



# *food* for the MIND

A collaboration between  
NUS Mind-Science Centre  
NUH Memory Clinic  
NUH Dietetics

# • nutrition and brain health

“Older adults aged 65 years and above with good nutritional status are more than 2 times likely to age successfully.” (Ng, Broekman, Niti & Kua, 2008)

As life expectancies increase, the need to promote and identify factors related to healthy ageing becomes more important than ever.

A core feature of ageing is **neurodegeneration**, the progressive loss of neurons in the brain, which leads to cognitive decline and in severe cases, dementia. Although neurodegeneration is largely a biological process, an individual's **lifestyle choices** are likely to make an impact on the maintenance of brain health.

The brain consumes approximately 20% of the energy produced by the food we eat – greater than any other organ in the body. Diets consisting of **high quality and nutrient-dense foods** have been shown to stave off the process of neurodegeneration. Moreover, nutrient-dense diets are also protective against the development of chronic cardiovascular diseases – which are also risk factors of neurodegeneration. Conversely, dietary deficiencies can compromise cognitive functioning as well.

This means that how much we eat and the types of food we supply the brain impact how sharp and alert our minds are.



# debunking common dietary myths amongst older adults

## myth #1

“It is important to take over-the-counter supplements to keep my mind sharp and to ensure that I meet my dietary requirements.”



While over-the-counter supplements can be used to supply the nutrients required to meet our daily needs, studies regarding their efficacy have shown mixed results. It is recommended that we meet our daily nutrient requirements through **whole foods** as they contain fibre and other important nutrients (e.g., vitamins & minerals) that confer health benefits as well.

## myth #2

“I am old... I should be allowed to eat whatever I want. There is no point in trying to follow a healthy lifestyle.”

Bad eating habits, such as a diet that is high in saturated fats, salt and sugar, as well as excessive alcohol consumption, contribute to poor cardiovascular health and weight gain. Research has shown that the development of diabetes, high blood cholesterol and high blood pressure, as well as being overweight or obese, increases the risk of older adults **developing dementia** by nearly two times and **reduces the quality of life**.



*Practical tip!*

*Instead of using salt and monosodium glutamate (MSG) to season your food, use natural food or herbs and spices, such as lemon, tomatoes, basil, cilantro, dill, pepper, garlic, etc.*

## myth #3

“There is no need to eat – I don’t even feel hungry!”

Older adults often find themselves with reduced appetites. While there are several causes (e.g., side effects from medication, depression, illness, and changes in hormonal regulation), reduced food intake is of concern and should not be dismissed as a normal sign of ageing. As we grow older, our nutritional needs remain the same, and thus **we need to ensure that we continue receiving the nutrients our bodies need**. Reduced food intake may lead to nutritional deficiencies, which in turn could lead to declines in cognition, functional status and quality of life.

*Practical tip! For older adults with reduced appetites, protein-rich snacks should be taken between meals, to increase calorie intake.*



Soya bean milk or curd



Yoghurt with fruits



Mung bean soup

# essential nutrients

Research has identified the following nutrients to be essential in maintaining optimal cognitive functioning.

## antioxidants

Reactive oxygen species (“free radicals”) are formed when cells respire to generate energy. As the brain requires a lot of energy to function, large quantities of free radicals can be found in the brain.

Free radicals are toxic in nature – they induce oxidative stress by “attacking” cells. This results in constant cellular damage to the body. The damage accumulated contributes to cell death, which has been hypothesized to drive the ageing process.

Antioxidants, such as Vitamins A, C and E, exert a **protective effect** by allowing the body to neutralize and remove free radicals before they begin their “attack”. While our bodies produce natural antioxidants, they should also be taken as part of our daily diets to **optimize cellular function**.

Some common dietary sources of antioxidants include: Goji berries, oranges, blueberries, sweet potatoes, garlic, broccoli, spinach and tomatoes. The daily recommended amounts for Vitamin A, C and E for seniors aged  $\geq 60$  are 750 mcg, 85-105 mg and 15mg, respectively.

### Good sources of antioxidants



Goji berries



Oranges



Spinach

## Good sources of Vitamin B12



Mackerel



Beef



Eggs

## Good sources of Vitamin D



Tuna



Milk



Egg yolks

# B-vitamins

Elevated levels of homocysteine (a type of amino acid found in the blood) are associated with poorer cognitive outcomes and cardiovascular health in elderly adults.

B-vitamins are essential in keeping homocysteine levels low. Elderly adults who report memory impairment are often found to have **vitamin B12 deficiency**, which can occur due to the reduced ability of the stomach in absorbing vitamin B12. Hence, it is recommended that older adults increase their intake of vitamin B12 beyond the daily requirement of 2.4 mcg, through dietary means.

Good dietary sources of vitamin B12 include milk, soy products, eggs, fish (e.g., mackerel, salmon) and lean red meat (beef, pork).

*While supplementation with vitamin B12 has been identified to be a potential intervention in which memory impairment could be reversed, its efficacy remains debatable.*

# vitamin D

Several studies have demonstrated that lower vitamin D levels in older adults are associated with cognitive decline.

Vitamin D **protects the brain against neurodegeneration**. It plays a role in the clearance of beta-amyloid plaques in the brain, which have been implicated as the root cause of Alzheimer's disease. Vitamin D helps us to **maintain our muscle strength**, and allows our bodies to absorb calcium, which is essential in **maintaining bone health**.

For most healthy adults, spending time in the sun for approximately 30 minutes each day allows our skin to produce sufficient levels of Vitamin D to meet our daily needs. However, as we age, the skin becomes less efficient in producing Vitamin D, thus increasing our risk of Vitamin D deficiency. Hence, it is important that older adults obtain adequate Vitamin D from their diets.

Key sources of Vitamin D are oily fish (e.g., salmon, tuna), cheese, milk and egg yolks. The daily recommended intake for Vitamin D is 2.5 mcg.

# essential fatty acids

The truth is that not all types of dietary fats are equal. Saturated and trans fats are “bad” fats as they are associated with increased levels of bad cholesterol (“LDL”) in the body. However, the consumption of monounsaturated and polyunsaturated fats is highly encouraged, as they confer many health benefits.

**Omega-3 fatty acids** (a type of polyunsaturated fat) have received much attention for its role in the promotion of healthy ageing. The consumption of omega-3 fatty acids **lowers cardiovascular risks** (lowered blood pressure, cholesterol and lipid levels). Its **anti-inflammatory** properties render them useful for older patients with rheumatoid arthritis.

Furthermore, omega-3 fatty acids are **neuroprotective**, and are hypothesized to reduce the production and buildup of amyloid plaques that cause Alzheimer’s disease. Supporting this, some researchers have found that an increased intake of omega-3 fatty acids is associated with reduced rates of cognitive decline.

Sources of Omega-3 fatty acids include oily fish (e.g., salmon, mackerel etc.), walnuts, canola/olive oil, tofu, eggs, spinach.

## Good sources of omega-3 fatty acids



Salmon



Walnuts



Tofu

# nootropics

Nootropics (also known as cognitive enhancers) are taken to **maximize higher-order mental processes** involving the brain’s executive function, such as planning, organizing and flexible thinking.

However, most research investigating the effectiveness of nootropics has yielded mixed results. Moreover, certain classes of nootropics may interact with existing medications to cause unpleasant side effects. Hence, **a dietician or clinician should always be consulted**, before consuming a new nootropic supplement.



# ginkgo biloba



Ginkgo biloba, an herbal extract, is used widely in the treatment of tinnitus, vertigo and dizziness due to its ability to improve blood flow to the brain, and overall blood circulation.

There is promising evidence of the **neuroprotective** benefits conferred by Ginkgo biloba in the prevention of cognitive decline. Its intake has been associated with improved test performances in patients diagnosed with cognitive impairment and dementia, although this benefit has not been replicated in healthy older adults.



While ginkgo supplements made from its leaves are generally safe, **ginkgo seeds** (especially when untreated) are **highly toxic** – its consumption may lead to loss of consciousness, seizures and even death.



## caffeine & L-theanine

Many people consume caffeinated beverages daily. Caffeine is a stimulant – it is known to improve cognitive performances by **increasing attention and mental alertness**. For individuals who are sensitive to caffeine, ingesting it may induce anxiety, irritability and higher blood pressure.

However, L-theanine can reduce these unwanted side effects from caffeine. Moreover, L-theanine magnifies the attentional benefits of caffeine. Research has shown that taking caffeine and L-theanine together **increases speed and accuracy in cognitive tasks**, and helps to decrease distraction. It is best to take it without added sugar.

L-theanine and caffeine can be found in both green tea and black tea.

## curcumin

Curcumin is a compound commonly found in turmeric – a spice used in curries.

Curcumin is known for its **antioxidant and anti-inflammatory properties**; a study revealed its therapeutic potential in alleviating pain in sports injuries, arthritis, etc.

It has been suggested that curcumin prevents the formation of beta-amyloid plaques and hence, is able to **delay the onset of cognitive decline and dementia**.



# the MIND diet

Although each nutrient is essential, research investigating the impact of single nutrients on cognitive functioning has yielded mixed results.

In contrast, whole diets that **prevent cognitive decline by improving cardiovascular health** have been shown to be effective. Such diets include the Mediterranean diet and the DASH (Dietary Approaches to Stop Hypertension) diet.

Nutrients work together synergistically – it is crucial that whole diets include a **combination of nutrients in optimal amounts** to promote brain health.

As neither diet is specific to the nutrition literature on dementia prevention, the **MIND diet** (Mediterranean-DASH Diet Intervention for Neurodegenerative Delay) was formulated. This is a combination of both diets but modified to include only foods associated with the prevention of dementia based on past research. Adherence to the MIND diet has been found to **reduce cognitive impairment and dementia** to a greater extent than either the Mediterranean or DASH diet alone.



Use olive oil as the primary cooking oil



Fish (especially fatty ones high in omega-3:  $\geq$  once per week



Whole grains:  $\geq$  3 times per day (e.g. brown rice, wholemeal bread, oatmeal etc.)



Poultry (non-fried):  $\geq$  twice per week



Green leafy vegetables:  $\geq$  6 servings per week



Non-leafy vegetables:  $\geq$  1 serving per day (e.g. eggplant, celery, cauliflower etc.)



Berries:  $\geq$  2 servings per week (e.g. strawberries, raspberries, blueberries etc.)



Nuts:  $\geq$  5 servings per week



Beans: include in  $\geq$  4 meals per week (e.g. beancurd, green bean soup etc.)



Wine: 1 glass per day