

# NuFFooDS

perspectives on science & business  
**Spectrum**

Volume 5 | Issue 6 | February 2018 | ₹100

[www.nuffoodsspectrum.in](http://www.nuffoodsspectrum.in)

52 pages including cover

## India sharpening its **FORTIFICATION** blade to cut down malnutrition



Is government  
tapering down on junk food?

-20



*“Asia is facing  
increasing health & dietary challenges”*

Rajeev Gokhale,  
Head of R&D, Asia Pacific, Roquette – 37

# Methylcobalamin and Diabetic Neuropathy



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In the 21st century, diabetes became a trend of health issue. The predominance of this disease become double in this century. It has been expected that more than 366 million people will be globally affected by diabetes. Both lifestyle and genetic factors mainly influence diabetes incidence. Insulin insensitivity is main pathophysiology of diabetes, which may occur due to insulin resistance, decreased insulin synthesis and / or pancreatic beta cell damage.

Diabetic neuropathy is a common peripheral nervous system dysfunction associated with diabetes. Almost 50% of diabetic affected individuals have complained of Diabetic neuropathy. Without treatment and care, Diabetic neuropathy can be a chronic and progressive condition. Initially, the sensory symptom appears in the toes and gradually it spreads to the upper limbs. A range of sensory symptoms such as insensitivity, pricking sensation of pins or needles, tingling, burning, electric shocks like feeling, some patients complaint loss of pain sensation, whereas others may have increased sensitivity to pain are included in diabetic neuropathy. These symptoms alter depending upon the type of nerve damages. Painful diabetic neuropathy poorly affects the quality of life of the patient. It decreases physical activity and movement increases fatigue, severe pain also causes sleep disturbance and these negatively affect social life. Metformin is widely used anti-diabetic medicine, which can accumulate in the body. Prolong consumption of this medicine leads to vitamin B12 deficiency and considered as one of the most common causes of Diabetic neuropathy.

General people often thought that the Cyanocobalamin and Methylcobalamin are synonymous. But Cyanocobalamin and Methylcobalamin are two different analogs of vitamin B12. Cyanocobalamin cannot produce any health benefits of vitamin B12 until it gets converted to Methylcobalamin. In the human body, the Cyanocobalamin is initially inactive. But

Cyanocobalamin converts to Methylcobalamin with the help of methylmalonyl Co-A mutase in mitochondria. Methylmalonyl Co-A mutase converts Cyanocobalamin to Methylcobalamin by replacing its cyanide group with a methyl group. Therefore, it is proven that cyanide is released in this metabolic reaction, which can get accumulated in the body. Usually, this risk is increased in case of kidney failure patient or smokers, though healthy people eliminate this little amount of cyanide from their system. However, people mostly prefer Cyanocobalamin formulation because of its low cost.

Vitamin B12 has a complex structure and made up of different analogs. The primary role of Vitamin B12 includes proper functioning of the brain and nervous system and production of blood cells. However, in general, vitamin B 12 analogs participate in different essential metabolic functioning, including fatty acids production, DNA synthesis and its regulation and production of energy. But our body directly unable to use vitamin B12; but Methylcobalamin is an active and most effective form of vitamin B12 among other analogs. It absorbs readily in the human cells and reached to the nervous system. Therefore, the healthcare experts expect systemic or local administration of Methylcobalamin can provide better treatment opportunity in nervous system related conditions.

## Why is Methylcobalamin best option to treat Diabetic neuropathy?

Cyanocobalamin, Methylcobalamin, and Hydroxocobalamin are the three therapeutic agents of vitamin B12, but Methylcobalamin is best in comparison to other generic forms. Cyanocobalamin is inactive and needs to convert in Methylcobalamin and also not readily absorbable in the cellular structures. Whereas, Hydroxocobalamin is a bioactive form, but cannot be given orally and Hydroxocobalamin injections are painful.

A clinical review report showed that among other vitamin B 12 analogs, Methylcobalamin is best to treat vitamin B12 deficiency. After oral administration of Methylcobalamin, sufficient amount of this active component is available in the blood in comparison with Cyanocobalamine.

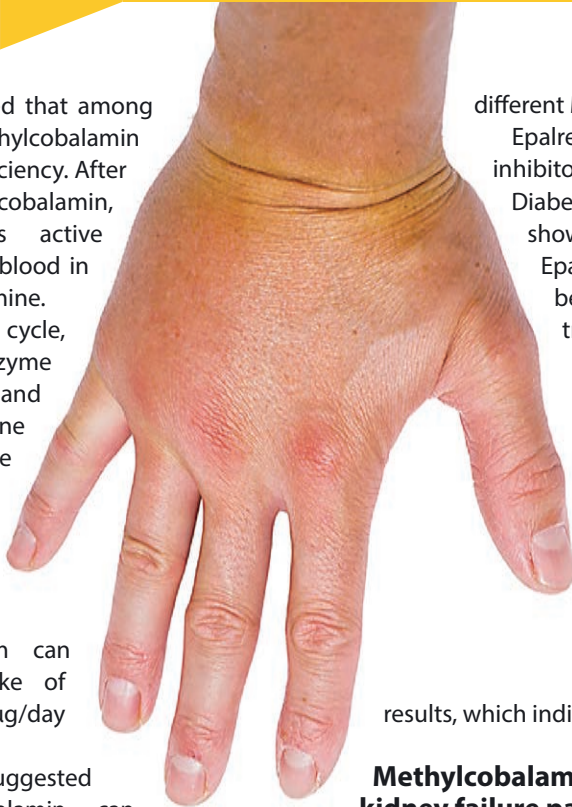
In protein methylation cycle, Methylcobalamin is a coenzyme of methionine synthase and takes part in methionine formation. In general, the experts recommended that the oral dose of co-enzyme supplements is above 1,000 µg/day. However, the individuals having vitamin B12 mal-absorption problem can be benefitted by oral intake of Methylcobalamin with 1,500 µg/day dose.

Clinical trial data suggested treatment with Methylcobalamin can improve the symptoms of diabetic neuropathy; possibly through regenerate motor nerve fibers and gradually also improves nerve conduction. In addition, Methylcobalamin also inhibits discharge of ectopic nerve impulses from injured primary sensory neurons. Thus, experts assume that Methylcobalamin can alter pathophysiology of Diabetic neuropathy.

### **Methylcobalamin as a painkiller**

Analgesics, NSAIDs (non-steroidal anti-inflammatory drugs), antidepressants, and anticonvulsants are a different class of medication use in the purpose of Neuropathic pain management. The intensity of pain and other symptoms of Diabetic neuropathy can vary patient to patient.

Methylcobalamin not only helps to regenerate damaged nerve but also reduce Diabetic neuropathy related pain symptom. The different clinical trial report showed Methylcobalamin alone or in combination with other drug has a potent analgesic effect and can effectively reduce Diabetic neuropathy pain symptom and other associated symptoms. Methylcobalamin effective to improve Diabetic neuropathy related pain, burning sensation, paraesthesia and heaviness of the limb. A significant pain score reduces by using an oral dose of Methylcobalamin and pregabalin for two weeks treatment. This combination is also well tolerated by the patient. It has been also noticed that nerve conduction is also improved in Diabetic neuropathy patient during



different Methylcobalamin trial period.

Epalrestat is an aldose reductase inhibitor and uses in the treatment of Diabetic neuropathy. A clinical study showed combination therapy of Epalrestat and methylcobalamin is better than Epalrestat alone in the treatment of Diabetic neuropathy.

Electrophysiologic techniques are applied to measure the symptomatic relief of the patient undergone different therapeutic approach to control the diabetic neuropathy. A clinical trial finding supports that pure Methylcobalamin intervention in diabetic neuropathy patient improves the electrophysiologic results, which indicates symptoms get better.

### **Methylcobalamin is safe and effective in kidney failure patient**

Diabetes is a chronic condition and gradually injure small blood vessels present in the kidney. Moreover, diabetes also increases the functioning load of the kidneys. Both of these factors increase the incidence of diabetes-associated kidney failure. Therefore, renal failure is a quite common complication in diabetes and most of the drugs are restricted to them. Because drugs cannot completely get eliminated from the body and accumulate, which increases the side effect risk. Methylcobalamin is a good treatment option for diabetic polyneuropathy patients with a kidney problem. A small-scale clinical trial showed intravenous administration of Methylcobalamin potentially provides benefits in diabetic neuropathy with chronic hemodialysis patients. This study also concludes that methylcobalamin treatment is safe for this type of patient also.

### **Can Methylcobalamin replace by Cyanocobalamin in the diabetic patient?**

It is necessary to know the answer of this question, so that the diabetic patients do not think Methylcobalamin can be replaced by Cyanocobalamin. Most of the Cyanocobalamin containing products provide 0.14 mg average daily dose. However, in some products, the amount of daily dose of Cyanocobalamin can increase up to 1 mg. It has been analyzed that almost 2% of total Cyanocobalamin dose converts to cyanide in the gastrointestinal tract. Therefore, the increased dose of Cyanocobalamin has a great risk of increase cyanide concentration in the body. **NS**