Vedic Science of Mind

Bacopa monniera Linn (formerly *Herpestis monniera*), the water hyssop, is a creeping annual plant with succulent leaves and delicate mauve flowers. While it is revered in India under the name *Brahmi*, the botanical is not unique to that nation, and can be found in marshy areas all over the world. The observation that this beautiful herb supports cognitive function and promotes tranquility goes back to the very beginnings of Ayurveda, the traditional medical system of India. The two core Vedic medical texts – the *Caraka Samhita* (first to sixth centuries CE) and the *Sushruta Samhita* (which may go back into the early centuries BCE) – both speak of ***Bacopa***'s ability to provide a wide range of benefits to mental function. The later *Bhavprakasa Varg-Prakarana* informed readers that ***Brahmi*** **"acts as a brain tonic and promotes longevity."**

It's important to note that *another* Ayurvedic herb, *Centella asiatica* or "Gotu kola," is also sometimes referred to as *Brahmi*. Evidence is accumulating that *Centella asiatica* may provide support for *blood vessel health,*[1,2] due to the herb's ability to modulate collagen synthesis. By contrast, the case for any meaningful benefits in *brain function* is slim: gotu kola supplements appear to be simple stimulants. Like the proverbial morning cup o' Joe, they provide a quick jump-start which can increase performance and make users *feel* "smarter." But there's little evidence that C. *asiatica* actually supports central processes of mental functioning. As we shall see, ***Bacopa*** is another story.

The issue of *which "Brahmi"* is meant by an ancient Ayurvedic text or a village healer has often confounded the efforts of modern scientists in their efforts to untangle the strands of carefully-accumulated traditional knowledge from the weeds of sheer superstition which infest the gardens of this tradition. The confusion has also been a big stumbling block in supplement formulation in the West. Make sure you know what you're taking.

From the Mouths of Babes

Following a venerable tradition, newborn infants in India today are still ceremonially anointed with ***Bacopa,*** in the belief that it will open the gateway of intelligence. And as they mature, Indian children are commonly given ***Bacopa*** teas and syrups to promote their mental development. In such a cultural context, it is not surprising that children have been the subjects of many of the human ***Bacopa*** trials.[3-7] In one double-blind, controlled study,[7] 110 boys, ages 10 to 13, of average intelligence as measured on IQ tests, took either a ***Bacopa*** supplement or a dummy wafer every day for nine months. Before and after starting the supplement program, the boys took a battery of brain function tests, covering intelligence, memory, and reaction time.

At the end of the trial, there were no significant improvements in the cognitive functioning of the boys who had been given the dummy wafers. But **math skills, direct memory, and several subtests of a variation on the IQ test were all significantly improved in the boys who took the *Bacopa* supplement.**

But studies have also been performed in adults. One of them focused on people with **anxiety disorders**[7a] – another aspect of cognitive function for which ***Bacopa*** is traditionally believed to be helpful. After four weeks of taking a ***Bacopa*** syrup, a group of 35 workers with anxiety were found to have **improved memory, less anxiety, better social adjustment** (as measured by the Asthana-Bell adjustment inventory), and (if actual work output efficiency is any indicator) **less mental fatigue.** The supplement also **lowered their blood pressure,** from 117 to 112 millimeters of mercury on systolic blood pressure (the "top" number of your reading).

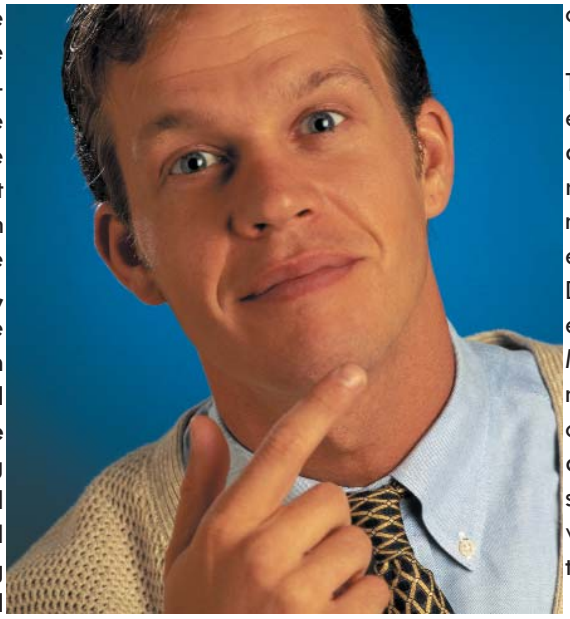
improved **memory**, less anxiety, better **social adjustment** and less mental fatigue after taking ***Bacopa***

The Best Evidence Yet

Most of the cognitive effects were mild, however – probably because of the short duration of the trial. Recently, a longer (twelve-week), better-designed study on the brain-boosting powers of ***Bacopa*** has given the herb a much stronger scientific endorsement.[8] Australian researchers performed a double-blind, placebo-controlled study involving 46 healthy men and women. The whole group took a battery of neuropsychological tests before the trial began. Then, half of this group took a daily supplement containing 300 milligrams of ***Bacopa*** extract (carefully standardized to contain at least 50% of the two

known active markers, **baccosides A and B**), while the remaining 23 people took dummy pills designed to look, smell, taste, and weigh the same as the real thing.

The participants were re-tested five weeks later, and again at the twelve week mark. Although there were hints of an improvement in those taking the ***Bacopa*** supplement, the differences between the folks taking the real supplement and those taking the bogus pill were not deemed significant after the first five weeks – a fact which might explain why the effects in the four-week syrup study, discussed above, were so mild. But at the end of the twelve-week study, **men and women supplementing with *Bacopa* showed significant improvements in cognitive function** compared to the group taking the placebo pill, **processing visual information 15% faster** as measured by the inspection time (IT) test, **showing a 14% greater rate of learning – and a 33% lower rate of *forgetting* – verbal information**, along with **a remarkable 108% better ability to consolidate new information without interference from previously-learned data** (a problem known as **"proactive interference"**) – all detected by Rey's Auditory Verbal Learning Test (AVLT), still the standard for verbal learning tests.



Few side effects were seen in the study, the most notable being an increase in thirst and urination. And, interestingly, the **people taking *Bacopa* actually suffered *fewer* headaches than did those getting the dummy pills**!

***Bacopa* boosts the brain's production of these key protective antioxidant enzymes.**

Studies in experimental animals also show that ***Bacopa*** **supplements can significantly improve brain function in the short term.**[9-11] More importantly, these studies have revealed some of the reasons *why* ***Bacopa*** improves mental function, including preventing the depletion of the key brain messenger-molecule **acetylcholine** from the **hippocampus** (an area of the brain which plays a key role in working memory)[11] and boosting the synthesis of new protein in the brain.[12] Recently, however, these studies have begun to give us some exciting clues about the potential *long-term*, *neuroprotective* effects of this Ayurvedic secret.

Nature's Deprenyl?

The last decade has seen the development of an international grey market, centered on *healthy* life-extensionists who are clandestinely procuring a drug that's usually only prescribed for people suffering with an advanced neurological disorder. All over the world, life-extension enthusiasts are betting that the Parkinson's drug **deprenyl** (selegiline, or **Eldepryl**®) will push the limits of human lifespan.

The reason: a series of experiments has shown that this drug can extend the lives of mice, rats, hamsters, and dogs.[13] In the most dramatic of these experiments,[14] Hungarian scientist Dr. Josef Knoll has actually extended the built-in *maximum lifespan* of laboratory rats by as much as 24% – a feat which no other drug or nutrient has yet achieved. In fact, in Dr. Knoll's study, the *average* animal treated with deprenyl lived on after *all* of the untreated animals were dead!

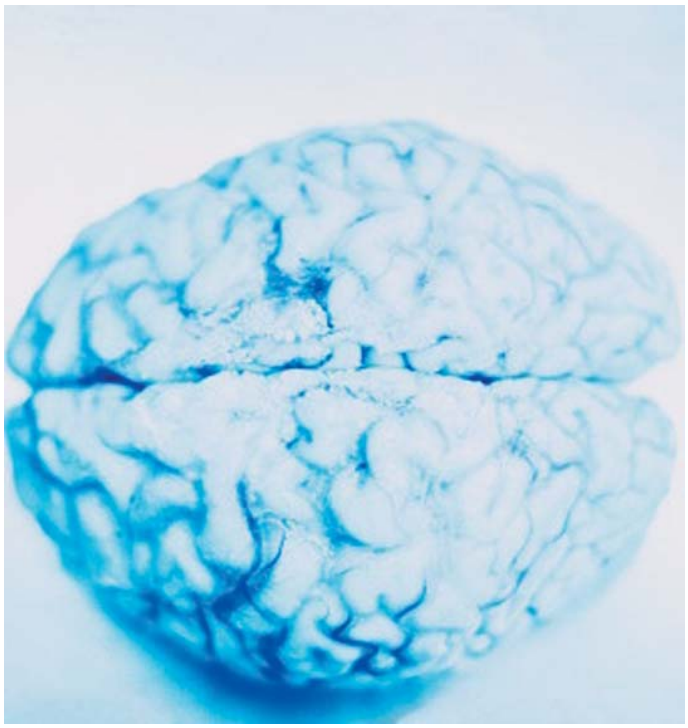
Not every study has found that deprenyl treatment increased longevity: its effects have been found to vary depending on such factors as the animals' gender, their age at the beginning of the study (benefits are most consistently found when treatment begins late in life), and among different species and strains of rodent.[13] There have also been complications in finding the optimal dose. And when life extension benefits have been observed, they have rarely been so dramatic as in Dr. Knoll's study; indeed, Knoll is still the only scientist to report an extension of life beyond the species' natural *maximum* lifespan. (The only *proven* way to reliably break this barrier is **Calorie Restriction with Optimal Nutrition (CRON** – see "The Road to Aging is Paved with Calories!" in *The Holistic Lifestyle* 1(5)).

All of these complicating factors mean that it's really too early to start recommending that healthy people dose themselves with deprenyl in hopes of extending their lives. But the evidence for life extension benefits of this drug remains more powerful than that for any other treatment except CRON (although **R(+)-lipoic acid**, Pyridoxamine (this is *not* the pyridox*ine* in standard multivitamins), and **Carnosine** remain promising based on preliminary evidence). Understanding *why* and *how* deprenyl exerts its life-extending effects is therefore a vital topic for further anti-aging research.

In search of answers to these questions, scientists have focused in on the drug's effects on the body's production of the antioxidant enzymes **superoxide dismutase (SOD) and catalase (CAT)**. While the antioxidants in foods and supplements are on a suicide mission, in which a free

radical is neutralized but the antioxidant is destroyed in the process, these enzymes have "**catalytic**" antioxidant abilities: like members of a tiny free-radical "bomb squad," SOD and CAT have the ability to shut down one free radical after another, without *themselves* being destroyed in the process.

So how can you increase the protection afforded to you by



these protective enzymes? Despite what you might hear, **you can't boost levels of SOD or CAT by taking them in supplement form**: these enzymes are destroyed by other enzymes, even when taken sublingually. But deprenyl treatment *has* been found to increase levels of these enzymes in the brains of rodents[13] and more recently in monkeys[15] – and, importantly, **the amount of increase in SOD and CAT enzymes appears to closely parallel the extension in lifespan.**[16]

Knowing this, many life extension devotees sat up and took notice when a recent animal study revealed that ***Bacopa* boosts the brain's production of these key protective antioxidant enzymes.**[17] Remarkably, in fact, **the effects of *Bacopa* were shown to be even *more* broad-ranging than those of deprenyl.** For one thing, the effects of deprenyl on SOD and CAT are only consistently seen in the **substantia nigra and striatum** – parts of the brain whose decay plays a key role in Parkinson's disease.[13,17] By contrast, ***Bacopa*** cranked up levels of these enzymes in *every* area of the brain tested – including the **hippocampus**, an area crucial to the formation of long-term memory and which decays rapidly in Alzheimer's disease, and which was not affected by deprenyl treatment.

And while deprenyl increased the levels of SOD and CAT, but *not* of the detoxifying **glutathione peroxidase (GSH-Px)** enzyme, ***Bacopa* boosted the brain's levels of GSH-Px as well.** The implications for arresting the aging of not only the brain but of the whole body, are exciting. We are reminded of the ancient Ayurvedic medical textbooks: again, the *Bhavprakasa Varg-Prakarana* flatly asserts that *Bacopa* "acts as a brain tonic and promotes longevity."

Bolstering brain function and relieving anxiety, while gearing up the brain's ability to defend itself from free radical assault, the standardized ***Bacopa*** extract of today is new steel in the war on aging, forged from the carbon of ancient wisdom and the iron of today's neuroscience.

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