Introduction:
Optimem is an evidence based, memory and cognitive optimiser.
Optimem consists of a carefully selected combination of naturally occurring nootropic substances.
Unlike other products on the market that are based on theoretical benefits or surrogate markers, the Optimem formulation was developed following an appraisal and review of evidence from randomised controlled trials with clinically defined, pre-set, outcomes.
Neurobiology and neuropharmacology are complex.
The actions of neurocognitive supplements in combinations may be synergistic, complementary or antagonistic. It is therefore imperative to test the combinations for biological effect.
Dose ranging studies are essential to identify not only the optimal ingredient but its dose as well.
Designed to assist in optimising/potentiating a range of essential cognitive processes such as memory, recall and processing speed, optimem is ideally suited to anyone seeking a psychological edge.
Students, professionals and business executives are all likely to derive a benefit manifest as increased processing speed, memory and recall.

INGREDIENTS:

Panax quinquefolius

Mode of action:
Panax Sp or Ginseng has been reported to exert multiple effects on the cholinergic system;
These are mediated through bioactivity of 3 groups of ginsenosides.
They increase synaptic choline uptake whilst stimulating acetylcholine release\(^1\).
The cholinergic system has a vital role in cognitive function, specifically attention and memory encoding and by increasing endogenous acetylcholine these functions are augmented\(^27\).
In addition, these agents promote increased expression of brain choline acetyltransferase increase brain serotonin concentrations\(^2\).
Other ginsenosides may affect specific physiological mechanisms, including corticosterone secretion, inhibition of synaptosomal uptake of norepinephrine, dopamine, serotonin and GABA\(^{16}\).

Outcomes:
Panax quinquefolius has been demonstrated to provide significant improvement in working memory (WM) performance.
Corsi block performance is also improved by all doses at all testing times. The differential effects were maintained across the testing day. Choice reaction time accuracy and ‘calmness’ were significantly improved.

**Bacopa monnieri**

*Mode of action:*

Whilst the precise mechanisms for BM are unknown, hypothesised modes of action include a procholinergic effect manifest as improvement in inspection time and rapid visual information processing [21, 26]. This is believed to occur through cholinergic upregulation,3 β-aminobutyric acid–ergic modulation,12 antioxidant effects,13,14 protein synthesis in the brain,11 5-HT agonism,15 and modulation of brain stress hormones.

Bacopa extracts have also ameliorated neurotoxic effects of nicotine17 and aluminum18 and reduced β-amyloid levels in the brain of a doubly transgenic mouse model of rapid amyloid deposition (PSAPP mice), suggesting mechanisms of action relevant to Alzheimer’s disease.[19,20]

BM has been found to have significant antioxidant,22 anti-inflammatory23 effects.

**Outcomes:**

Bacopa has been demonstrated to have positive benefits on multiple measures of cognitive performance and affect. Bacopa recipients improved in delayed recall memory and Stroop task reaction times over the course of the study while placebo recipients remained stable on both.

Additionally, Bacopa recipients benefited from a decrease in depression and combined state plus trait anxiety scores with the placebo recipients increasing on both.

The benefits of B. monnieri for both the delayed recall task and anxiety are replicated in several studies.

**Caffeine**

*Mode of action:*

Three main mechanisms of action of caffeine on the central nervous system have been described.

- Mobilization of intracellular calcium and inhibition of specific phosphodiesterases.
- By antagonism at the level of adenosine receptors, caffeine increases energy metabolism throughout the brain.
- Caffeine activates noradrenaline neurons and seems to affect the local release of dopamine.
- Many of the alerting effects of caffeine may be related to the action of the methylxanthine on serotonin neurons.4

**Outcomes:**

Low doses (75 mg to 150 mg) of caffeine have been demonstrated to improve cognition for attention, problem solving and delayed recall.

Effects on mood were positive too,
with statistically significant increase in clearheadedness, happiness and calmness and decreases in tenseness although in excessive doses it may cause agitation.\(^5\)

**L-Theanine**

*Mode of action:*

In the brain L-theanine increases dopamine and serotonin production,\(^6\)

Theanine increases alpha-brain wave activity, a sign of induced relaxation.\(^7\)

L-theanine is extremely safe and has been shown to mitigate the negative aspects of caffeine, such as anxiety, increased blood pressure and diminished sleep quality, while possibly improving upon the positive aspects\(^8,9,10\).

L-Theanine is an amino acid found naturally in tea. Not surprisingly, L-theanine, is often consumed in combination with caffeine in the form of tea. Whilst studies of caffeine supplemented in isolation have demonstrated multiple benefits such as faster digit vigilance reaction time, improved Rapid Visual Information Processing (RVIP) accuracy and attenuated increases in self-reported ‘mental fatigue’, the synergistic combination with L-Theanine provides additive benefits. In addition to improving RVIP accuracy and ‘mental fatigue’ ratings, the combination also led to faster simple reaction time, faster numeric working memory reaction time and improved sentence verification accuracy. ‘Headache’ and ‘tired’ ratings were reduced and ‘alert’ ratings increased. There was also a significant positive caffeine × L-theanine interaction on delayed word recognition reaction time. “These results suggest that beverages containing L-theanine and caffeine may have a different pharmacological profile to those containing caffeine alone.”

**DISCUSSION:**

*How do the nutraceutical cognitive enhancers stack up against registered pharmacological products?*

There are emerging data comparing nutraceuticals to registered pharmacological agents. Pharmacological neuroenhancers include medications such as modafinil, methylphenidate and dexamphetamine. These agents are associated with potentially high cost and adverse effects. Nutraceuticals like Optimem may offer safer alternatives. But how do they stack up?

In a well conducted review of available high quality studies (published in the British Journal of Clinical Pharmacology)\(^25\) the reviewers summarised/concluded:

“A search strategy was implemented to capture clinical studies into the...”
neurocognitive effects of modafinil, Ginseng and Bacopa. Studies undertaken on healthy human subjects using a double-blind, placebo-controlled design were included. For each study where appropriate data were included, effect sizes (Cohen’s d) were calculated for measures showing significant positive and negative effects of treatment over placebo. The highest effect sizes for cognitive outcomes were 0.77 for modafinil (visuospatial memory accuracy), 0.86 for Ginseng (simple reaction time) and 0.95 for Bacopa (delayed word recall). These data confirm that neurocognitive enhancement from well characterized nutraceuticals can produce cognition enhancing effects of similar magnitude to those from pharmaceutical interventions.

Whilst these findings are encouraging, one should be cautious not to over interpret this data. The investigators of this meta-analysis conclude:

“All three substances reviewed here exerted overwhelmingly positive effects on neurocognitive function across different cognitive domains.”

“The highest effect sizes for cognitive outcomes were 0.77 for modafinil (visuospatial memory accuracy), 0.86 for Ginseng (simple reaction time) and 0.95 for Bacopa (delayed word recall).”

Whilst the 3 neuroenhancers performed well, each performed best in a different domain, making true head to head comparisons challenging.

What we may conclude from this review is that no one agent is likely to provide the desired full spectrum of ‘cognitive boost’. In order to achieve optimal outcomes, a combination of agents functioning in a synergistic and complementary mode of action are required. This has guided not only the choice of agents included in Optimem, but their optimal dosing as well. Optimem has been specifically formulated to improve cognitive performance in each of these domains.

**Formula**

<table>
<thead>
<tr>
<th>INGREDIENT (and strength)</th>
<th>Label Claim (mg/Capsules)</th>
<th>Ratio x:1</th>
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<tbody>
<tr>
<td>Standardised ginkgo biloba</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td>Standardised panax ginseng</td>
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<tr>
<td>Bocopa monieri</td>
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<td>Green tea (equivalent to 30mg caffeine)</td>
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<tr>
<td>Caffeine Anhydrous</td>
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<td>1</td>
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REFERENCE


5. 2011;16(4):348-54.


16. Andrew Scholey, Anastasia


