

Depression, Mood, ADD

For 20 years consumers of AFA have reported an increase in mental clarity and mood elevation; the active ingredient has now been isolated.

Phenyl ethylamine, a neuromodulating compound

from *Aphanizomenon flos-aquae* (AFA)

Aphanizomenon flos-aquae (AFA) is a blue-green alga growing naturally in Klamath Lake, Southern Oregon, that has been used as a dietary supplement for more than two decades. The most commonly reported benefit is an increase in mental clarity and mental energy, an elevation of mood, a reduction of the symptoms of attention deficit disorder and an alleviation of the symptoms of depression.

Recent scientific analysis has revealed the presence in AFA of the amino acid phenyl ethylamine (PEA) in significant concentration. PEA is well known to alleviate depression, to elevate mood and to play an important role in the pathogenesis of learning disability and attention deficit disorder. *Aphanin*™ is a standardized cold-processed extract of AFA that contains high concentrations of PEA, and was shown to improve concentration and mental performance.

Mechanism of PEA Action

PEA is a compound naturally produced by the brain and is responsible for the mediation of experiences associated with pleasure and mental awareness. For example, PEA is released in the brain when one experiences a feeling of love and joy; for this reason it has been coined the molecule of love.

When taken orally, PEA is known to readily cross the blood-brain barrier and be immediately available in the brain. It is normally rapidly degraded by the enzyme monoamine oxidase (MAO), however AFA was also shown to contain compounds that inhibit MAO activity, providing for a long-term modulation of brain activity.

In the brain PEA acts by having a greater affinity for the re-uptake mechanism for dopamine in pre-synaptic vesicles. Therefore, when present in the brain, PEA is captured into the pre-synaptic vesicles and occupies the space normally taken by dopamine. This leads to an increase in free circulating dopamine in the pre-synaptic terminal and a higher concentration of dopamine diffusing into the synaptic cleft, enhancing dopaminergic transmission.

Figure 1.

Burger et al. 1984

This ability to modulate dopaminergic transmission provides PEA with interesting properties in alleviating depression and attention deficit disorder, while increasing concentration and elevating mood.

Depression

It was discovered nearly two decades ago that the amount of PEA in the brain of depressive patients was decreased when compared to normal individual (Sabelli and Mosmain, 1974), and that PEA given orally to individual suffering from depression was able to reverse the depressive

condition (10). A decrease in the brain levels and/or turnover of endogenous PEA may therefore play a major role in the etiology certain forms of depression. In fact, it was observed that most antidepressant drug treatment act by increasing the level of PEA in the brain (paper 4; 7; Mosnaim *et al.*, 1973a, 1974; Sabelli & Mosnaim, 1974). For example, PEA is known to be degraded in the brain by the enzyme monoamine oxidase (MAO). A popular class of antidepressant drugs acts by inhibiting MAO activity and indirectly raising the concentration of PEA in the brain.

When taken orally at concentrations equivalent to 1 gram of 3% AFA extract twice daily, PEA was shown to decrease the symptoms of depression in 60% of the patients. The patients did not develop tolerance and PEA remained effective over time. None of the side effects associated with conventional antidepressant therapy was experienced (i.e. nausea, fatigue, decreased libido, cardiovascular problems). On average patients did not gain weight, in fact many actually lost the weight that had gained on the conventional antidepressant therapy.

Attention Deficit Disorder

Sabelli and Mosnaim paper 4 also paper 100

PEA is synthesized in the brain from the two amino acids phenylalanine and tyrosine. It is degraded by MAO into phenyl acetic acid (PAA), which is eliminated in the urine. Both PEA and PAA were found to be decreased in the urine of patients suffering from ADD. The PEA precursors phenylalanine and tyrosine were also both decreased in the plasma of ADD patients (38).

The phenyl ethylamine hypothesis of affective behavior (Sabelli and Mosnaim, 1974) states that PEA is an endogenous neuromodulator responsible for triggering or sustaining wakefulness, alertness, and excitement. Structurally, PEA is closely related to amphetamine and, to a lesser extent, to catecholamines. PEA induces behavioral and electrophysiological (1) effects similar to those of amphetamine, which is already sold under the name Adderall for the treatment of ADD. Unlike amphetamine, PEA is endogenous to the brain and does not develop tolerance or dependency, or produce any side effects.

Likewise, methylphenidate, the most prescribed drug for the management of ADD, is believed to act by stimulating the release of endogenous norepinephrine and PEA. PEA may therefore prove to be a safe and effective alternative for the treatment of ADD.

Mood elevation

The phenyl ethylamine hypothesis of affective behavior also states that PEA is a neuromodulator that modulates mood, attention, pleasure-seeking behavior, and libido. A deficit in PEA's brain content and/or a decrease in the turnover of endogenous PEA may therefore be a causal factor in certain forms of subclinical depressive conditions. Oral intake of PEA may increase PEA brain levels and alleviate subclinical symptoms of depression, which would translate in individuals into an increased quality of life and an elevation of mood.

Phenylalanine (PA), the precursor of PEA, has been shown to increase brain PEA content in animals. In one study, PA was shown to be effective at alleviating depression in patients with low PAA urinary excretion. Furthermore, PA led to an increase in urinary PAA excretion that was concomitant with its antidepressant therapeutic effects. This suggests that the antidepressant and mood-elevating effects of PA may be related to its ability to increase brain PEA.

Runners High.

There is growing evidence that regular exercise boosts people's moods and may even fight clinical depression. Researchers found that a session of moderate aerobic activity appears to elevate the body's levels of phenylethylamine, a natural chemical linked to energy, mood and attention. When they had 20 healthy young men run on a treadmill for 30 minutes, the average concentration of phenylethylamine in the participants' urine increased 77%.

Because the chemical is similar in some ways to amphetamines, the researchers speculate that phenylethylamine may play a role in the "runner's high."

In addition, the report indicates, research in patients with depression and bipolar disorder has shown they have lower-than-normal levels of the chemical in their urine.

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