ALBION®
HUMAN NUTRITION

RESEARCH NOTES

A COMPILATION OF VITAL RESEARCH UPDATES ON HUMAN NUTRITION

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Cognitive Function

As the population of the developed nations continues to see the lifespan of its people lengthen, science has started to look harder at the processes of cognitive function. What do the scientists mean by cognitive function? According to Mosby's Medical dictionary, 8th Edition, 2009, Elsevier:

'Cognitive function is an intellectual process by which one becomes aware of, perceives, or comprehends ideas. It involves all aspects of perception, thinking, reasoning, and remembering.'

During the aging process, there are changes in cognitive function that are commonly seen. Obviously this occurs in some more than others. Certain diseases are also known to impact changes in cognitive function over time.

In addition, cognitive function can be negatively impacted by acute traumas, such as strokes, concussions, and other diseases of the central nervous system (CNS), as well. Certain medications can cause negative changes in cognitive function. Recently, we have heard more about some drugs that have a positive impact on cognitive function, and have been used (or abused, mattering on your point of view) to help students to perform better at school and aptitude exams. There is no doubt that cognitive function is of critical importance to mankind. The curiosity concerning how to maintain or improve our cognitive abilities is at an all time high. It is a most complex area of science.

Magnesium

In the past, calcium dysregulation has been the subject of many studies concerned with brain ageing and the decline in cognitive function. Magnesium's role had received less attention, in this regard. In 2004, Fromm L, et al (J Am Coll Nutr 23(5):529S-533S) looked into magnesium and post traumatic brain injury. It had been seen that magnesium declines after traumatic brain injury. In this animal study, the researchers tested the use of magnesium on animals suffering from the post traumatic depression/anxiety commonly associated with traumatic brain injury. Pre and post traumatic injury open field, spontaneous activity testing was used to determine changes related to the injury. One group was treated with a single injection of magnesium, while the other was not. The untreated animals had an incidence of post traumatic depression/anxiety of 61%, while the magnesium treated group had an incidence of less than 30%. From this, the researchers concluded that magnesium can benefit as a CNS neuroprotective agent after traumatic brain injury.

A paper by M.R. Hoane, (Magnes Res. 2007; 20(4):229-236) looked further into the use of magnesium in the therapy against cognitive performance loss following traumatic brain injury. The paper presents cases where Mg+2 was used to facilitate cognitive function recovery in several models of cortical injury. Studies were done to observe improvement in cognitive function following bilateral anterior medial cortex ablations, bilateral frontal cortex contusions, and unilateral frontal contusions that were then treated

with daily injections of magnesium. In all cases the use of magnesium post-injury effectively improved recovery of cognitive deficits. These results suggested that the use of post injury magnesium treatment improved the recovery of cognitive deficits following injury. Subclinical magnesium ion alterations have been implicated in mild to moderate Alzheimer's Disease [Barabagallo, M., et al; Magnes Res. 2011; 24(3):S115-21]. Other evidence [as reviewed by Billard, JM: Magnes Res. 2006; 19(3) 199-215] points to a relationship between lower magnesium levels having a negative impact on many functional properties of the hippocampal neuronal networks. The hippocampus, among other things, is majorly involved in memory forming, organizing, and storing.

In addition, Inna Slutsky, et al., conducted a study, reported in Neuron 65,165-177, January, 2010, that showed magnesium deficit can lead to decreased learning and memory ability, while an abundance of magnesium leads to the enhancement of learning abilities, working memory, and short and long term memory. This all relates to the impact that magnesium has on increasing the number of functional presynaptic release sites, while it reduces their release probability. This synaptic reconfiguration that results enables selective enhancement of synaptic transmission in the CNS. Magnesium helps NMDA receptors to open up for meaningful input, shuts down background noise, and improves cognitive function (see Figure 2).

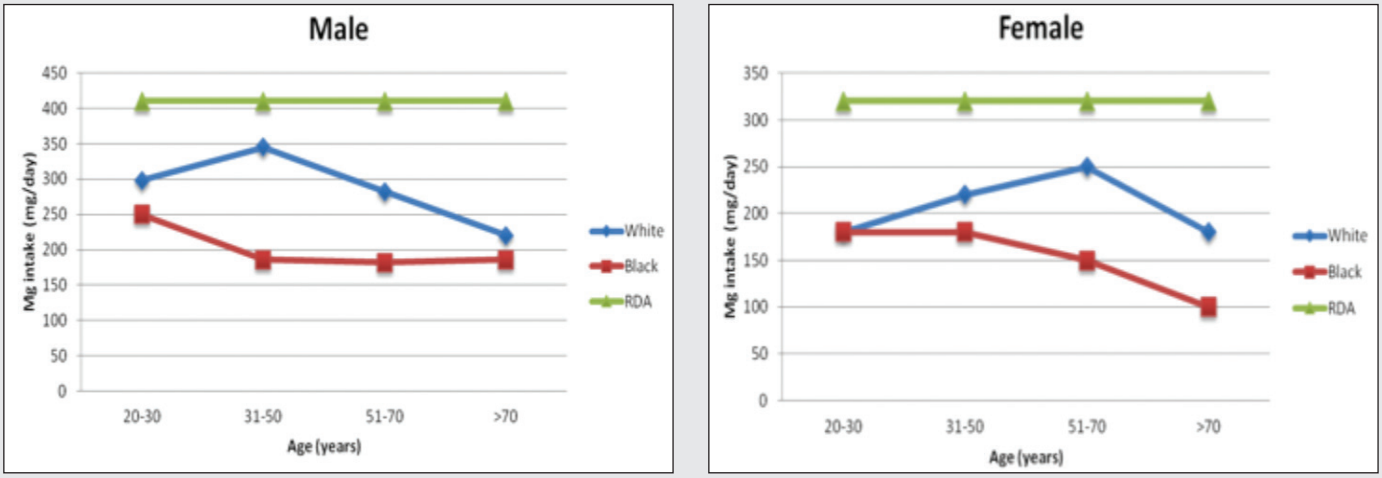
The NMDA receptor is the predominant molecular device for controlling synaptic plasticity and memory function. A loss in plasticity of these synapses in the hippocampus is a cause for memory loss.

Creatine

The use of creatine, as a consideration for issues related to brain function or cognitive function is still a relatively new area. An earlier study, concerning the potential for creatine as a neuroprotective agent, was reported by Sakellaris g., et al [J Trauma. 2006;(2):322-9]. This was a pilot study conducted on 39 children and adolescents, aged 1 to 18 years old with traumatic brain injury. Creatine was administered orally at a dose of 0.4 grams/kg per day for 6 months. This lead to improvement in several parameters, including: duration of post-traumatic amnesia, duration of intubation, intensive care stay, disability, good recovery, self care, communication, locomotion, sociability, personality/behavior, plus neurophysical and cognitive function. This all suggested that creatine administration may be beneficial to patients with traumatic brain injury. No side effects were observed.

In vitro work by Rambo, LM [Brain Res. Bull. 2012 Sep 1;88(6):553-9] delved into the use of creatine in the hippocampus. In their study, it was seen that creatine increased calcineurin activity. Calcineurin deficit is known to cause impaired working memory, attention deficit, and other behavioral activities. In addition this study found that creatine increases Na(+), K(+) –ATPase activity, and this enzyme is seen to be decreased in a variety of neurological diseases. Work by Souza, MA [Amino Acids, 2012 Jun5. ePub] using creatine injections into the hippocampus, and the resulting changes in the biochemistry of the area made it plausible that creatine plays a putative role as a neuromodulator in the brain, and that at least some of its effects may be mediated by intracellular CaMKII/CREB pathway, which is involved on a molecular basis with long term memory.

Figure 1 . Half of the Human Population in USA is Magnesium-deficient



J Nutr; 2003; 133:2879-2882

Scientists Rawson ES and Venezia AC , in 2011(ISSN 1438-2199) reported that creatine is an inexpensive and safe dietary ingredient that has both peripheral and central effects. Stating further that "the benefits afforded older adults through creatine ingestion are substantial, can improve quality of life, and ultimately may reduce the disease burden associated with sarcopenia and cognitive dysfunction". Allen, PJ (ISSN : 1873-7528) reviewed the essential role of creatine in brain function and development. Stating that although the role of creatine in cognitive function and emotional processing is still very new, further research on this endogenous metabolite could advance our understanding of the biological bases of psychopathology and improve current therapeutic strategies.

A Case for Creatine MagnaPower®

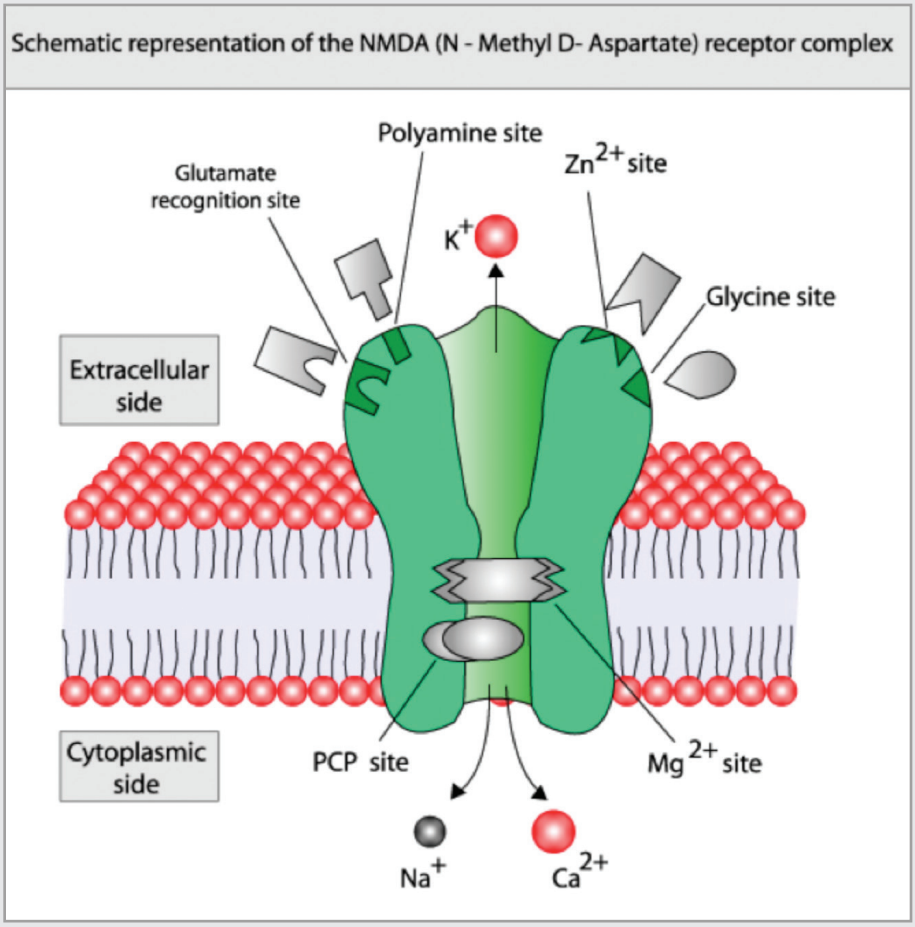
Previously, Albion® has had clinical studies performed by independent University researchers [Albion Research Notes, Vol 18, No 3 (Sept 2009)] that have shown the bioavailability and effectiveness of Creatine MagnaPower®. This unique Albion ingredient provides both magnesium and creatine in a single compound that has been shown to have beneficial effects in the field of sports performance. These studies have shown Creatine MagnaPower® can assist in the enhancement of the development of anaerobic muscular performance. In the studies, it was observed that Creatine MagnaPower® gave rise to a greater increase in skeletal muscle intracellular water, than those using creatine monohydrate. An increase in this intracellular water is believed to indicate a greater increase in protein synthesis in skeletal muscle. The Creatine MagnaPower® users were observed to have a greater increase in peak power, and other indicators of anaerobic muscle performance. Albion has combined creatine and magnesium into a single compound, given the involvement of each of these nutrients in forming the energy rich ATP needed for skeletal muscle contraction. This combination into a single ingredient has proven to be effective.

In the new research on cognitive function, we have seen much evidence that points to the benefits of both magnesium and creatine in the area of cognitive function.

The use of Creatine MagnaPower® in products aimed toward cognitive function is food for thought. As the populace grows older, the concern over memory increases, and we are getting older as a society.

Creatine MagnaPower® is a bioavailable source of magnesium and creatine!

Fig. 2. Magnesium Modulates NMDA Receptors



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