








Brain Fog

Overview

- Brain fog is used to describe 'a usually temporary state of diminished mental capacity marked by inability to concentrate or to think or reason clearly'.¹
- Brain fog is not a formal diagnosis or medical condition but a series of neuropsychologic symptoms related to mild cognitive impairment which may affect daily function.
- Although there are no statistics on the prevalence of brain fog specifically, it was estimated that around 600 million people worldwide suffer from cognitive dysfunction.²
- It has been reported that brain fog is one of the most common long COVID symptoms among survivors.³



Symptoms and signs

-  Poor concentration⁴
-  Feeling confused⁴
-  Difficulty in learning and remembering⁴
-  Forgetfulness⁴
-  Lost words⁴
-  Slow thinking⁴
-  Haziness in thought processes or fuzzy thoughts⁴

Causes and risk factors

- Physiological condition such as reduced cerebral blood and high levels inflammation.⁵
- Mental health conditions such as depression, anxiety⁴
- Long COVID syndrome³
- Medications for pain and sleep⁶
- Chronic sleep disturbances
- Stressful lifestyle
- Ageing

Supplement recommendations

Acetyl-L-Carnitine (ALC)

Mechanism of action

ALC has the activity on cholinergic neural transmission and ability to enhance neuronal metabolism in the mitochondria⁷. It has the property to stabilize the cell membrane fluidity through the regulation of sphingomyelin levels, and to provide a substrate reservoir for cellular energy production, thereby preventing excessive neuronal degeneration on human⁸.

Benefits

Mild cognitive impairment

Taking ALC daily may improve memory and intellectual functions as resulted in better scores in clinical and psychometric assessment scales in older people with memory deficits compared to those in the placebo group⁹.

Depression

Depressed patients have higher total cortisol secretion possibly attributed by heightened activation of the hypothalamic-pituitary-adrenocortical (HPA) axis⁹. Daily consumption of ALC may significantly improve mood and counteracting depression symptoms in elderly with depressive disturbance as measured by decreased scores in the Hamilton Rating Scale for Depression¹⁰.

Alzheimer's disease

As ALC levels are declined in many forms of dementia, daily supplementation of ALC may improve spacial learning tasks, timed tasks of attention, discrimination-learning tasks and personal recognition tasks. Reduction in deterioration of reaction time and short-term memory associated tasks have also been observed¹⁰⁻¹². Long term memory performance and delay in behavioural deterioration are recorded after one-year administration of ALC¹³.

Recommended dosage

Typical doses used in clinical trials are in the ranging from 1g - 3g daily, in divided doses for up to 33 months.

- **Mild cognitive impairment**

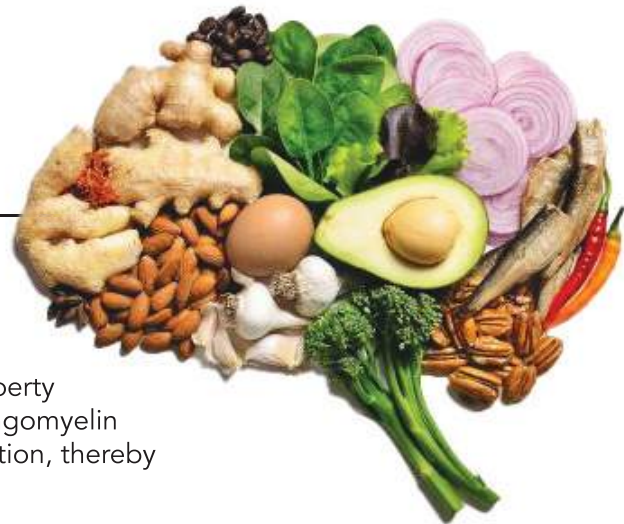
1.5g to 2g daily for at least 3 months

- **Depression**

500mg, 3 times daily for 2 months

- **Attention Deficit Hyperactivity Disorder (ADHD) and Fragile X Syndrome (FXS)**

50mg/kg – 500mg, twice daily for 12 months



Supplement recommendations

Phosphatidylserine (PS)

Mechanism of action

PS facilitates activation of neuronal signaling pathways, including Akt, protein kinase C (PKC) and Raf-1 signaling which are known to stimulate neuronal survival, neurite growth and synaptogenesis¹⁴.

Benefits

Cognitive function

Delay recall is considered as one of the indicators of impaired cognitive functions at early stage of dementia. Daily consumption of PS may improve memory function, particularly in delayed recall in the elderly with memory complaints¹⁵. PS may improve attention-deficit hyperactivity (ADHD) symptoms, short-term auditory memory (the ability to process, analyse and recall orally presented information) and inattention in children aged 4 to 14 years old¹⁶. PS (in combination with DHA and EPA) may positively influence the memory skills as observed in verbal immediate memory, long term memory, learning abilities and response rate among cognitively impaired elderly¹⁷. Taking PS daily (in combination with phosphatidic acid) may have favourable effect on memory and cognition in elderly with cognitive deficiencies¹⁸. Daily intake of PS has resulted in cognitive and memory enhancement in young students as measured in language and non-language memory abilities improvement¹⁹⁻²⁰.

Stress and mood

PS (with phosphatic acid and phospholipids complex) may help reduce stress response. This could be observed through the dampening reactivity of the pituitary-adrenal axis to stress as adrenocorticotrophic hormone (ACTH) and cortisone levels were inhibited²². PS may improve emotional tension, mental health and daily functioning in elderly with Alzheimer's disease²³. PS may reduce exercise-induced stress following strenuous exercise training through prevent the increase in cortisol and adrenocorticotropin²⁴.

Recommended dosage

Typical doses used in clinical trials are ranging from 200mg to 400mg daily for 1 to 3 months.

• Cognitive function

- 100mg to 300mg daily for 3 months²⁵
- 100mg twice daily for 2 months²⁶
- 300mg daily (in combination with 79mg DHA + EPA) for 15 weeks²⁷
(in combination with 240mg phosphatidic acid) for 3 months²³
- 100mg daily for 40 consecutive days²⁸

• Stress and mood

- 400mg daily (in combination with phosphatic acid and phospholipids complex) for 3 weeks²²



Supplement recommendations

Vitamin B12

Mechanism of action

Vitamin B12 is vital for the proper functioning and development of the brain and nerve cells. It assists in the maintenance of the sheaths that cover and protect the nerves of the central and the peripheral nervous system, ensuring fast and effective nerve impulse transmission.

Benefits

Cognitive function

Vitamin B12 is a key player in the function and development of brain and nerve cells³⁰. It is involved in the synthesis of myelin in the central nervous system³¹. Supplementation with vitamin B6, vitamin B12 or folate has positive effects on memory performance in women of various ages³². Low levels of vitamin B12 are associated with impaired cognition and memory³⁴.

Energy

Vitamin B12 works as a coenzyme in the conversion of protein and fat into energy. It is involved in maintaining the mitochondrial one-carbon transfer cycles by regulating mitochondrial enzymes along with vitamins B6 and folate³⁵.

Recommended dosage

The daily recommended dietary allowances (RDAs) of vitamin B12 are: 18 years and older, 2.4mcg; pregnancy, 2.6mcg; lactation, 2.8mcg.

- **Cognitive function**

24 months of daily oral supplementation of 400mcg folic acid and 100mcg vitamin B12³⁶.



Diet & lifestyle recommendations

- Manage stress³⁷
- Get good sleep
- Get sufficient protein and healthy fats³⁷
- Limit sugar intake
- Address any food allergies

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