BRAIN FOOD: Acetyl-L-Carnitine

By Dr. S.V. Padgaonkar, Technical Director- Clarico FPC/Spica Tech Specialities

Acetyl-L-Carnitine:

Recently Acetyl-L-Carnitine has been the subject of numerous scientific studies showing this remarkable compound may be key in maintaining normal brain and nerve function during ageing. Acetyl-L-Carnitine is a naturally occurring metabolite of L-Carnitine and both are present in the diet, particularly in foods of animal origin.

Traditionally, their main claim of fame lies in their role in fatty acid oxidation. L-Carnitine & Acetyl-L-Carnitine are part of the so-called Carnitine shuttle. L-Carnitine shuttles fatty acids into the cell's mitochondria for oxidation and energy production. The main end products of fatty acid oxidation are energy (in the form of NADH), and acetyl groups. Most of these acetyl groups are further oxidized in the mitochondria's Krebs cycle; but some are needed in the cytosol for producing other important metabolites. Acetyl-L-Carnitine provides a way to carry these acetyl groups through the mitochondrial membranes back out into the cytosol (the cell fluid).

In brain and other nerve tissues, acetyl groups export by Acetyl-L-Carnitine. This is important in maintaining normal levels of acetyl groups for the production of acetylcholine and other neurotransmitters that are so crucial for normal brain and nerve function.

Acetyl-L-Carnitine also helps maintain normal activity of choline acetyl transferase. This important enzyme has a tendency to decline with age, causing sub optimal acetyl choline levels, which in turn are thought to contribute to the impairment of brain function that is associated with ageing.

Besides maintaining normal acetylcholine levels, several studies indicate other neuroprotective effects of Acetyl-L-Carnitine, which may be due to atleast two modes of action. First, Acetyl-L-Carnitine has been shown to maintain cellular membrane stability and to restore age related membranal changes. Acetyl-L-Carnitine can also act as an antioxidant, scavenging harmful super oxide anion radicals. Since Super oxide anion can damage membrane lipids, this may explain Acetyl-L-Carnitine's membrane protective properties.

Second, animal studies indicate that the Acetyl-L-Carnitine preserves normal levels of nerve growth factor in brain tissue during ageing. Moreover human studies indicated that Acetyl-L-Carnitine increases cerebral blood flow.

In summary, Acetyl-L-Carnitine is a naturally occurring compound that supports normal brain and nerve function during ageing through various mechanisms. These include its actions on acetylcholine synthesis, membrane stability, nerve growth factor production, and cerebral blood flow.

Acetyl-L-Carnitine appears to be well absorbed, capable of crossing the blood brain barrier and utilized by the body. Typically, daily amounts of 1500 to 3000 mg have been used for several months and were found to be adequate in human studies without adverse effects.

With no significant adverse or toxic effects reported, Acetyl-L-Carnitine, a potent carnitine metabolite, is a promising new nutritional supplement.

Key References:

1. Acetyl-L-Carnitine and Alzheimer's disease; Brown, B.A.; Nutr.Rev.50, 142-144(1992)
2. Acetyl-L-Carnitine and Alzheimer's disease; Pharmacological considerations beyond the cholinergic sphere; Carta A. et.al.; Ann N.Y. Acad.Sci.695,324-326,(1993)
3. Neuroprotective activity of Acetyl-L-Carnitine: studies in vitro, Farloni, G. et.al.; J.Neurosci.Res.37, 92-96(1994)
4. Cerebra Blood Flow in patients with chronic cerebro vascular disease: effect of acetyl-L-Carnitine; Postiglione,A. et.al.; Intl.J.Clin.Pharmacol Res.10, 129-132,(1990)
5. L-acetyl Carnitine treatment of mental decline in the elderly, Salvioloi,G. and Neri, M.; Drugs. Exp. Clin. Res. 20,169-176(1995)
6. Double-blind parallel design pilot study of acetyl –levocarnitine in patients with Alzheimer's disease, Sano,M.et.al ;Arch.Neurol.49, 1137-1141(1992)
7. Long term Acetyl-L-Carnitine treatment in Alzheimer's disease. Spagnoli, A.et.al.; Neurology 41, 1726-1732(1991)

❋❋❋