Derived from naturally occurring amino acids, **L-carnitine** is essential for the production of energy and the proper metabolism of fatty acids in both cardiac and skeletal muscle.* The addition of the acetyl group facilitates the crossing of the blood-brain barrier.* With this added factor, acetyl L-carnitine offers specific support for neurological functions and cardiovascular health.*

**Acetyl L-Carnitine:**
- Improves concentration, memory and focus; supports nerve cell function*
- Enhances cardiovascular health*
- Provides antioxidant protection*

**Healthy Neurological Function***:
Acetyl L-carnitine enhances the production of nerve cells, provides antioxidant protection and promotes cellular energy, which helps to support healthy neurological function, including concentration and focus.*

**Cardiovascular Health***:
Benefits to cardiovascular health are provided from acetyl L-carnitine due to enhanced fatty-acid transport that drives ATP production in the mitochondria of both skeletal and heart muscle.* Animal studies have also shown that acetyl L-carnitine improves the level of cardiolipin (a key component of the mitochondrial membrane) found in the heart.*

**Antioxidant Protection***:
Acetyl L-carnitine plays a protective role regarding oxidative stress in the nervous system.* Research shows that it attenuates protein oxidation and lipid peroxidation and enhances the activity of other antioxidants.*
Acetyl L-Carnitine

**Background**

Acetyl L-carnitine is an ester of the amino acid derivative L-carnitine and plays a major role in the healthy functioning of the mitochondria, the key energy-producing organelle found in all cells of the body. Acetyl L-carnitine acts as a transport molecule for free fatty acids, which helps fuel many tissues as well as being an important acetyl-group donor for energy metabolism. It's primarily found in skeletal and cardiac muscle, along with free plasma L-carnitine and other esters of varying chain lengths. The addition of the acetyl group in acetyl L-carnitine produces a considerable difference in the biochemical properties of the molecule as compared to L-carnitine, allowing it to more easily cross the blood-brain barrier, the protective mechanism that restricts movement of substances between the blood and interstitial fluid of the central nervous system. In comparison to L-carnitine, acetyl L-carnitine has specific indications for supporting mental functions, such as concentration and focus, nerve health, cardiovascular health, as well as enhancing sperm health.

**How It Works**

The exact mechanisms of action of acetyl L-carnitine are unknown, but current research indicates they may be related to both acetyl L-carnitine's neural transmission activity and its ability to enhance cellular energy metabolism.

**Mental Function Benefits**

Acetyl L-carnitine supports healthy mental functions, such as concentration and focus in three key ways: it enhances nerve cell function, provides antioxidant protection, and promotes cellular energy production. Oxygen free-radicals are a normal byproduct of the processes that fuel the body's systems. Most of these oxygen radicals are contained within the membrane folds of the mitochondria (see figure), however, about two percent are able to get free, generating toxins that present a significant danger to the entire cell.

Antioxidants “load out” extra molecules to stabilize the oxygen free – radical atoms. A recent study investigated whether acetyl L-carnitine plays a protective role regarding oxidative stress in the nervous system. The study found pretreatment with acetyl L-carnitine attenuated protein oxidation and lipid peroxidation, while also enhancing the activity of other antioxidants at the same time.

One animal model study investigated the effect acetyl L-carnitine supplementation had on nerve cell protection. Administration of acetyl L-carnitine began when rats were aged sixteen months and continued for six months treatment. Supplementation was shown to support healthy nerve cell life cycles.

Other studies have supported these findings, confirming that acetyl L-carnitine supports cerebral cell health via reduction of oxidative stress markers.

Another study examined the effect of acetyl L-carnitine on spatial working memory in animals. Test parameters included maze performance along with measures of biomarker evaluation. The study found that acetyl L-carnitine enhances spatial working memory while also providing natural support for reducing oxidative stress and enhancing healthy cell life cycles.

Lastly, acetyl L-carnitine has been shown to promote healthy cellular function by increasing cellular ATP production. It also enhances brain growth factors that are known to naturally decline with age.

**Cardiovascular Benefits**

Like L-carnitine, acetyl L-carnitine enhances fatty acid transport to drive ATP production in the mitochondria of both skeletal and heart muscle. Animal studies have also shown that acetyl L-carnitine improves the level of cardioprotection (a key component of the mitochondrial membrane) found in the heart.

**Sperm Health Benefits**

Acetyl L-carnitine is found in high concentrations in the epididymis, a coiled segment of the spermatic ducts that serves to store, mature, and transport spermatozoa between the testes and the vas deferens. Acetyl L-carnitine enhances the motility of sperm and also acts as an antioxidant, protecting spermatozoa against reactive oxygen species.

A placebo-controlled double-blind randomized trial examined the ability of acetyl L-carnitine to enhance the kinetic parameters of sperm. The study concluded that acetyl L-carnitine enhanced sperm cell motility.

**Safety**

Acetyl L-carnitine has been shown to be well-tolerated. Safety has been confirmed; side effects are negligible, electrocardiograms, lab work, and physical exams were unremarkable. Though rare, the most common adverse reactions noted have been agitation, nausea, and vomiting.

**Conclusion**

Acetyl L-carnitine is a safe and effective way to aid memory, memory improvement and mental sharpness. It can also promote cardiovascular function and enhance sperm motility.