BRAIN, BODY AND HEART FOR COGNITIVE HEALTH AND DEMENTIA PREVENTION

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• The evidence behind YBM
• Modifiable risk factors – what we know
• Preventative health strategies for people with dementia
8. PREVENTATIVE STRATEGIES FOR THOSE DIAGNOSED WITH DEMENTIA

Many of the preventative strategies addressed in Alzheimer's Australia’s Your Brain Matters program are also likely to benefit people diagnosed with dementia. Remaining active and socially engaged, treating depression and managing cardiovascular risk factors may help slow the progression of cognitive decline in those with dementia.

Management of dementia should include preventative approaches to maintain health and wellbeing as much as possible. The management of comorbid conditions may have to be modified in the presence of dementia according to the person's declining ability to self-manage their healthcare.

Drugs with anticholinergic effects can worsen cognition in those with Alzheimer's disease and contribute to their confusion. The use of such drugs should be minimised in people with Alzheimer's disease and other dementias.

8.1 DEPRESSION

Depression is a common comorbidity in dementia and is itself associated with cognitive impairment. Continued antidepressant use has been associated with a reduced rate of cognitive decline in people with depression and Alzheimer's disease, compared to non-depressed and untreated depressed people with Alzheimer's [126]. Depression has also been identified as a risk factor for early transition to residential care in people with dementia, with antidepressant treatment seeming to protect against this outcome [127].

Depression has consequences detrimental to people with dementia and should be managed with appropriate behavioural and/or pharmacological treatments, with careful monitoring to determine effectiveness and any adverse effects [8].

8.2 VASCULAR RISK FACTORS

Careful treatment of hypertension (while avoiding episodes of low blood pressure), high cholesterol and diabetes (particularly avoidance of hypoglycemia) is recommended for those with vascular dementia [8]. It is likely to be also important for people with other forms of dementia including Alzheimer's disease.

Treating hypertension, high cholesterol and diabetes has been associated with slower progression of dementia. For people with Alzheimer's disease without cardiovascular disease, vascular risk factor treatment was associated with significantly less cognitive decline over an average follow up time of 2.3 years [128]. In this study, only 7% of the Alzheimer's disease patients had no vascular risk factors, suggesting they are common in the dementia population. Neuroradiology studies have also demonstrated benefits of cardiovascular risk factor treatment in people with dementia, such as slowed progression of white matter lesions [129].

8.3 MENTAL STIMULATION

There is ongoing research to determine whether cognitive training can improve, maintain or slow decline of cognitive function in dementia. A meta-analysis of the literature on cognitive training for people with Alzheimer's disease concluded that it may improve cognitive and functional abilities, or at least slow the rate of decline [130].

Cognitive rehabilitation programs that focus on real life activities and provide education to improve self-management, rather than training specific cognitive skills, may be more beneficial [25].

There is also evidence that cognitive and functional decline in dementia may be delayed by continued participation in mentally stimulating activities [8,131]. People with dementia should be encouraged, as far as possible, to maintain their usual hobbies and activities. While adjustments may be needed as dementia progresses, keeping socially involved and mentally active may be important for the person's cognitive and functional status and mental wellbeing.

8.4 PHYSICAL ACTIVITY

There is good evidence to recommend an individualised exercise program for people with mild to moderate dementia [131]. Benefits include increased strength, fitness, and improvements in cognitive and functional performance [132]. A randomised controlled trial of nursing home residents with Alzheimer's disease reported that a simple exercise program (1 hour twice a week), compared with routine medical care, was associated with slower functional decline [133].

An Australian randomised controlled trial of older people with subjective memory complaints found that a six-month physical activity intervention resulted in improved cognition over 18 months follow up [134]. This trial is currently being repeated in patients with Alzheimer's disease.

Physical exercise should be continued for as long as possible for people with dementia as it can help prevent muscle weakness, mobility problems, falls and other health complications. It may also help promote a normal day-night routine, improve mood, increase social participation and reduce stress and depression.

8.5 DIET

Eating a well-balanced diet can be beneficial for those with dementia, giving the person more energy and helping to avoid health problems. Eating or drinking too little or missing out on essential nutrients can increase confusion. Special attention needs to be paid to avoid or deal with obesity or loss of weight, to ensure an adequate dietary intake of vitamins and minerals, and to avoid dehydration [8].

Higher adherence to the Mediterranean diet has been associated with lower mortality in people with Alzheimer's disease [135]. For each additional point on an adherence scale of 0 to 9, patients had a 24% lower risk of dying over 4.4 years of follow up, suggesting a dose-response effect. A balanced diet low in saturated fat and high in vegetables and fruit may increase survival in patients with dementia.

Soybean is a food, taken as a daily drink, which contains a potent combination of nutrients and aims to improve synaptic formation and function. Recent clinical trial results suggest that it improves memory performance and brain functional connectivity in people with mild Alzheimer's disease [136]. It is currently being tested in people with prodromal Alzheimer's disease. Soybean is not yet approved or available for use as a therapy for Alzheimer's disease.
PREVENTION IS IMPORTANT
DEMENTIA EPIDEMIC

- Over 300,000 Australians have dementia in 2013
- Almost 1 million Australians will have dementia in 2050
COMBATING THE EPIDEMIC

• There is no cure for dementia
• Clinical trials of new medications have so far been unsuccessful, but watch this space
• Preventative health approaches to reduce risk factors currently provide the best hope

Nepal et al, 2010
COMBATING THE EPIDEMIC

• The future numbers of people developing dementia can be reduced by reducing risk factors in the community (Barnes & Yaffe, 2011)
  • 2% type 2 diabetes
  • 2% midlife obesity
  • 5% midlife high blood pressure
  • 11% depression
  • 13% physical inactivity
  • 14% smoking
  • 19% cognitive inactivity / low education

• If 25% lower prevalence of these risk factors → 3 million fewer AD cases worldwide
COMBATING THE EPIDEMIC

• The future numbers of people developing dementia can be reduced by reducing risk factors in the community (Ritchie et al, 2010)
  • 5% type 2 diabetes
  • 6% fruit & vegetable consumption
  • 7% apoe4 gene
  • 10% depression
  • 18% intelligence / education

• Modifiable factors have as much or more impact as the major risk gene for AD
IS PREVENTION POSSIBLE?
ALZHEIMER’S PREVENTION PATHWAY

Primary Prevention
- Healthy
- No Disease
- No Symptoms

Secondary Prevention
- Pre-symptomatic AD
- Early Brain Changes
- No Symptoms

Tertiary Prevention
- Mild Cognitive Impairment
- AD Brain Changes
- Mild Symptoms
- AD
- Moderate to Severe Impairment

Disease Progression
Keeping your brain active matters

Being fit and healthy matters

Looking after your heart matters
KEEPING YOUR BRAIN ACTIVE MATTERS

• Keep your brain challenged and be socially active
MENTAL ACTIVITY

- Lower risk of dementia is associated with:
  - Higher levels of education
  - More mentally demanding occupations
  - Participating in more intellectually stimulating leisure activities

- Mental activity may provide greater “brain reserve”, associated with 46% reduced risk of dementia (Valenzuela & Sachdev, 2006)

- Cognitive and functional decline in dementia may be delayed by continued participation in mentally stimulating activities

- Cognitive rehabilitation and cognitive training may provide benefits for people with MCI or dementia
SOCIAL ACTIVITY

• Lower risk of dementia is associated with:
  • Engaging in more social activities
  • Having larger social networks
  • Lower perceived loneliness
  • Being married

• Social activity may reduce risk by contributing to cognitive brain reserve, improving mental health

• Social participation can be beneficial for people with dementia
Eat healthy and participate in regular physical activity
ALCOHOL

• Moderate alcohol consumption is associated with reduced risk of dementia, AD and VaD (Anstey et al, 2009)

• Moderate alcohol consumption may offer protection by reducing cardiovascular risk, increasing brain blood flow, reducing inflammation

• Any type of alcohol is beneficial – antioxidants and ethanol may both be involved

• Heavy alcohol consumption / binge drinking may be associated with increased risk of dementia
DIET

- Higher intakes of saturated fats and trans fats are associated with increased risk of dementia
- Higher intakes of monounsaturated and polyunsaturated fats are associated with lower risk of dementia
- Evidence is limited that omega-3 fats reduce dementia risk; fish may be beneficial
- Antioxidants may have protective effects
- Higher fruit and vegetable intake associated with lower dementia risk
- Mediterranean diet associated with lower dementia risk
• Eating a well balanced diet can be beneficial for those with dementia
• Benefits include more energy, avoiding health problems, avoiding worsening cognitive symptoms
• Eating or drinking too little or missing out on essential nutrients can increase confusion and cognitive impairment
PHYSICAL ACTIVITY

• PA in early, mid and late life is associated with lower risk of cognitive decline and dementia
• Aerobic activity and resistance/strength training may be beneficial
• Moderate activity is beneficial; may also be a “dose” effect, so greater intensity confers greater benefit
• 25% ↓ in physical inactivity could lower AD prevalence by 1 million cases worldwide (Barnes & Yaffe, 2011)
• Benefits of PA for people with dementia include increased strength and fitness, improvements in cognitive and functional performance
PHYSICAL ACTIVITY & THE BRAIN

• PA may contribute to brain health by:
  • improving blood and oxygen flow to the brain
  • supporting function and survival of neurons
  • stimulating new synapses and neurons
  • contributing to brain reserve
  • reducing cardiovascular risk factors
  • reducing inflammation
LOOKING AFTER YOUR HEART MATTERS

- What is good for the heart is good for the brain
BLOOD PRESSURE

- High blood pressure (hypertension) is associated with increased risk of stroke and VaD
- High blood pressure in midlife may increase risk of AD
- Treatment of hypertension found to reduce risk of cognitive decline and dementia
- Hypertension may lead to dysfunction of the blood vessel lining, mini-strokes and major stroke
- Blood vessel changes could also affect the vascular clearance of beta amyloid
- Treating hypertension is associated with less cognitive decline and slower progression of dementia
BODY WEIGHT

- Obesity (BMI > 30) and underweight (BMI < 18) at midlife are associated with increased risk of dementia, including AD (Anstey et al, 2011)
- Weight reduction has not as yet been shown to reduce the risk of dementia
- Adipose tissue may affect brain function, or poor diet and lack of exercise may affect risk for both obesity and dementia
- In old age, those who are underweight or are losing weight are found to be at increased risk of dementia
CHOLESTEROL

• High total cholesterol at midlife associated with increased risk of dementia, especially AD (Anstey et al, 2008)
• Treatment with statins possibly associated with reduced risk of dementia
• Cholesterol decreases in preclinical phase of AD, so late life high cholesterol not associated with increased risk
• High cholesterol levels may contribute to:
  • accumulation of beta amyloid
  • oxidative stress
  • cerebrovascular disease
• Treating high cholesterol associated with less cognitive decline and slower progression of dementia
DIABETES

- Diabetes associated with increased risk of MCI and dementia, including AD and VaD
- Treatment of diabetes not yet shown to reduce dementia risk, but a few studies show benefits
- Preventing type 2 diabetes may help prevent dementia
- Diabetes and pre-diabetes syndromes contribute to:
  - cerebrovascular disease
  - inflammation and oxidative stress
  - reduced clearance of beta amyloid
- Treating diabetes associated with less cognitive decline and slower progression of dementia
SMOKING

• Smoking is a risk factor for cognitive decline, dementia, AD and VaD (Anstey et al, 2007)

• Current smokers have increased risk, former smokers do not

• Risk of dementia increased with increasingly heavy smoking (“dose” effect)

• Smoking increases oxidation, inflammation, atherosclerosis, cardiovascular and cerebrovascular disease
ALZHEIMER’S DISEASE

The graph illustrates the progression of various biomarkers across different clinical disease stages: normal, cognitively normal, MCI, and dementia. The biomarkers include:

- Aβ: Amyloid beta, a protein that aggregates in plaques in the brain.
- Tau-mediated neuronal injury and dysfunction: A protein that contributes to neurodegeneration.
- Brain structure: Changes in brain anatomy.
- Memory: Decline in cognitive function.
- Clinical function: Changes in daily living abilities.

The y-axis represents the biomarker magnitude, ranging from normal to abnormal, while the x-axis is the clinical disease stage.
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FOR MORE INFORMATION
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