

COENZYME 1 - CHRONIC FATIGUE SYNDROME

Georg D. Birkmayer, M.D., Ph.D., Professor of Medicine
Labor Birkmayer & MEDINFO Inc., Vienna AUSTRIA

Summary

Barely functioning, burned out, exhausted and being tired all the time are the main symptoms reported from patients suffering from Chronic Fatigue Syndrome. Stress, depression, coffee consumption, digestive problems, food allergy, food and environmental toxin represent only a part of the many possibilities discussed as cause of chronic fatigue. The most obvious complaint is the lack of energy. This lack in drive and stamina can be overcome by NADH, the reduced form of the naturally occurring substance Coenzyme 1. This coenzyme is found naturally in all living cells and plays the key-role in the energy production of the cells. The more NADH a cell has available, the more energy can be produced to perform its processes efficiently. In addition to this energy enhancing effect, Coenzyme 1 (NADH) improves the capacity of the immune system, increases dopamine and adrenaline production in the brain and is the most potent biological antioxidant. Coenzyme 1 (NADH) is available in the USA in tablet form as a food supplement. More than 100 patients complaining about various symptoms of Chronic Fatigue Syndrome have been taking NADH tablets. Almost all reported a relief of their fatigue, an increase in strength and endurance and a boost in energy.

Chronic Fatigue Syndrome

A syndrome is characterized by a combination of various symptoms and complaints not necessarily related. It is not as well defined as a disease such as diabetes or tuberculosis. Those can be diagnosed with 100% certainty by a relatively simple lab test. A syndrome can barely be diagnosed with the same precision as a disease, nor is there a specific test to prove a syndrome. Finding a cause without a clear diagnosis is even more difficult. This holds true for Chronic Fatigue Syndrome.

Being tired all day long, feeling dragged out, exhausted, depressed, having no drive and bone-deep weariness could be an expression of Chronic Fatigue Syndrome. How long these symptoms have to persist in order to fulfill the criteria for chronic fatigue is not yet clear. The Centers for Disease Control (CDC) has therefore defined criteria for Chronic Fatigue Syndrome, which are listed below:

1. Fatigue for at least six months
2. Mild fever or chills
3. Sore Throat
4. Painful lymph nodes in the neck
5. Unexplained muscle weakness
6. Muscle pain
7. Fatigue that lasts 24 hours or longer after exercising
8. Headaches
9. Joint pain without swelling or redness
10. Short-term memory problems, forgetfulness and inability to concentrate
11. Depression
12. Sleep disturbance

All these symptoms are only valid if they are not associated with a chronic disease such as cancer, immunodeficiency, rheumatoid arthritis and many others. In other words, a chronic disease has to be excluded before the diagnosis of Chronic Fatigue Syndrome can be made.

An effective therapy can be more easily found if the cause of the illness is known. Diabetes for example, is due to a deficient

production of insulin, hence injection of insulin normalizes the elevated blood sugar levels and relieves the diabetic associated symptoms. The cause for Chronic Fatigue Syndrome has not yet been identified. A broad spectrum of potential factors are discussed. These include stress, depression, food allergy, food and environmental toxin, nutritional deficiency, hormone imbalances or viral infections. These factors can certainly be considered and tried to be identified by numerous lab tests. You may test more than 100 viruses which can occur in the human body and find some of them in the individual patient. However, proving that one or the other of these viruses is the actual cause of chronic fatigue is difficult, if not impossible.

From the viewpoint of a clinical pathologist, simple blood tests can exclude acute or chronic diseases as cause of the debilitating fatigue. These are:

- red blood cell count
- hemoglobin
- hematocrit
- iron
- potassium
- magnesium
- thyroid hormone

The rationales of these tests are as follows: too low a number of red blood cells or a low hemoglobin value indicates that your body is unable to transport sufficient oxygen, which is essential for energy production. If one of these three parameters is very low, it is reflected by chronic fatigue. The reason for a low number could be from chronic bleeding from an ulcer or tumor. An iron deficiency can also be responsible for fatigue as it is an essential component of hemoglobin and the red blood cells.

Low levels of potassium or magnesium can cause muscle weakness and cramps accompanied by pain called fibromyalgia in medical terms.

If all these parameters are normal or have been normalized and the patient is still complaining of fatigue, other potential factors have to be considered. Recreational drugs such as cocaine or amphetamine derivatives such as ecstasy, induce an euphoric feeling and better mood however, only for a very short



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period of time. This effect is due to the release of adrenaline and dopamine from the storage site in the nerve cells. However, as soon as the pool of this activating neurotransmitters is exhausted, the individual relapses to a condition which is worse than before taking the recreational substance.

COENZYME 1 (NADH)

(1) What is NADH and where is it found?

NADH is a coenzyme found naturally in all living cells. Coenzymes are essential components of enzymes which are necessary for every metabolic reaction in our body. They are forming other molecules in the cells which the cell needs for its special functions. Without a coenzyme, this production machine does not work and the cell stops its processes. NADH is also called Coenzyme 1 indicating that it is top-ranked over all other coenzymes including the well known Coenzyme Q-10. Every living cell from bacteria up to the human body contains NADH. For example, human heart cells contain 90 micrograms of NADH per gram tissue. Brain and muscle tissue contain 50 micrograms and even red blood cells have 4 micrograms of NADH available.

(2) Why is NADH important to the body?

NADH is important to the body because of the many reactions it triggers and the numerous functions it performs. The most important of these are:

- a) Acts as a driving force of the cellular energy production.
- b) Plays a key role in cell regulation and DNA repair.
- c) Stimulates capacity of the immune system.
- d) Is the most potent biological antioxidant.
- e) Can increase the biosynthesis of dopamine and adrenaline.

(3) How does NADH create energy?

NADH is actually the reduced form of Coenzyme 1. When it gets oxidized in the cell, energy is released and available to the cell. This oxidation process takes place in the energy producing compartment of the cell, the mitochondria. In a cascade of processes, NADH and oxygen combine to form water and energy. The energy is preserved in form of ATP. ATP stands for adenosine triphosphate, which is the intracellular currency of energy. ATP is necessary for all energy consuming reaction in the body.

Our brain and our muscle, including the heart, need the most energy. Interesting to note that these tissues have the highest NADH content. The more NADH a cell has available, the more energy it can produce.

(4) What are dietary sources of NADH?

NADH occurs in all cells and is present naturally in our daily food. The highest concentrations of NADH are found in red meat, poultry and yeast. Vegetables are not as rich in NADH as animal tissues (Plants need less energy to survive as they need no energy for locomotion). People who don't eat red meat, poultry or yeast should therefore consider supplementing their diet with NADH. As a matter of fact, most if not all NADH present in food gets destroyed when processed and cooked and the acid gastric juice degrades most of the remaining NADH.

(5) How does NADH work?

As we age, the energy levels in our cells decrease. When the cellular energy declines below a certain threshold, the cell dies and the tissue degenerates. Loss of cellular energy plays a substantial role in degenerative diseases such as Alzheimer's Disease, Parkinson's Disease and other degenerative diseases.

As NADH increases the energy production in the cells, it can keep cells alive for a longer period of time. Recently, we discovered in our research laboratory that NADH can enter the cell from outside providing an additional energy source.

The energy production in the cell can be increased by NADH supplied from outside. This energy enhancing effect after taking NADH is reported by most of the patients complaining about symptoms of chronic fatigue. This improvement can also be confirmed by measuring the energy production of cells before and after NADH by a special laboratory test.

A further effect of NADH lies in its strong antioxidant features. NADH is the most potent biological antioxidants. In terms of biochemistry, aging is a transition from an energy rich state to an energy poor state. The energy rich state is the reduced form of a biological compound and the energy poor form is the oxidized form of the same compound. NADH is the reduced form of Coenzyme 1 and in addition, the substance in the cell with the highest reduction potential of all biologically active compounds. Therefore, it can produce the greatest amount of energy. Due to the high reducing power of NADH, it can scavenge free radicals to a much greater extent than any other biological substance.

If the aging process is due to the damage of cells and its genes by free radicals, then NADH, on the basis of its biochemical features should have the strongest effect. The anti-aging effect is certainly due also to the key role NADH plays in cell regulation and DNA repair. The more DNA needs to be repaired, the more NADH is used up by the cell. The more NADH a cell has available, the greater the repairing capacity of a cell. This makes the cell less vulnerable and keeps it alive for a longer period of time.

Longevity and life extension can be the consequence. However, what good is a longer life if quality declines, cognitive impairment and memory problems makes a caregiver essential. In this respect, NADH can be as efficient as it stimulates the production of adrenaline and dopamine, particularly in the brain. These two substances are essential for alertness, cognitive functions and mobility. The more we have in the storage places of our cells, the better off we are.

NADH in its purified form is very sensitive to humidity, temperature, light and acid conditions such as the gastric juice. Therefore, the formulation of the NADH tablet is of critical importance. The only stable and absorbable form of NADH tablets are the newly patented formula which is marketed under the brand name ENADA as a nutritional supplement.

ENADA is marketed by MENUCO Corporation. Information about ENADA (NADH) can be obtained from MENUCO Corporation free of charge by calling 1-800-636-8261.

References may be requested from the author by contacting MENUCO Corporation