Cannabinoids, and THC in particular, have what is called a “biphasic effect,” which means that low and high doses of the same substance can produce opposite effects in users.

**FINDING THE OPTIMAL DOSAGE, WITHOUT THE NEGATIVE SIDE EFFECTS, IS THE FIRST STEP TO EFFECTIVE TREATMENT.**

Since cannabis therapeutics is personalized medicine, the right treatment regimen depends upon the individual and the condition being treated.

### CANNABIS & DEMENTIA

There is also research that indicates the potential benefits of cannabinoids for older individuals who are at risk of developing dementia or who have already been diagnosed.

### TACKLING UNDERLYING HALLMARKS OF ALZHEIMER’S DISEASE

Our bodies have what is called an endocannabinoid system that consists of a group of cannabinoid receptors in the brain, and throughout the central nervous system and the peripheral nervous system. Currently, there are two known receptors, CB1 and CB2. The brain naturally produces cannabinoids, which affect both of those receptors. When an individual uses a cannabis product, that product targets those same receptors and imitates the effects of the cannabinoids that are produced naturally in the body.

The endocannabinoid system is associated with brain aging. For instance, scientists have found that the brains of mice age much faster when they do not have any functional CB1 receptors. Also, the quantity of cannabinoids that is produced naturally in the body is known to decrease with age and when this occurs, researchers have noticed rapid aging in the brain.

The endocannabinoid system is associated with more than just brain aging and has been linked specifically with neurodegenerative diseases and dementia, including Alzheimer’s disease. Accordingly, researchers are studying the effects of targeting the endocannabinoid system as a potential therapeutic approach to treat Alzheimer’s disease. According to a 2015 review article by Ahmed et al., published in *Clinical Pharmacology and Therapeutics*,

**SEVERAL STUDIES HAVE FOUND THAT CANNABINOIDS CAN REDUCE OXIDATIVE STRESS, NEUROINFLAMMATION, AND THE FORMATION OF AMYLOID PLAQUES AND NEUROFIBRILLARY TANGLES—ALL HALLMARKS OF ALZHEIMER’S DISEASE.**

An earlier review by Aso et al., published in the 2014 issue of *Frontiers in Pharmacology*, shared similar findings and specifically noted that beneficial effects were observed with the use of both natural and synthetic cannabinoids at non-psychoactive doses.

Findings from a study by Currais et al., published in June 2016 in *Aging and Mechanisms of Disease*, suggest that cannabinoids may be able to remove existing amyloid beta from brain cells. This research was conducted on nerve cells altered to produce high levels of amyloid beta in a laboratory setting at the Salk Institute in California. Researchers found that high levels of amyloid beta were linked with cellular inflammation and higher rates of neuron death. When the human neurons were exposed to THC, it reduced the levels of amyloid beta and eliminated the inflammatory response, thereby allowing the nerve cells to survive.

### HELPING WITH ALZHEIMER’S SYMPTOMS

Cannabinoids may also help alleviate some of the neuropsychiatric symptoms commonly experienced with Alzheimer’s disease, especially in the mid-to-later stages of the illness. A 2015 review article published in *CNS Drugs* cited six studies that found that the synthetic cannabinoids dronabinol and nabilone had a significant positive impact on agitation and aggression. The researchers cautioned, however, that definitive conclusions could not be reached based on those studies alone due to the small sample sizes, short study duration, and the lack of placebo controls in some instances.

Another small study, involving ten Alzheimer’s patients who received medical cannabis oil containing THC for a four-week period, found that participants experienced significant reductions in both behavioural and psychological symptoms, which included agitation, aggression, apathy, and delusions. The researchers, Shelef et al., from Tel-Aviv University and Bar-Ilan University in Israel, concluded that cannabis oil is a safe and promising treatment option for Alzheimer’s disease. (The results of this study were published in the November 2015 issue of the *Journal of Alzheimer’s Disease*.)

### HELPING WITH PAIN

Pain is common among dementia patients even though they may lack the ability to express it. An article published in the last issue of *Mind Over Matter*® examined the topic of pain and shared pertinent information about how to recognize signs of pain in individuals with dementia, as well as emphasized the importance of treating pain when it is present. Importantly, cannabinoids are known to help alleviate pain.

In 2017, the National Academies of Sciences, Engineering, and Medicine in the U.S. issued a rigorous review of the scientific research published since 1999 regarding the health impacts of cannabis and cannabis-derived products. —>

## WITH RESPECT TO CHRONIC PAIN IN ADULTS, THE RESEARCHERS FOUND THAT CANNABIS OR CANNABINOIDS HELPED PATIENTS EXPERIENCE "A SIGNIFICANT REDUCTION IN PAIN SYMPTOMS."

While we now know that cannabis can help alleviate chronic pain, the question becomes how safe is it? Do the benefits outweigh the risks, if any? A team of Canadian researchers, led by Dr. Mark Ware from the Research Institute of the McGill University Health Centre in Montreal, examined these questions and published their findings in the December 2015 issue of *The Journal of Pain*. "We found that patients with chronic pain who used medical cannabis daily for one year did not have an increase in serious adverse effects compared to pain patients who did not use cannabis," explained Dr. Ware. "Medical cannabis appeared to be reasonably safe for the participants in our study. In particular, we did not find any evidence of harmful effects on cognitive function."

### MUCH MORE RESEARCH IS NEEDED

As the date for legalization of non-medical cannabis quickly approaches in Canada, it is now more critical than ever to expand the research on cannabis, and there are many individuals and organizations working to draw attention to this urgent need.

Dr. Lynda Balneaves, an associate professor at University of Manitoba's College of Nursing, is a researcher pushing for more investment in cannabis research. In particular, she wants to see research expand on the potential risks and benefits of medical cannabis. Currently, research has been largely focused on the physiological and social harms of recreational use.

"There is so much we don't fully understand about cannabinoids and how best to use them for therapeutic effect," she said. "For example, which cannabinoid or combination of cannabinoids work best for what conditions? What is the appropriate dosage? What delivery mechanism is best—smoking, vaping, tincture, pill, edibles, topical? These are important questions that need to be answered so that health professionals can make informed decisions about what to recommend to patients."

Dr. Ware, who is co-chair of the federal government's Task Force on Cannabis Legalization and Regulation, also observes the pressing need

more research and education. He said, "Canada needs to be supporting connections between researchers studying plant sciences, pharmacology, clinical research and policy to better understand what the impact of legalization will be on individual health and on public health."

The Canadian Medical Association (CMA) agrees that cannabis research should be a priority. The CMA's website indicates that the organization "will continue to urge that Health Canada support development of rigorous research on the effects, both positive and adverse, that the use of marijuana for medical purposes will have."

The Arthritis Society in Canada is another organization encouraging more cannabis research and has demonstrated its support by providing significant funding (the Society has committed to spending \$720,000 between 2015 and 2019 on cannabis research, and in 2016 it also created the Medical Cannabis Strategic Operating Grant that provides at least \$120,000 per year for medical cannabis research). Additionally, the Canadian Institutes of Health Research announced the "Catalyst" funding opportunity in May 2017. This program will provide a total of \$1 million over a one-year period for "population health intervention research related to the legalization and regulation of non-medical cannabis in Canada." Hopefully this is just the beginning of a rapid expansion of investment in cannabis research, by both the government and more private sector organizations. 🌿



for



Women's Brain Health Initiative (WBHI) spoke with Beverly Elashuk, member of *Between the Pages* book club in Muskoka, about why she volunteered to oversee the MIND OVER MATTER® Book Club Initiative.

Having read several issues of MIND OVER MATTER® (MOM), and with a growing appreciation for the valuable information in each edition, I wanted to explore how to get the magazines into more people's hands. Book clubs seemed like a great way to do this.

MOM is easy to read and the content is interesting, current and relevant to so many of us. The articles are informative, backed by research, and address many issues related to the brain health of every age group.

I learn best by talking, deliberating and even arguing with others, where I can be honest, not judged, and delve into topics that are personal and sensitive. Our club thrives on this type of trusting environment. I'm sure many other clubs offer a similar atmosphere for its members and it is ideal for discussing the articles in MOM.

The Book Club Initiative is now on the WBHI website [wbhi.org](http://wbhi.org). If you go to the "Get Involved" link from the homepage, you'll see a Book Club icon. Pressing on the icon takes you to the Book Club Page where you can download a form requesting your own copies of MOM. Once a member of a book club reaches out by emailing back the form, I will make contact and begin the process of having MOM distributed to their book club.

The Book Club Initiative is a remarkable way to touch so many people – particularly women – and about such an important issue, our brain health and caregiving for those we love.



### BETWEEN THE PAGES BOOK CLUB, Muskoka

Front Row (L-R) Sandie Adelson, Lynn Bell, Sheila Davidson, Marilas McInnis, Lenore Davidson  
Back Row (L-R) Beverly Elashuk, Arleen Kurahashi, Donna Nickol, Valerie Garland  
(Absent) Debbie Peck (Photo credit) Deborah Chambers Photography



# MIND OVER MATTER®

A WOMEN'S BRAIN HEALTH BOOK CLUB INITIATIVE

Interested in obtaining copies of MIND OVER MATTER® for an upcoming book club read?

We've received thousands of requests for additional copies of MIND OVER MATTER®, many coming from women who have taken their copy of the magazine to their book club to show their friends and discovered the high level of interest for reading and discussing the articles from their members.

Thanks to the generosity of our partner Brain Canada, along with Margaret Nightingale (one of our most ardent supporters), and Beverly Elashuk, who graciously volunteered to oversee the book club initiative with the support of her own book club members, WBHI is pleased to provide your club copies of MIND OVER MATTER® free of charge!

If you'd like to participate in Women's Brain Health Book Club Initiative and receive copies of an edition\* of MIND OVER MATTER®, please visit our website <https://womensbrainhealth.org/book-club> or contact us at [bookclub@womensbrainhealth.org](mailto:bookclub@womensbrainhealth.org).

\*while quantities last



# EVERYONE'S GREY MATTER MATTERS

## Dementia & the LGBTQ Community

Individuals living with dementia will experience a range of challenges, many of which will not be affected by the person's sexual orientation or gender identity. However, living with dementia as a lesbian, gay, bisexual, trans, or queer (LGBTQ) person can bring unique challenges, for both the individuals and those supporting them. LGBTQ older individuals may experience stigmatization, firstly because of their sexual orientation and/or gender identity and secondly because of the stigma associated with old age. When combined with cognitive impairment, **LGBTQ older individuals may experience triple marginalization that, in turn, leads to health inequalities and unmet needs.** Some of these challenges will be similar whether the person is lesbian, gay, bisexual, trans, or queer. Others will be different. Individuals living with dementia will have their own experiences, life history, relationships, and support.

Shoshana Pellman's family history gives her reason to wonder about her fate in old age. Her father suffered from profound dementia when he passed away in 2012. Her 95-year-old mother now has dementia and is living in a care home.

"It might be my future also," said Ms. Pellman, who turns 71 this year. "I'm scared. I'm getting older. I forget things. I'm terrified. Someone asked me today if I had someone to advocate for me. I'm not sure."

Ms. Pellman is a trans woman. When she transitioned over ten years ago, some of her seven children accepted her, and some did not. The child who she would likely call upon to act as her advocate does not live in Canada.

**ALTHOUGH THE BROADER SOCIETY HAS BECOME MORE OPEN TO DISCUSSING THE ISSUES FACED BY THE LGBTQ COMMUNITY, OLDER MEMBERS OF THE COMMUNITY SAY THAT THERE STILL NEEDS TO BE A SERIOUS CONVERSATION ABOUT THEIR NEEDS - AND ABOUT DEMENTIA.** They come from a generation in which many more stayed in the closet. Many are still there, fearing that their peers might not accept them. LGBTQ older individuals are more likely to be isolated. Many do not have children or, like Ms. Pellman, have children with whom they no longer have contact. All too often the crucial support systems that

individuals with dementia require may not be there. This further increases their need for dementia care services.

"For me, the biggest nightmare is dementia as a trans person. You become depressed. You become isolated," she said.

Dr. Joy Masuhara, a Vancouver family physician with a specialty practice in geriatric mental health, says that Ms. Pellman's story is common. Dr. Masuhara works with a diverse group of patients and is also active in the LGBTQ community. She says that the **fear of stigmatization remains a predominant concern.**

"If you talk to queer seniors they're worried about the type of care they might get, or subtle prejudice. Or are their partners going to be accepted," Dr. Masuhara said in an interview.

**TO DATE, THERE HAS BEEN LITTLE ACADEMIC RESEARCH ON THE UNIQUE NEEDS OF LGBTQ INDIVIDUALS LIVING WITH DEMENTIA.** It is hoped that a major, long-term study of more than 2,400 older Americans who identify as LGBTQ will yield more insights.

The lead researcher of the study, Dr. Karen I. Fredriksen Goldsen from the University of Washington, said at a 2015 conference in San Francisco that early studies indicate a lack of dementia awareness among the LGBTQ community, which in turn poses a "serious risk of unmet needs, social isolation, and premature morbidity." She further noted that the challenges and the risks are diverse, and can vary greatly among gay men, lesbian women, or those who identify as trans.

One of the few scholarly studies in the field is a collection of essays published by CRC Press in 2016 entitled *Lesbian, Gay, Bisexual and Trans\* Individuals Living with Dementia: Concepts, Practice and Rights*. Dr. Sue Westwood, an Oxford University researcher, wrote in one paper that LGBTQ\* individuals are "systematically disadvantaged in comparison with non-LGBTQ\* people who are affected by dementia." She argued that dementia affects lesbian and bisexual women as much as, if not more than, heterosexual women and, given that fewer of them have children, they are more likely to be living in care facilities. However, in Dr. Westwood's view, their voices

are underrepresented in the discussion about these issues and, if anything, these circumstances are worse for trans women. Indeed, as Dr. Westwood observed, "The absences and silences related to LGBTQ\* people affected by dementia have produced and are producing significant inequalities for LGBTQ\* people."

**Importantly, the needs of LGBTQ individuals are starting to attract more attention and some progress is being made.** For instance, there are two long-term care facilities in Toronto - True Davidson Acres and Fudger House - that promote themselves as LGBTQ-friendly. "It's good that the conversation has started. But there is a way to go," said Shrid Dhungel of the Alzheimer Society of Toronto. He is also a member of the Gender and Sexuality Alliance, which is working to establish a presence in long-term care settings in order to promote a positive experience for LGBTQ residents.

Toronto's Senior Pride Network is actively reaching out to care homes around the city, encouraging greater understanding and training to meet the needs of LGBTQ individuals.

Robert Nelder, an active member of the Network, noted that while many care homes are welcoming individuals of all orientations and backgrounds, this in and of itself is "not good enough." **More needs to be done to recognize the unique needs of LGBTQ individuals and to reassure members of the community that they will be treated appropriately.**

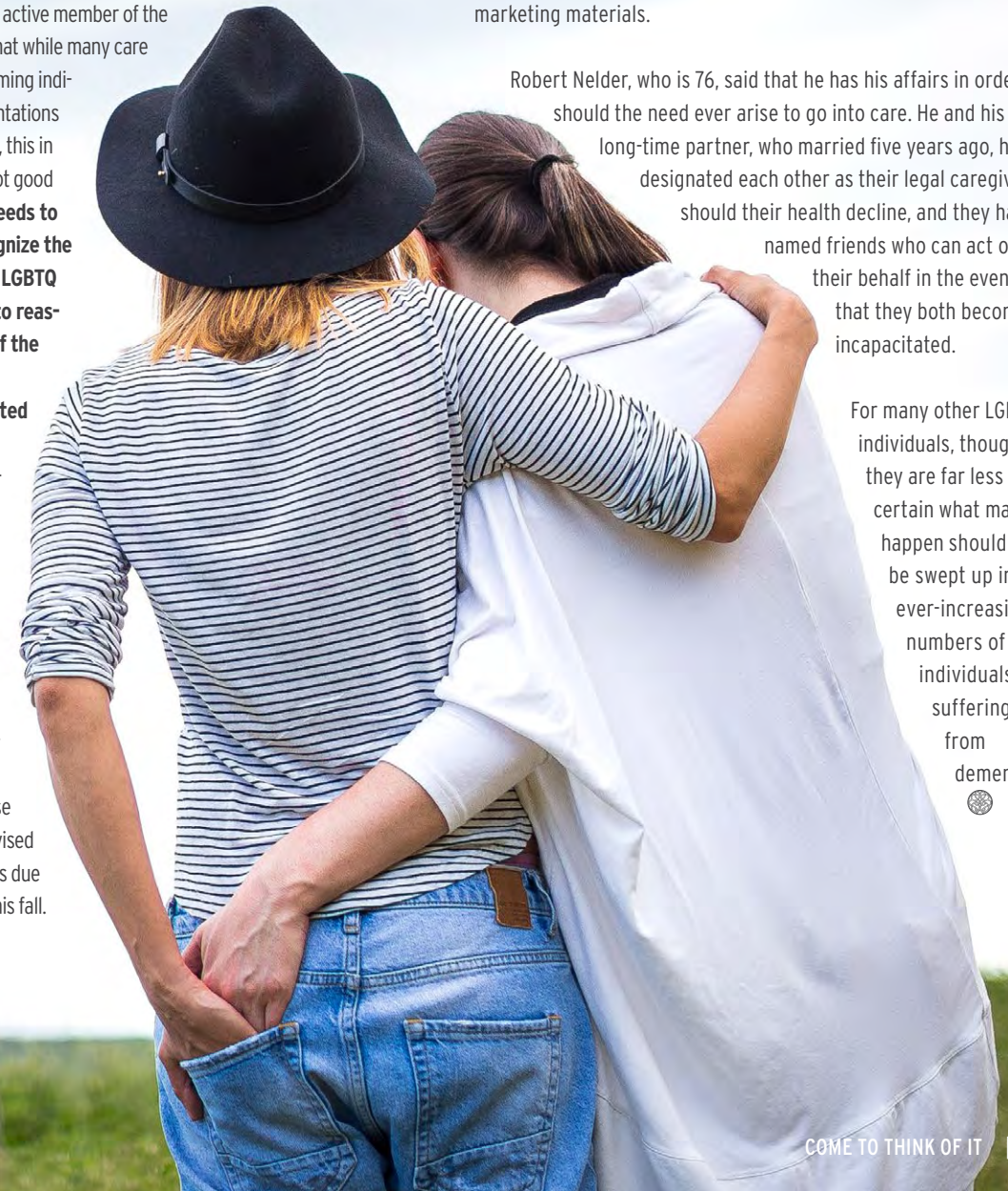
Working in collaboration with the City of Toronto, the Network produced a "toolkit" of advice for creating LGBTQ-inclusive environments and interacting with diverse populations, a revised version of which is due to be rolled out this fall.

In the United States, California continues to be on the forefront of advancing equality for LGBTQ individuals. One recent law requires all health care professionals to receive ongoing training to improve their understanding of how to effectively assist LGBTQ patients. The law also mandates that health care professionals must meet "cultural competency standards." The hope is that this will allow patients to feel more comfortable being open about their identities and therefore be able to receive the specific kind of care that they deserve.

In general, there are more resources for older individuals living in cities such as San Francisco, Los Angeles, and New York that already have well-established LGBTQ communities. It is more difficult in small centres, not unlike the situation in Canada. Similar issues are found in the UK. The British National Care Forum (a collective of non-profit care organizations) issued a report last year with suggestions as to how to make environments more LGBTQ-friendly. Amongst other recommendations, the report suggests that care facilities could promote diversity by showing same-sex couples in marketing materials.

Robert Nelder, who is 76, said that he has his affairs in order, should the need ever arise to go into care. He and his long-time partner, who married five years ago, have designated each other as their legal caregiver should their health decline, and they have named friends who can act on their behalf in the event that they both become incapacitated.

For many other LGBTQ individuals, though, they are far less certain what may happen should they be swept up in the ever-increasing numbers of individuals suffering from dementia.



# FOOD FOR THOUGHT:

## How the “Western Diet” Affects Your Brain

“You are what you eat” has become such a common refrain that it has nearly lost its potency. However, be careful about disregarding these established words of wisdom. From heart disease and diabetes to obesity and osteoporosis, it is now commonly understood that diet plays an integral role in the genesis of many diseases. Similarly, research has demonstrated that **nutritional habits have a profound effect on our mental health, including depression, insomnia, and attention-deficit/hyperactivity disorder (ADHD)**. More recently, studies have shown that the types of food that we consume can impact our risk of developing Alzheimer’s disease and other dementias.

Mounting evidence from ecological studies indicates that the contemporary Western dietary pattern - characterized by higher intakes of red and processed meat, refined sugars and grains, alcohol, and high-fat dairy products, with minimal intakes of fruits, vegetables, whole grains, nuts, and fish - is strongly associated with negative health outcomes. According to an article published in *The American Journal of Clinical Nutrition* in 2005, the types of foods that fall within the “Western diet” category comprise 72.1% of the total daily energy consumed by all individuals living in the U.S.

Newer research conducted by celebrity chef Ricardo Larrivé, in partnership with Léger Marketing, examined the cooking and eating habits of Canadians from the west coast, Prairies, Ontario, Quebec, and the Atlantic provinces. The researchers found that while the vast majority (91%) of participants indicated that they wanted to eat a healthy and balanced diet, only one out of every ten individuals felt that their meals reached that goal. Nevertheless, the study shows that more Canadians are conscious about healthy eating than ever before. Over 55% of Canadians buy at least one organic food product every week at the grocery store, and the purchase of local vegetables grown through smaller-scale community-supported agriculture is gaining traction.

### THE QUALITY OF OUR DIET IMPACTS NOT ONLY OUR PHYSICAL HEALTH BUT ALSO OUR BRAIN HEALTH.

“Our brains require a huge number of vitamins and minerals every minute that our heart is beating; in other words, every minute we’re alive,” explains Dr. Bonnie Kaplan, a behavioural psycholo-

gist at the University of Calgary. She continues, “Approximately a litre of blood perfuses your little two-and-a-half to three pound brain every 60 seconds that your heart is beating. What is it doing? Of course, it’s bringing oxygen and taking away waste products - but it’s also bringing all the vitamins and minerals into your brain that you’ve eaten in the last few hours - and that’s every minute of every day, 24/7.” The vitamins and minerals that we intake through the foods that we eat or through supplementation “are used in every metabolic step in our brains,” says Dr. Kaplan.

Most of us are familiar with serotonin, for instance, which is a neurotransmitter that boosts our mood and social functioning. But what many people do not know is that the majority of the body’s serotonin (between 80% to 90%) can be found in the gastrointestinal tract. “We don’t eat serotonin. What we eat are the precursors to serotonin,” notes Dr. Kaplan. In addition to serotonin, we require enzymes, vitamins, and minerals at each step of the process “for every chemical in your brain.”

Likewise, approximately two-thirds of the brain is composed of —>





## DIETS THAT ARE HIGH IN CARBOHYDRATES AND SUGARS HAVE ALSO BEEN LINKED TO AN INCREASED RISK OF MILD COGNITIVE IMPAIRMENT (MCI) AND DEMENTIA.

Research out of the Mayo Clinic found that elderly individuals with relatively high caloric intake from carbohydrates and low caloric intake from fat and protein had nearly four times the risk of developing MCI, and the danger also increased with a diet heavy in sugar.

Additionally, research conducted by Crane et al. and published in the *New England Journal of Medicine* found a correlation between higher glucose levels and an increased risk of dementia in populations with and without diabetes. The Western diet is high in both sugar and those less-healthy carbohydrates that get converted to sugar more quickly (as opposed to complex carbohydrates such as vegetables or legumes). Although the traditional Japanese diet tends to be higher in carbohydrates, too, the population also consumes a variety of healthier foods, including fish, eggs, meat, soy, and vegetables.

fat, and fatty acids are among the most crucial molecules that determine the brain's integrity and ability to perform.

**ALTHOUGH ESSENTIAL FATTY ACIDS (EFAS), PARTICULARLY THE OMEGA-3 FATTY ACIDS, ARE IMPORTANT FOR BRAIN DEVELOPMENT, THEY CANNOT BE SYNTHESIZED BY THE BODY AND MUST BE OBTAINED FROM DIETARY SOURCES.**

The most common food sources of EFAs include seafood, such as sardines and salmon, as well as flax seeds, walnuts, almonds, dark green leafy vegetables (such as broccoli and spinach), olive oil, whole grain foods, and eggs. "You should never eat a low-fat diet," advises Dr. Eva Selhub, an internationally-recognized expert in the fields of stress, resilience, and mind-body medicine. "Every cell in your body is made up of fat. You might want to do a no-bad-fat diet but not a low-fat diet."

The medical literature indicates that traditional diets that are higher in the "good" fats, such as those found in Japan (high in fish and low in saturated fats) and the Mediterranean (high in olive oil, vegetables, and legumes), lower the risk of developing certain diseases, including cardiovascular disease and brain disease. In a 2014 study published in the *Journal of Alzheimer's Disease*, the researchers found that changes in Japan's dietary habits (due to the influx of Western foods) is highly related to the dramatic increase in Alzheimer's disease, with the same trend being observed in other developing countries and their changes in national diets.



## BREAKING BAD Are Your Habits Impacting Your Brain Health?

Lower intakes of nutrient-dense foods and higher intakes of unhealthy "Western" foods have even been associated with smaller left hippocampal volume, according to recent research published in the journal *BMC Med*. The hippocampus is a brain area critical for learning and memory, as well as mood regulation, and is especially vulnerable to damage at early stages of Alzheimer's disease. While a growing body of clinical studies have linked eating patterns with illnesses of the brain, this was the first study to demonstrate actual changes to brain structure associated with dietary patterns.

As Dr. Selhub observes, "In general when you're eating, you're feeding your brain. Your brain needs those nutrients more than any other organ in the body, except the heart, which comes close in terms of metabolic demand." **While consuming brain-healthy foods is critical at all ages, this becomes increasingly important as we age because our ability to absorb and utilize many nutrients becomes less efficient, as our nutrient requirements simultaneously increase.** Dr. Selhub says that we should think of our brain as a Lamborghini, as opposed to a Chevy: "[The brain] needs to be fueled with really good, clean, healthy, strong, positive fuel. If you don't feed it that way it will lose itself. If people want to live as long as we're living and still have their brain intact, they're going to need to cut out the processed food and the sugar from their diet." Food for thought, indeed. 🍷

Most of us go through our lives without giving much thought as to how our behaviours affect our brains. From failing to keep our New Year's resolutions or hitting the snooze button instead of going to workout, to mindlessly snacking while watching television, we all know that our daily habits are exceedingly difficult to break. What we often do not realize, however, is that many of these negative habits are incredibly harmful for our brain health. Numerous studies have demonstrated that the way in which we live our lives could damage the brain over short- or long-term periods. It is therefore critical to be aware of those habits that are self-destructive and to take better care of our overall brain health and well-being. →

**THE FOLLOWING IS A LIST OF SOME OF THE MOST COMMON "BAD" HABITS THAT CAN CAUSE DAMAGE TO YOUR BRAIN HEALTH:**

**1. LACK OF SLEEP**

When you are tired, it is challenging to concentrate, learn, and understand information. As Dr. Scott Schreiber from Newark Delaware explains, "individuals who do not get at least seven to nine hours of quality sleep per night are at higher risk of cognitive impairment." He continues, "during sleep, our body repairs and regenerates. If this is not allowed to happen, degeneration will occur." The quality of sleep is equally as important as the length of the rest because "if sleep is interrupted, so is the regeneration process to recharge."

**2. TOO MUCH STRESS**

Prolonged periods of stress can increase the levels of the stress hormone cortisol, which can cause our brain cells to lose synapses - the necessary bridges that connect our brain cells to one another. Damage to the synapses and communications process undoubtedly impairs our cognitive ability. Scientists suspect that high cortisol levels over a prolonged period are a key contributor to Alzheimer's disease and other forms of dementia. A growing body of research suggests that meditation is an effective method for lowering cortisol levels and protecting the brain from age-related cognitive decline. In fact, it is well established that meditation enhances various cognitive functions, including attention, memory, and executive function, and positively affects brain function and structure relevant to cognition.

**3. POOR DIET**

You may have noticed the short-term effects on your brain from the consumption of certain types of food, such as a sugar rush after eating too much candy. Our diets not only shape our bodies, but also our brains. Of course, some foods are better for your brain than others. A great deal of evidence now suggests that

**DIETS THAT ARE HIGH IN "UNHEALTHY" FATS CAN HAVE A PROFOUND IMPACT ON THE BRAIN, BEHAVIOUR, AND COGNITION.**

It is therefore important to consume those fats that are beneficial to your brain, such as extra-virgin olive oil, whole eggs, and avocados, and avoid those that are detrimental, such as processed and fried foods, baked goods, and junk foods.

Excess sugar can also impair memory and cognitive function, so much so that

**ELEVATED BLOOD SUGAR IS COMMONLY REFERRED TO IN THE MEDICAL LITERATURE AS "TYPE 3 DIABETES" OR THE "BRAIN DIABETES"**

and is associated with Alzheimer's disease and other forms of dementia. Dr. Gary Small, a professor of psychiatry at UCLA's Semel Institute notes that "high blood sugar leads to inflammation throughout your body and brain. With respect to Alzheimer's, this is a problem because chronic inflammation has been linked with the formation of amyloid plaques and tau tangles, abnormalities in the brain that are hallmarks of Alzheimer's disease."

As Dr. Small observes, although not every individual who has type 2 diabetes will develop Alzheimer's disease, vascular dementia, or any other form of dementia, and there are several individuals who have Alzheimer's disease or another form of dementia who do not have diabetes, "these risk factors tend to add up: If you have diabetes, that doubles the risk of developing Alzheimer's."

**VITAMIN D INSUFFICIENCY HAS ALSO BEEN CORRELATED WITH ACCELERATED COGNITIVE DECLINE AND IMPAIRED PERFORMANCE, PARTICULARLY IN DOMAINS SUCH AS MEMORY LOSS.**

According to researchers with the UC Davis Alzheimer's Disease Center in Sacramento, California and Rutgers University in New Jersey, individuals with low vitamin D levels decline at a rate three times faster than those with adequate vitamin D levels. The researchers note that their findings "amplify the importance of identifying vitamin D insufficiency among the elderly, particularly high-risk groups such as African-Americans and Hispanics, who are less able to absorb the nutrient from its most plentiful source: sunshine. Among those groups and other darker-skinned individuals, low vitamin D should be considered a risk factor for dementia."

For more helpful diet and health tips to optimize your brain health, you can refer to the Women's Brain Health Initiative Memory Morsels web page at <http://memorymorsels.org>.

**4. LOUD SOUNDS**

While it is well established that exposure to loud sounds can cause hearing impairment, stress, and irritability, recent research now suggests that **listening to loud noises can also affect memory and learning mechanisms.** According to an article published by *The Memory Foundation*, the brain reacts immediately to "harsh, unpleasant sounds" with an "acoustic startle response." The amygdala is alerted with adrenalin and the hippocampus is "stimulated to access stored memories of previous dangers and responses." As the article explains, "when

your brain is in 'fight-flight' mode, other neural connections cannot operate normally."

**5. SMOKING**

While most of us are aware of the link between smoking and lung cancer, the effect of smoking on the function of the lungs and heart is often overlooked. By slowing oxygen to the brain, smoking effectively decreases brain function. According to the World Alzheimer Report 2014, published by *Alzheimer's Disease International*, there is now quite strong and consistent evidence to support an association between "current smoking" (as compared with "never smoking") and the incidence of Alzheimer's disease, with tentative (non-statistically significant) evidence for a similar association with vascular dementia, and a smaller association with any dementia. Conversely, ex-smokers do not appear to be at increased risk - an encouraging finding for dementia prevention, suggesting, as with other adverse impacts of smoking, that the increased risk of dementia can be avoided by quitting smoking.

**6. LACK OF PHYSICAL AND MENTAL EXERCISE**

It is critical to stay both physically and mentally stimulated to help keep your body and brain healthy. Exercise affects the brain on multiple fronts; it increases heart rate, which pumps more oxygen to the brain, and it also promotes the bodily release of various hormones, all of which participate in aiding and providing a nourishing environment for the growth of brain cells. Your brain is no different than rest of the muscles in your body: you either use it or you lose it. Just as you utilize the gym to stimulate the growth of muscle cells, you can likewise use a brain fitness program to increase connections in your brain. Therefore, remember to not only keep active and fit, but also to challenge yourself with mentally-stimulating exercises such as crosswords, math games, and puzzles.

Dr. Majid Fotuhi, founder and Chief Medical Officer of NeurExpand Brain Center in Lutherville, Maryland, reminds us that the "brain is malleable, meaning it changes and improves [...] memory can be boosted with simple powerful interventions." Accordingly, when assessing the negative habits that we may be guilty of, note that it is never too late to make changes to our lifestyle and to take control of our brain health.

**ALCOHOL**

Drinking alcohol can impact memory in both the short and long term. The Alzheimer's Society indicates that drinking more than the recommended limit for alcohol increases a person's risk of developing common types of dementia such as Alzheimer's disease and vascular dementia.

However, recent research has also demonstrated the potential benefits of light to moderate alcohol consumption to cognitive learning and memory later in life. A recent study conducted by Downer et al. utilized data from the Framingham Heart Study Offspring Cohort to examine the relationship between midlife and late-life alcohol consumption, cognitive functioning, and regional brain volumes among older adults without dementia or a history of abusing alcohol. The researchers found that for individuals aged 60 and older without dementia, light alcohol consumption during late life was associated with higher episodic memory (the ability to recall memories of autobiographical events). Additionally, moderate alcohol consumption was linked with a larger hippocampal volume (a brain region critical for episodic memory). The researchers cautioned, however, that **"extended periods of abusing alcohol, often defined as having five or more alcoholic beverages during a single drinking occasion, is known to be harmful to the brain."**

**WOMEN'S BRAINS VS. MEN'S BRAINS**

Previous research has linked alcoholism with reduction in the brain's white matter - the part of the brain that forms the connections between neurons, contributing to the successful communication between different areas of the brain. A new study suggests that the effects on white matter brain volume from long-term alcohol abuse are different for men and women. In particular, the researchers found that the restoration and recovery of the brain's white matter among alcoholics occurs later in abstinence for men than for women. These findings are preliminary, though, and more research is needed to further explore the gender differences in alcohol consumption.



# NOT ALL OMEGAS ARE CREATED EQUALLY

## The Essentials of Essential Fatty Acids

All fats, including saturated fatty acids, have important roles in your body. While your body can manufacture most of the fats that it requires from carbohydrates, protein, and other fats, there are two groups of fatty acids that your body cannot produce naturally: omega-3 and omega-6. Consequently, each of these essential fatty acids (EFAs) must be obtained through the foods that we eat or through supplementation.

As the name suggests, both of these fatty acids are vital for the proper functioning of the body and the brain. Deficiencies in EFAs can lead to a host of symptoms and disorders, including abnormalities in the liver and the kidneys, reduced growth rates, decreased immune function, and depression. It is therefore critical to understand what EFAs are, what they do, and how to incorporate good sources of omega-3 and omega-6 into your daily diet.

### OMEGA-3

Omega-3, an unsaturated fat, is considered to be one of the “good” types of fat, and comes in three unique forms, each of which the body manages differently: alpha-linolenic acid (ALA), docosahexaenoic acid (DHA), and eicosapentaenoic acid (EPA).

ALA can be found in many plant sources, such as pumpkin seeds, walnuts, flaxseed, and some pastured meat, while DHA and EPA can be found in high concentration in seafood such as sardines and salmon. Although it is important to incorporate all three of these omega-3s into your diet, a 2015 report by Statistics Canada indicates that nearly 40% of Canadians are not consuming enough omega-3s.

Omega-3 fatty acids are critical to our immune system, brain development and cognition (brain memory and performance), and prevent inflammation.

**SEVERAL STUDIES HAVE SHOWN THAT OMEGA-3 CONSUMPTION CAN HELP DECREASE THE RISK OF STROKE, HEART FAILURE, AND DEMENTIA, AND CAN EASE SYMPTOMS OF ARTHRITIS AND DEPRESSION.**

Most of these benefits have been associated with DHA and EPA in particular. As described in a recent article in *BrainMDLife*, DHA is the most abundant omega-3 found in the brain and is important for the maintenance of nerve cell structure and function, while EPA plays a central role in supporting the healthy regulation of cellular inflammation. This

makes DHA and EPA the “essential building blocks for healthy cell membranes,” which, in turn, support healthy memory, cognition, and emotional well-being.

New evidence suggests that omega-3 fatty acids may be linked to increased brain volume in women. In one study involving over 1000 postmenopausal women from the Women’s Health Initiative Memory Study, the researchers found that the participants who had the greatest levels of DHA and EPA in their blood had the largest average brain volume by the end of the study. These participants also had a 2.7% larger hippocampal volume – the area of the brain associated with memory. Individuals with Alzheimer’s disease experience declines in the hippocampus before any other symptoms.

Given the impact of omega-3 fatty acids on cognitive and behavioural function, it is not surprising that the symptoms of an omega-3 deficiency include fatigue, poor memory, dry skin, heart problems, mood swings or depression, and poor circulation.

Health writer and nutrition educator Barbra Cohn reports that “several studies show that reduced intake of omega-3 fatty acids is associated with increased risk of age-related cognitive decline or dementia, including Alzheimer’s disease. Scientists believe the omega-3 fatty acid DHA is protective against Alzheimer’s disease and dementia.”

### OMEGA-6

Omega-6 is also a type of unsaturated fat but can be found in vegetable oils, poultry, eggs, whole-grain breads, nuts, and seeds. Unlike omega-3 fatty acids, most diets provide adequate amounts of this fatty acid, and therefore planning is rarely required to ensure sufficient consumption.

It is well established that omega-6 aids in strengthening brain function, growth, and development, stimulates skin and hair growth, maintains good bone health, and helps to regulate metabolism. These fatty acids can also be used to help lower the risk of heart disease by decreasing low-density lipoprotein or LDL (the “bad” cholesterol) and increasing high-density lipoprotein or HDL (the “good” cholesterol).

Omega-6 is also found in processed foods and oils, which are now common in the so-called “Western” diet (characterized by higher intakes of red and processed meat, refined sugars and grains, alcohol, and high-fat dairy products, with minimal intakes of fruits, vegetables, whole grains, nuts, and fish). Too much omega-6 is associated with its own risks, and may lead to or increase the problems of certain medical conditions. Additionally, most omega-6 fatty acids tend to promote inflammation, which may contribute to disease.

### EXAMPLES OF OMEGA-3 FATTY ACIDS:

- » Salmon
- » Sardines
- » Chia seeds
- » Herring
- » Trout
- » Walnuts
- » Mackerel
- » Tuna (fresh)
- » Oysters
- » Flaxseed

### EXAMPLES OF OMEGA-6 FATTY ACIDS:

- » Vegetable oil (also safflower, grapeseed, sunflower, corn, soybean, flaxseed, and sesame oils)
- » Chicken, pork, and beef
- » Onion rings
- » Cereals
- » Seeds (such as pumpkin seeds and raw sunflower seeds)
- » Baked goods (such as muffins, cookies, and bread)
- » Dairy products
- » Eggs

### DIETARY IMBALANCE

It is not only important to incorporate good sources of omega-3 and omega-6s into your daily diet, but also to consume these fatty acids in the proper ratio. Omega-6 fatty acids compete with omega-3 fatty acids for use in your body, and therefore excessive intake of omega-6s can actually inhibit omega-3s (and, as previously mentioned, most of us already consume adequate amounts of omega-6s and not enough omega-3s). According to the National Institutes of Health’s National Center for Biotechnology Information (NCBI),

**“A VERY HIGH OMEGA-6/OMEGA-3 RATIO, AS IS FOUND IN TODAY’S WESTERN DIETS, PROMOTES THE PATHOGENESIS OF MANY DISEASES, INCLUDING CARDIOVASCULAR DISEASE, CANCER, AND INFLAMMATORY AND AUTOIMMUNE DISEASES.”**

The College of Family Physicians of Canada notes that Canada was the first country to adopt guidelines to reduce consumption of omega-6 fatty acids and to increase consumption of omega-3 fatty acids with a target ratio of 6:1 (although most Canadians will not achieve this goal). In fact, according to Dr. Jorn Dyerberg, one of the world’s leading authorities on omega-3 fish oils, most North Americans currently consume these fatty acids at a ratio of between 10:1 and 25:1 (omega-6/omega-3), and are consequently unable to reap the benefits of omega-3s. Sweden recommends a ratio of 5:1, while Japan recently lowered its recommended omega-6/omega-3 balance from 4:1 to 2:1.

Certainly, then, we can all benefit from consuming more omega-3 fatty acids and fewer omega-6 fatty acids. For some suggestions on recipes rich in omega-3 and omega-6, check out Women’s Brain Health Initiative Memory Morsels web page at <http://memorymorsels.org/recipes/> and follow the Instagram account (@memorymorsels) for tips on how to optimize your brain health. 🌱

OIL	OMEGA-6 CONTENT	OMEGA-3 CONTENT
Safflower	75%	0%
Sunflower	65%	0%
Corn	54%	0%
Cottonseed	50%	0%
Sesame	42%	0%
Peanut	32%	0%
Soybean	51%	7%
Canola	20%	9%
Walnut	52%	10%
Flaxseed	14%	57%
Fish	0%	100%

Source: Chris Kresser, M.S., L.Ac, Berkeley, California

# JUST A SPOONFUL OF EVOO

The Brain Benefits of Extra-Virgin Olive Oil

While there is a growing body of research investigating potential drugs to help treat or cure Alzheimer's disease and other dementias, there are currently only a few medications that have been approved in North America and, according to the National Institute of Aging in the U.S., these drugs do not stop or reverse the underlying disease process. The question that arises, then, is what can we do now to keep our brains healthy?

Some of the most promising outcomes to date have been observed with extra-virgin olive oil (EVOO), one of the primary ingredients of the Mediterranean diet. Over the years, research has shown that individuals living in the Mediterranean have "a much lower incidence of dementia, mild cognitive impairment, and Alzheimer's," says Dr. Domenico Praticò, a professor at the Lewis Katz School of Medicine at Temple University in Philadelphia. The Mediterranean diet includes large amounts of fruits, vegetables, olive oil, beans, and grains, moderate amounts of fish, dairy, and wine, and limited red meat and poultry. Now, researchers have identified EVOO as the component largely responsible for the many health benefits linked to the Mediterranean diet.

In a study published in the June 2017 issue of *Annals of Clinical and Translational Neurology*, Dr. Praticò and his colleagues found that

**THE CONSUMPTION OF EVOO PROTECTS MEMORY AND LEARNING ABILITY, AS WELL AS REDUCES THE FORMATION OF AMYLOID-BETA PLAQUES AND NEUROFIBRILLARY TANGLES IN THE BRAIN (WHICH ARE BOTH CONSIDERED CLASSIC MARKERS OF ALZHEIMER'S DISEASE).**

In order to investigate the relationship between EVOO and dementia, the researchers used a well-verified Alzheimer's disease

mouse model and divided the animals into two groups: one that received a chow diet enriched with EVOO and one that received the regular chow diet without it. The mice that consumed EVOO performed significantly better on tests that were designed to evaluate memory and learning abilities. Remarkably, these mice were "basically performing as if they never developed the disease," notes Dr. Praticò.

The researchers then examined the brain tissue from both groups of mice and found that the brain cells in the EVOO group were visibly healthier, with stronger connectivity between neurons - which is important for memory formation and recollection. Additionally, compared to the mice on a regular diet, the animals in the EVOO group experienced a reduction in levels of amyloid plaques and phosphorylated tau (the toxic products that accumulate in the brains of Alzheimer's patients). Ultimately, the researchers concluded that EVOO is able to "activate the autophagosome system," the process by which nerve cells are able to "digest, degrade, and eliminate" before they accumulate in the brain.

In a press statement, the researchers called their findings "a very important discovery" since a reduction in autophagy seems to mark the beginning of Alzheimer's disease. Moreover, as a natural activator of autophagy, EVOO "could be a new therapeutic approach without all the risk of side effects," says Dr. Praticò. Of course, what works for mice may or may not work as well for humans, and therefore more research is needed. In the meantime, though, taking a tablespoon of EVOO in its raw form or even cooking with EVOO (although less effective) would be "good for you, no matter what," notes Dr. Praticò. So, to bolster your brain health, consider adding extra-virgin olive oil to your diet. 🍵

## OTHER OILS AND SPICES FOR BETTER BRAIN HEALTH

### FLAX SEED, HEMP SEED, AND FISH OILS

In addition to extra-virgin olive oil, there are various oils that are beneficial for the brain. A lack of omega-3 oils in one's diet (found in fish and flax seed oils, as well as in nuts and seeds) has been repeatedly proven to increase the risk of "age-related cognitive decline or dementia such as Alzheimer's disease," according to an article published in *Prostaglandins, Leukotrienes, and Essential Fatty Acids*.

### TUMERIC

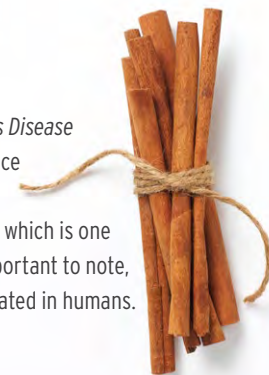
Several studies have shown that turmeric, and its active ingredient curcumin (found in curry), is an anti-inflammatory and an anti-



oxidant. These properties are believed to "help ease Alzheimer's symptoms caused by oxidation and inflammation." Observational and population-based research have shown that elderly individuals living in India, where curry is often consumed, have a lower incidence of Alzheimer's disease. According to an article published in the *Annals of Indian Academy of Neurology*, "one of the important pathogenesis in Alzheimer's disease is the chronic inflammation of nerve cells."

### CINNAMON

Research published in the *Journal of Alzheimer's Disease* found that active extracts from the common spice cinnamon - cinnamaldehyde and epicatechin - may prevent the aggregation of the tau protein, which is one of the hallmarks of Alzheimer's disease. It is important to note, however, that this result has not yet been replicated in humans.



### BLACK PEPPER

Black pepper has been found to have brain-boosting capabilities, specifically assisting in "cognitive brain functioning," according to research published in *Critical Reviews in Food Science and Nutrition*. In cell and animal studies, black pepper's active compound, piperine, has shown antioxidant, antimicrobial, anti-inflammatory, and anti-depressive properties. Research still needs to be conducted with humans.

### PEPPERMINT

Research out of Northumbria University in the UK found that drinking peppermint tea could help improve long-term memory, working memory, and mood. Peppermint tea was



examined alongside chamomile, which was found to have a sedating effect, and hot water.

### ROSEMARY OIL

The same researchers from Northumbria University sought to assess the olfactory impact of the essential oils of lavender (*Lavandula angustifolia*) and rosemary (*Rosmarinus officinalis*) on cognitive performance in healthy adults. The study revealed that the inhalation of lavender produced a significant decrement in performance of working memory, and impaired reaction times for both memory- and attention-based tasks. In contrast, the aroma of rosemary significantly enhanced the ability to remember events and to remember to complete tasks at particular times in the future.

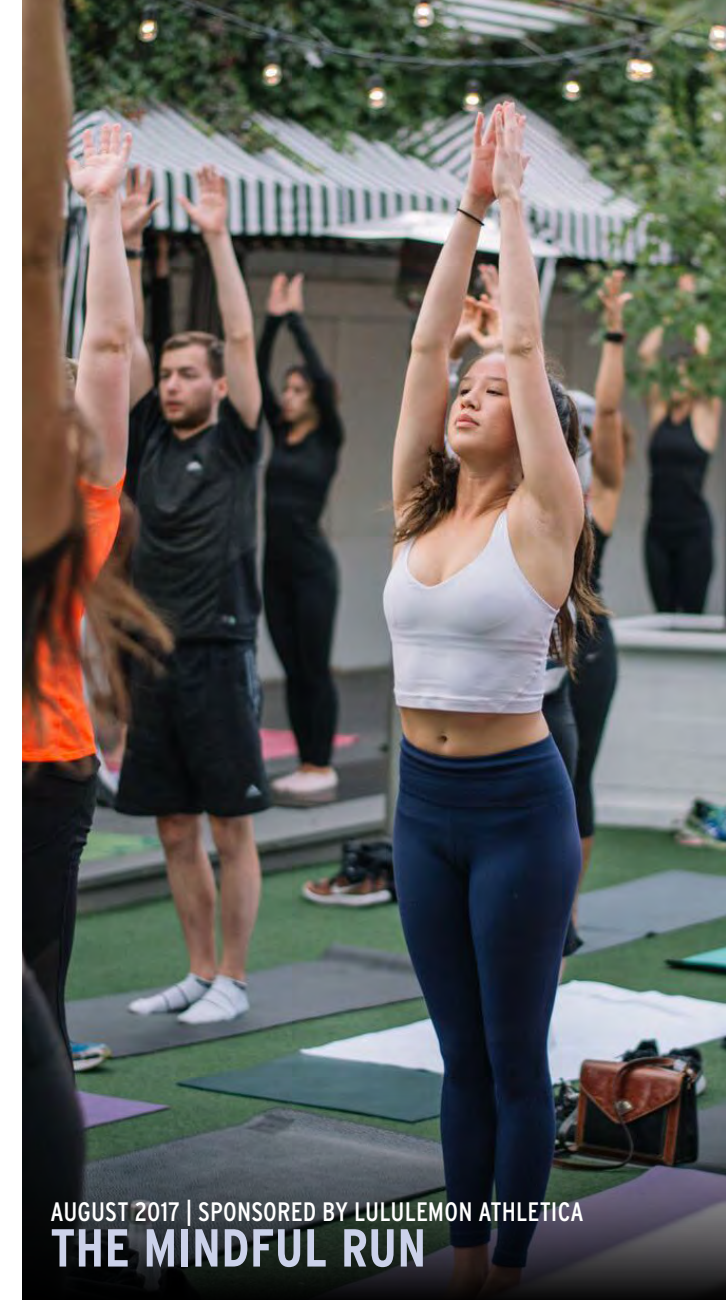




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Back Row: (L-R) Martin Reader, Vitina Blumenthal, Courtney Bobyk, Jennie Greben, Jen Sceviour, Laura Best, Lauren De Freitas, Dalia Kagrananov, Michael Bray Front Row: (R-L) Bryanna Nyhof, Abby Farrell, Cheyla Reader, Julia Hamer, Patrisha Reader

# Curry Lentil Loaf

## INGREDIENTS

3/4 cup (175 mL) red or orange lentils  
3 1/2 cups (875 mL) filtered water  
1/2 cup (125 mL) quinoa  
2 tbsp (30 mL) coconut oil  
1 small onion, chopped  
1 cup (250 mL) sliced cremini mushrooms  
1/2 cup (120 mL) finely chopped sweet red pepper  
2 eggs (any size), lightly beaten  
2 cloves garlic, minced  
1 cup (250 mL) chopped fresh parsley or cilantro  
3/4 cup (175 mL) old-fashioned or quick-cooking rolled oats  
1/2 cup (125 mL) pecans or almonds, coarsely chopped  
3 tbsp (44 mL) curry powder  
2 pinches of sea salt and lots of freshly ground pepper  
Arugula or spinach

## INSTRUCTIONS

1. Preheat oven to 350 F (180 C). Grease a 10x10-inch (3 L) baking dish with coconut oil.
  2. In a medium saucepan, bring lentils and 2 1/2 cups (625 mL) of the water to a boil. Reduce heat and simmer, partly covered, just until tender; 15 to 25 minutes. Be careful not to overcook the lentils.
  3. Meanwhile, in a separate small pot, bring quinoa and remaining 1 cup (250 mL) of water to a boil. Reduce heat and simmer, partly covered, until fluffy, about 15 minutes.
  4. Meanwhile, melt coconut oil in a large saucepan over medium heat. Cook the onion, mushrooms and red pepper, stirring frequently, for 5 minutes or until tender.
  5. In a large bowl, combine lentils, quinoa, mushroom mixture, eggs, garlic, parsley, oats, pecans, curry powder, salt and pepper to taste. Mix well with your hands. Transfer mixture to baking pan. Bake for 30 to 35 minutes or until golden brown.
- Serve this comforting loaf on a bed of peppery arugula or spinach.

## Curry

The active ingredient in most curries - turmeric - is the source of a special polyphenol called curcumin, which enhances the birth of new brain cells, essential for optimal learning, memory, and mood.

# MEMORY MORSELS®

— A WOMEN'S BRAIN HEALTH INITIATIVE —

Your diet is crucial to the maintenance of a healthy brain and functional independence as you get older. Memory Morsels® is a website dedicated to delicious, brain health recipes, brain health tips (our morsels), and great information to help keep your brain functioning the way you want.

*Excerpt from Joyous Health by Joy McCarthy, Holistic Nutritionist joyoushealth.com. Photography by Nicolas Collister*

# Ma McCarthy's Baked Apples and Pears

## INGREDIENTS

1 cup (250 mL) raisins  
1 cup (250 mL) finely chopped walnuts  
1 tsp (5 mL) cinnamon  
2 apples, unpeeled  
2 pears, unpeeled  
1/4 cup (120 mL) apple juice or filtered water  
1/4 cup (60 mL) coconut butter  
2 tbsp (30 mL) dark real maple syrup (optional)

## INSTRUCTIONS

1. Preheat oven to 400 F.
2. In a medium bowl, stir together raisins, walnuts and cinnamon. Set aside.

3. Cut apples and pears in half and remove the cores. In a shallow baking dish, arrange apples and pears cut side up. Pour enough apple juice over fruit to come 1/2 inch (1 cm) up the side of the pan. Spoon raisin-walnut mixture into the fruit cavities. Cover dish with a lid or foil and bake for 30 minutes or until soft.

4. Once fruit is cooked, place coconut butter in a small pot and warm it over the lowest heat until it becomes creamy. (It will not melt the way coconut oil does.) Be sure not to burn it.

5. Serve apples and pears topped with warmed coconut butter and drizzled with maple syrup if you like.

## Apples

The powerful antioxidant in apples protects brain cells against oxidative stress, helping you to think clearly, boost your memory, and contributes to overall good health.



For more recipes, morsels, and the latest from our Featured Foodie, Joy McCarthy, visit [memorymorsels.org](http://memorymorsels.org).

*Excerpt from Joyous Detox by Joy McCarthy, Holistic Nutritionist joyoushealth.com. Photography by Christopher Bodnar.*

# Beet Cashew Dip

## INGREDIENTS

3 beets, unpeeled, cut into chunks  
2 cups cashews, soaked in water for 3 hours or overnight  
1 garlic clove  
1/4 cup extra-virgin olive oil  
Juice of 1 lemon  
1/2 tsp sea salt  
Black pepper to taste

## INSTRUCTIONS

1. Preheat oven to 350 F degrees. Place beets in a covered baking dish with 1/4 inch of water. Bake for 45 to 50 minutes or until beets are fork tender. Let cool slightly once cooked.
2. In a food processor, combine beets, cashews, garlic, extra-virgin olive oil, lemon juice, sea salt, and pepper. Blend until smooth or desired consistency.

2. Store in an airtight container for up to one week.

*From Joy McCarthy, Holistic Nutritionist, Best-selling Author, joyoushealth.com*

## Beets

Beets contain nutrients that fight inflammation and enhance oxygenation, improving brain neuroplasticity to guard against age-related cognitive decline.





# THE HOPE-KNOT

SO YOU CAN REMEMBER THE WOMEN IN YOUR LIFE. WE'VE CREATED AN ICON YOU WON'T FORGET.

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The Hope-Knot is a symbol of the importance of our thoughts and memories, and the interwoven connections that make life meaningful. This holiday season and everyday, celebrate the women in your life - your mother, wife, daughter, sister or best friend - with a gift of brain health.

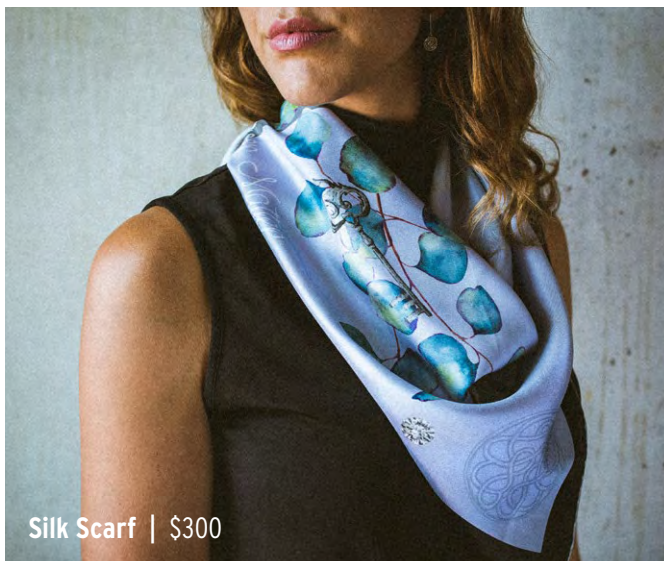
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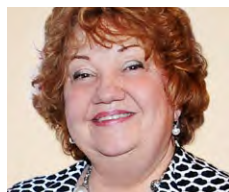
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Women's Brain Health Initiative is a charitable non-profit organization that funds research and creates education programs to combat brain-aging diseases that affect women. We rely on philanthropic gifts to support these endeavours.

**When women support each other, incredible things happen.**

We are truly grateful to:



and all those who generously supported this publication:

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Women's Brain Health Initiative is a national charitable foundation raising funds for research and education to combat brain-aging diseases that affect women.

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