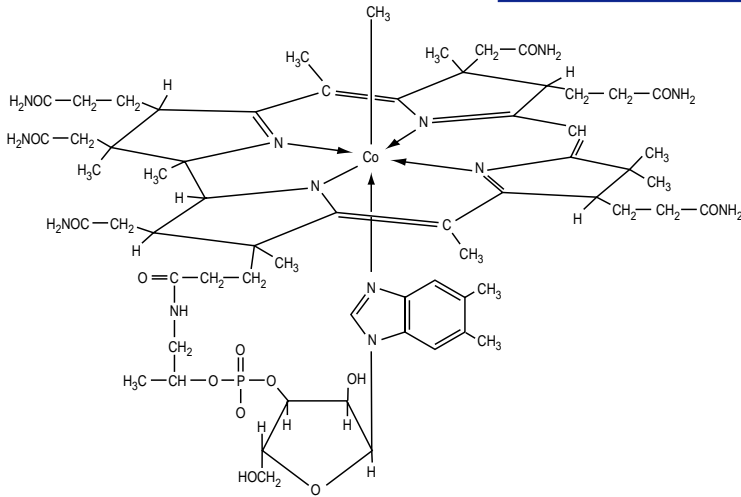


# Monograph



## Methylcobalamin

### Introduction

Methylcobalamin is one of the two coenzyme forms of vitamin B12 (the other being adenosylcobalamin). It is a cofactor in the enzyme methionine synthase which functions to transfer methyl groups for the regeneration of methionine from homocysteine.

### Pharmacokinetics

Evidence indicates methylcobalamin is utilized more efficiently than cyanocobalamin to increase levels of one of the coenzyme forms of vitamin B12. Experiments have demonstrated similar absorption of methylcobalamin following oral administration. The quantity of cobalamin detected following a small oral dose of methylcobalamin is similar to the amount following administration of cyanocobalamin; but significantly more cobalamin accumulates in liver tissue following administration of methylcobalamin. Human urinary excretion of methylcobalamin is about one-third that of a similar dose of cyanocobalamin, indicating substantially greater tissue retention.<sup>1</sup>

### Clinical Applications

**Bell's Palsy:** Evidence suggests methylcobalamin dramatically increased the recovery time for facial nerve function in Bell's palsy.<sup>2</sup>

**Cancer:** Cell culture and *in vivo* experimental results indicated methylcobalamin inhibited the proliferation of malignant cells.<sup>3</sup> Research indicated that methylcobalamin enhanced survival time and reduced tumor growth following inoculation of mice with Ehrlich ascites tumor cells.<sup>4</sup> Methylcobalamin has been shown to increase survival time of leukemic mice. Under the same experimental conditions, cyanocobalamin was inactive.<sup>5</sup> Although more research is required to verify findings, experimental evidence suggested methylcobalamin might enhance the efficacy of methotrexate.<sup>6</sup>

**Diabetic Neuropathy:** Oral administration of methylcobalamin (500 mcg three times daily for four months) resulted in subjective improvement in burning sensations, numbness, loss of sensation, and muscle cramps. An improvement in reflexes, vibration sense, lower motor neuron weakness, and sensitivity to pain was also observed.<sup>7</sup>

**Eye Function:** Experiments indicated chronic administration of methylcobalamin protected cultured retinal neurons against N-methyl-D-aspartate-receptor-mediated glutamate neurotoxicity.<sup>8</sup> Deterioration of accommodation following visual work has also been shown to improve in individuals receiving methylcobalamin.<sup>9</sup>

**Heart Rate Variability:** Heart rate variability is a means of detecting the relative activity and balance of the sympathetic/parasympathetic nervous systems. Methylcobalamin produces improvements in several components of heart rate variability, suggesting a balancing effect on the nervous system.<sup>10</sup>

**HIV:** Under experimental conditions, methylcobalamin inhibited HIV-1 infection of normal human blood monocytes and lymphocytes.<sup>11</sup>

**Homocysteinemia:** Elevated levels of homocysteine can be a metabolic indication of decreased levels of the methylcobalamin form of vitamin B12. Therefore, it is not surprising that elevated homocysteine levels were reduced from a mean value of 14.7 to 10.2 nmol/ml following parenteral treatment with methylcobalamin.<sup>12</sup>

**Male Impotence:** In one study, methylcobalamin, at a dose of 6 mg/day for 16 weeks, improved sperm count by 37.5 percent.<sup>13</sup> In a separate investigation, methylcobalamin, given at a dose of 1,500 micrograms per day for 4-24 weeks, resulted in sperm concentration increases in 38 percent of cases, total sperm count increases in 54 percent of cases, and sperm motility increases in 50 percent of cases.<sup>14</sup>

**Sleep Disturbances:** The use of methylcobalamin in the treatment of a variety of sleep-wake disorders is very promising. Although the exact mechanism of action is not yet elucidated, it is possible that methylcobalamin is needed for the synthesis of melatonin, since the biosynthetic formation of melatonin requires the donation of a methyl group. Supplementation appears to have a great deal of ability to modulate melatonin secretion, enhance light-sensitivity, normalize circadian rhythms, and normalize sleep-wake rhythm.<sup>15-20</sup>

## Dosage

The dosage for clinical effect is 1500-6000 mcg per day. No significant therapeutic advantage appears to occur from dosages exceeding this maximum dose. Methylcobalamin has been administered orally, intramuscularly, and intravenously; however, positive clinical results have been reported irrespective of the method of administration. It is not clear whether any therapeutic advantage is gained from the non-oral methods of administration.

## Safety, Toxicity, and Side Effects

Methylcobalamin has excellent tolerability and no known toxicity.

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