Healthy Brain Aging: Consider the Possibilities

Maria C. Carrillo, Ph.D.
Medical & Scientific Relations
Outline

• Landscape of Alzheimer’s disease and other dementias

• Risk Related to Alzheimer’s disease
  – Factors that are not modifiable
  – Factors that may be modifiable (cardiovascular risk factors, lifestyle risk factors and other related risk factors)

• Women and Alzheimer’s

• What does this mean for you
Growing Epidemic in the United States

5.3 million Americans of ALL Ages will have Alzheimer’s in 2015

6 TH LEADING CAUSE OF DEATH IN THE U.S.

Of the top 10 killers, Alzheimer’s is the only one that cannot be prevented, cured or even slowed.

$1.1 TRILLION IN 2050

$226 BILLION IN 2015

Total cost of care for those with Alzheimer’s, with more than two-thirds paid by Medicare and Medicaid

Source: Centers for Disease Control and Prevention cdc.gov/nchs/artst/leading-causes-of-death.htm
Landscape of Alzheimer’s Hope In Research

- 6th leading cause of death across all ages
- 5th leading cause of death for those aged 65 and older
- Only cause of death among the top 10 in America without a way to prevent, cure or even slow its progression.

- Change in the Number of Deaths: 68%
- Between 2000 and 2010

Based on preliminary 2010
Changing the Trajectory Report

DELAYED ONSET
If we develop a treatment by 2025 that delays the onset of Alzheimer’s by just five years, then:

5.7 MILLION people expected to develop Alzheimer’s would not in 2050.

Families would save $87 billion in 2050.

In total, America would save $367 billion in 2050.
Federal Advocacy 2014

Challenge
Needed to move past status quo and on to growth
For that, no substitute for Congressional engagement
$350 million proposed by US Senate for Alzheimer's research

• US House of Representatives proposed a bill to increase funding for Alzheimer’s research by $300 million
• Senate increased to 350M
• If approved, biggest increase in Alzheimer’s research funding ever.
• Be informed, get involved at alz.org/advocate
Alzheimer’s Accountability Act

Then… AAA requires the NIH to submit this Alzheimer’s budget *directly* to Congress and the President.

With comment only from the Secretary of HHS and the Alzheimer’s Advisory Council.
Global Funder in Alzheimer’s Research

• Currently funding over $80 million to more than 350 active projects in 21 countries
• More than $355 million since our first award
• Most Impactful Non-Profit Funder of AD

Thompson Reuters Web of Science, 2014
LOCAL Funder of Alzheimer’s Research

- $5.32 million to 28 awards since 1993 funded in Orange County
- Currently active - 6 awards $850,000
Global Funder in Alzheimer’s Research
Dementia & Alzheimer’s disease

- Dementia is the loss of memory due to changes in the brain
- Alzheimer’s is the most common form
- Biomarkers increase certainty of diagnosis, but definitive diagnosis by autopsy only
- Many mixed cases
- Many memory disorders reversible, not true dementia

**Alzheimer’s**
50%-75%

**Vascular**
20%-30%

**Lewy Bodies**
10%-25%

**Frontotemporal**
10%-15%

**MIXED DEMENTIA**
>1 NEUROPATHOLOGY - PREVALENCE UNKNOWN

An “umbrella” term used to describe a range of symptoms associated with cognitive impairment.
What is Cognitive Aging

Key Features

Inherent in humans and animals as they age

Occurs across the spectrum of individuals as they age regardless of initial cognitive function

Highly dynamic process with variability within and between individuals

Includes some cognitive domains that may not change, may decline, or may improve with aging, and there is the potential for older adults to strengthen some cognitive abilities

Only now beginning to be understood biologically yet clearly involves structural and functional brain changes

Not a clinically defined neurological or psychiatric disease and does not inevitably lead to neuronal death and neurodegenerative dementia (such as in Alzheimer disease)

Blazer et al. JAMA. 2015;313(21):2121-2122
Cognitive Function, By Age

FIGURE 3-2 Differences in cognitive functioning by age based on different cognitive tests, Midlife in the United States Study II (MIDUS II), N = 4,268, United States, 2004–2006.
Developing Brain Gives Clues to Brain Change with Age

FIGURE 3:
Synapse Density Over Time

Source: Coreil, JL. 
The postnatal development of the human cerebral cortex. 
Age Related Changes

• Many changes of our bodies as we age, including our brains

• Examples of changes in brain with age:
  – Shrinkage of specific parts of brain, especially prefrontal cortex, hippocampus.
  – Changes in how brain cells communicate.
  – Changes in the brain’s blood vessels/ blood flow.
  – Damage by free radicals increases.
  – Increase in inflammation.

Adapted from NIA/NIH’s Alzheimer’s Disease: Unravelling the Mysteries
Summary of the evidence on modifiable risk factors for cognitive decline and dementia: A population-based perspective

Matthew Baumgart\textsuperscript{a}, Heather M. Snyder\textsuperscript{b,\textsuperscript{*}}, Maria C. Carrillo\textsuperscript{b}, Sam Fazio\textsuperscript{c}, Hye Kim\textsuperscript{a}, Harry Johns\textsuperscript{d}

\textsuperscript{a}Division of Public Policy, Alzheimer's Association, Washington, DC, USA
\textsuperscript{b}Division of Medical & Scientific Relations, Alzheimer’s Association, Chicago, IL, USA
\textsuperscript{c}Division of Constituent Relations, Alzheimer’s Association, Chicago, IL, USA
\textsuperscript{d}President & CEO, Alzheimer’s Association, Chicago, IL, USA
Statement of Evidence: Modifiable Risk Factors for Cognitive Decline & Dementia

(1) Regular physical activity and management of cardiovascular risk factors (diabetes, obesity, smoking, and hypertension) have been shown to reduce the risk of cognitive decline and may reduce the risk of dementia;

(2) Healthy diet and lifelong learning/cognitive training may also reduce the risk of cognitive decline;

(3) There are still many unanswered questions and significant uncertainty with respect to the relationship between individual risk factors and dementia.
Risk Related to Cognitive Decline: Possibly Able to Modify Behaviors

- Cardiovascular Risk Factors:
  - Diabetes
  - Mid-Life Obesity
  - Mid-Life Hypertension
  - Cholesterol
Cardiovascular Risk Factors: Mid-Life Obesity

- 10+ studies = mid-life obesity associated with increased risk of dementia
- Mid-life obesity measured by BMI

Cardiovascular Risk Factors: Mid-Life Obesity

11,169 long-term Kaiser members

- Underweight (<18.5)
- Normal (18.5-24.9)
- Overweight (25-29.9)
- Obese (30+)

Whitmer et al., BMJ 2005.
Cardiovascular Risk Factors: Mid-Life Hypertension and Cholesterol

- Mid-life hypertension or cholesterol relationship with cognitive decline/dementia not consistent
- Several studies have shown hypertension medications may reduce cognitive decline

National Cholesterol Education Program Cholesterol Guidelines

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<td>HDL Cholesterol</td>
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<tr>
<td>Triglycerides</td>
<td>Less than 200</td>
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http://www.eqpdi.com/2014/02/do-you-understand-your-cholesterol.html
Risk Related to Cognitive Decline: Possibly Able to Modify Behaviors

• Lifestyle Risk Factors:
  • Current Smoking
  • Physical Activity
  • Diet
  • Cognitive training/ lifelong learning
Lifestyle Risk Factors: Current Smoking

- Over 25 studies (n>50,000) show current smoking linked to increased risk of cognitive decline and possibly increased risk of dementia

Lifestyle Risk Factors: Physical Activity

- Numerous studies suggest physical activity decreases risk of cognitive impairment and may possible reduce risk of dementia
- ADCS launching exercise intervention for individuals with MCI (Baker/ Cotman)

**Exercise Improves Cognition in Older Adults with MCI**

170 adults age ≥ 50 yrs
Lifestyle Risk Factors: Diet

- Limited, conflicting information on role of diet
- For example, Mediterranean diet has shown positive risk reduction effects
- Alcohol consumption in older adults may decrease the risk of cognitive decline and dementia
Risk Related to Cognitive Decline & Dementia

Years of formal education
People with fewer years of formal education or reduced literacy are at a higher risk for dementia than those with more years of formal education.

Head Injury:
Moderate or severe traumatic brain injury have been shown to increase the risk of developing certain types of dementia.
Lifestyle Risk Factors: Cognitive Training / Lifelong Learning

• More than 35 large, rigorous studies of mental engagement/cognitive training show improvements in immediate and delayed recall
• Unclear whether benefit due to cognitive intervention.
• “Recipe” for any successful engagement is unknown.
Risk Related to Alzheimer’s:
Possibly Able to Modify Behaviors

- Other Risk Factors:
  - Depression
  - Sleep
Other Risk Factors: Depression

• 1 in 5 individuals will have depressive symptoms in a lifespan

• Depressive symptoms and dementia:
  – After someone diagnosed or in reaction to early cog. decline
  – May impair cognitive function and lead to “pseudodementia”
  – May be a risk factor or early symptom of dementia

• Nearly 20 studies with combined > 100,000 individuals show history of depression increases risk for dementia

Li, G et al. JAMA Psychiatry 2011, 68 (9)

Byers AL and Yaffe K, Nat Rev Neurol 2011, 7 (6).
Other Risk Factors: Sleep

• More than three dozen randomized controlled trials of mental engagement/cognitive training interventions show improvements in immediate and delayed recall among those in the treatment group compared with the control group.
• A systematic review of observational studies reached similar conclusions.
• Unclear whether benefit due to cognitive intervention.
• Most studies in this area of research fairly small, the data overall are inconclusive, and (as with physical activity) the “recipe” for any successful engagement is unknown.
Factors that Increase/Decrease Risk of Cognitive Decline

Fig. 1. Strength of evidence on risk factors for cognitive decline.
Factors that Increase/Decrease Risk of Dementia

Fig. 2. Strength of evidence on risk factors for dementia.
FINGER Study: Receipe of Lifestyle Interventions for Cognition

- Gold standard of testing any type of therapy or intervention – Randomized Control Trial (RCT)
- Large, rigorous study of 1,200 individuals
  - Half received intervention and half received standard of care
- First solid evidence that recipe of lifestyle interventions reduces cognitive decline
- Needs to be replicated in more diverse populations

*Kivipelto et al., Alzheimer & Dementia 2013*

Partially funded by the Alzheimer’s Association
ALZHEIMER’S DISEASE is impacting FAR TOO MANY WOMEN

3.2 million living with ALZHEIMER’S

60% OF CAREGIVERS

alzheimer’s association™

THE BRAINS BEHIND SAVING YOURS™
OVER 60% of Alzheimer’s and dementia caregivers are WOMEN.

WOMEN are at the epicenter of the Alzheimer’s epidemic.

In her 60’s, a woman’s estimated lifetime risk of developing Alzheimer’s is 1 IN 6. For breast cancer it is 1 IN 11.

Today, nearly 2/3 of Americans living with Alzheimer’s are WOMEN.

More WOMEN than MEN stopped working to provide care for someone with Alzheimer’s.

11% vs 5%
Two-Thirds of Care Partners are Women (~10 million)

- Almost half express providing care is physically stressful (2x more than males)
- 62% of women find providing care emotionally stressful
- Providing care is isolating, but for women, this is more commonly linked to depression
Impact of Caregiving on Women in the Workplace

- 20% from full time to part time employment
- 19% quit work as a result of caregiving
- 18% took leave of absence from work
- 10% lost job benefits
- 17% feel they were penalized as a result of caregiving duties
Duration & Course of Illness Different for Men and Women

- Duration of AD: Women 5.3, Men 4.7
- Nursing Home Stay: Women 5.0, Men 2.8
- Community: Women 0.3, Men 2.0

Yang and Levey, Women’s Health Issues 2015
Lifetime Risk is Greater for Women

Yang and Levey, Women’s Health Issues 2015
Lifetime Out of Pocket, Informal & Third Party Costs Greater for Women

Assisted Living
- Women: $6,882
- Men: $1,084

Home Health Care
- Women: $9,281
- Men: $1,462

Informal Care
- Women: $54,956
- Men: $8,659

Medicare
- Women: $15,543
- Men: $13,351

Medicaid
- Women: $16,919
- Men: $9,855
Further evidence that women are the epicenter of the Alzheimer's epidemic:

- **More women are living with Alzheimer’s disease.**
  - Duration of the disease for women is also longer than for men.
  - Women are more likely to live in a nursing facility than men.
- **Women bear the burden of caregiving more than men.**
- **Women bear a greater economic burden from Alzheimer’s.**
  - Women more likely to be lower-income & rely on Medicaid than men.
  - As caregivers, women are more likely drain finances than men.

Yang and Levey, Women’s Health Issues 2015
What should I be doing now?
In Summary …

• Cognitive decline as we age; this is not Alzheimer’s disease or dementia.

• Regular physical activity & management of cardiovascular risk factors (e.g. diabetes, obesity, smoking, and hypertension) have been shown to reduce the risk of cognitive decline and may reduce the risk of dementia.

• Healthy diet and lifelong learning/cognitive training may also reduce the risk of cognitive decline.
A future without Alzheimer's

The race is on. Alzheimer's and related dementias research is a dynamic field, and momentum builds each year. This site is for professional researchers and anyone interested in following the progress in research. The Alzheimer's Association has been involved in every major advancement in Alzheimer's and related dementias research since the 1980's and is a leader in the global fight for a world without Alzheimer's.

www.alz.org/research
THE END OF ALZHEIMER’S STARTS WITH YOU

alzheimer’s association

alz.org