

continue neuroprotection. The withdrawal led to further neurodegeneration. The authors suppose that Ubisol-Q₁₀ halts neurodegeneration by supporting of remaining neurons.

The most common, progressive, irreversible and fatal brain disease is Alzheimer's disease (AD), which disturbs cognition and memory functions. AD is strongly associated with increasing age with usual onset over 65 years old. Globally, the greatest contributors to AD risk are smoking following by diabetes, mid-life hypertension, mid-life obesity, depression and physical inactivity. Study focused on prevention of AD development described the improvement of cognitive decline, oxidative stress, β -amyloid accumulation, astrogliosis, synaptic loss and caspase activation in young triple transgenic mice given MitoQ in the drinking water at two months of age and continued for 5 months, i.e. the period during which the first AD-like pathologies become manifest. MitoQ-treated mice showed improved memory retention compared to untreated triple transgenic AD mice as well as reduced brain oxidative stress, synapse loss, astrogliosis, microglial cell proliferation, amyloid- β accumulation, caspase activation, and tau hyperphosphorylation. These findings support the involvement of mitochondria-derived oxidative stress in the etiology of AD and suggest that MitoQ may lessen symptoms in AD patients.

Conclusions. From the first pioneering clinical administration of CoQ₁₀ to patients with heart failure in Japan in the 60s of the last century the number of CoQ₁₀ applications keeps increasing. In the context of mitochondrial dysfunction and oxidative stress in the above-mentioned serious neurological diseases the most prominent and relevant functions are the energetic role and antioxidant capacity of CoQ₁₀. New promising formulations improve bioavailability and could make possible the more efficient administration. CoQ₁₀ administration can serve only as a corroborative substance. It is important to note that numerous clinical and experimental studies repeatedly provide the evidence that CoQ₁₀ is highly safe and good tolerated with negligible side effects or drug interactions.

Ω -3 FATTY ACIDS AND THE TREATMENT OF DEPRESSION

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Introduction. Depression is a condition in which an individual feels lethargic, irritable, and guilty, has difficulty and trouble, no enjoyment in life, mood swings, sometimes suicidal ideation and thoughts, and loss of pleasure in activities. There are hundreds of millions of individuals suffering from major depression disorder all over the world. This leads to a considerable portion of the economy going for treatment as large amounts of money are spent on drugs every year. Pharmaceutical drugs are not very effective and they also have side effects that compound the problem. There are number of studies which shows that ω -3 fatty acids are proving to be very effective against the treatment of major depression disorder and other psychiatric disorders.

Aim. To study the effect of ω -3 fatty acids on the chains of formation of depressive states.

Materials and methods. A number of search engines such as Google Scholar, PubMed and Web of Science were used to study the literature on ω -3 fatty acids on the chains of formation of depressive states.

Research results. Ω -3 fatty acids are known to be important for normal metabolism. Most mammals are unable to synthesize ω -3 fatty acids on their own. However, through diet they are able to obtain the shorter chain ω -3 fatty acids such as α -linolenic acid consisting of 18 carbon and three double bonds and later on use them to produce eicosapentaenoic acid (EPA) which is considered to

be a more important fatty acid that consists of 20 carbons and five double bonds. From EPA they further synthesize docosahexanoic acid (DHA), which is considered more crucial and consists of 22 carbons and six double bonds.

Formation of neurotransmitters and prostaglandin is affected by ω -3 and ω -6 fatty acid proportion, which is very important in the maintenance and regulation of normal functioning of the brain. There are other drugs that are used in the treatment of depression; lithium carbonate, for example, is used for the treatment of bipolar disorder. However, it has been observed that arachidonic acid turnover was lowered by 75% within brain phospholipids in rats fed lithium chloride for 6 weeks, whereas there were no changes observed in the production of rat ω -3 fatty acids. Valproic acid when given therapeutically on a long-term basis leads to a decline in arachidonate production in rat brain. The downregulation of gene expression and action of enzyme cytosolic phospholipase A2, an enzyme that particularly releases arachidonic but not ω -3 fatty acid from phospholipids, corresponded to the decline of lithium's arachidonate production.

There is evidence that ω -3 fatty acids are closely linked to mental health. In addition to this there is evidence that they may be useful as a supplement for the treatment of bipolar disorder related depression and evidence that EPA-supplemented food is helpful in patients suffering depression are well documented. By contrast, due to participant recall and diet-related systematic differences there is an important complexity in interpreting the literature to specific conclusions.

In order to combat this problem, some foods are usually recommended. Fish with red flesh such as salmon or mackerel are a good source of ω -3 oils. Ω -3 is also present in small amounts in some plant oils such as flaxseed oil. Ω -3 oils are fatty acids in which EPA and DHA are the two most useful components. The more important is EPA, which is usually considered to provide more health benefits. The long chains of unsaturated fatty acids from ω -3 oils are regarded as important for health because they are believed to decrease cholesterol levels and clear fatty deposits in the arteries. The cardiovascular system is also benefitted, and it also helps in exacerbating dysfunctions in insulin receptor signaling in the brain and cognition.

There is also significant evidence which support that ω -3 oils can be used in the treatment for schizophrenia and bipolar depression disorder. Besides treating depression ω -3 fatty oils may also be useful in treating the symptoms of dementia. Ω -3 oils are approved if a depressed person's diet appears to be deficient of it. Ω -3 oil pills are used in combination with selective serotonin reuptake inhibitors and are considered as more standard treatment for depression as recommend by some physicians.

One study showed that using ω -3 fatty acids from marine sources results in lowering of inflammation markers such as C reactive proteins, TNF- α and IL-6 in the blood.

Patrick et al. proposed a model whereby insufficient levels of vit. D, ω -3 fatty acids, and various other genetic factors that play a role during critical periods of development, lead to dysfunction in serotonin activation and function, which may be an important underlying mechanism that may lead to depression and other neuropsychiatric disorders. This model further suggests that optimizing the intake of ω -3 fatty acids from marine sources and vit. D may help in modulating and preventing the severity of brain functions.

Conclusions. Depression is a multifactorial disorder and depression due to insufficient ω -3 fatty acids diets can be of one type. Those patients who may have depression because of insufficient ω -3 fatty acids can respond well to the diet containing high levels of ω -3 fatty acids and can show positive signs regarding treatment of depression. However, for patients who have depression due to factors other than ω -3 fatty acids diet, expecting that type of depression can be treated due to ω -3 fatty acid supplement does not seem reasonable. Although it is very difficult in the present scenario to trace the exact cause of depression, it is encouraging that vital research can help us to categorize the patients of depression on the basis of their cause which can possibly help us to narrow down the use of ω -3 fatty acid on depression patients.