

## What is Vitamin B-12?

Vitamin B-12 (also called cobalamin, Cbl) is a water-soluble vitamin found mostly in animal foods. It is necessary for synthesis of DNA and normal red blood cells as well as proper neurological function. Deficiency results in megaloblastic macrocytic anemia - lower than normal red blood cells counts, and larger than normal immature RBCs.



## Risk Factors for B-12 Deficiency

*There is little evidence to suggest that exercise increases the need for B-12.*

### Inadequate B-12 intake:

- Vegetarians, vegans, athletes with relative low energy intakes (RED-S)

### Absorption issues:

- Too high/low acid in the gut
- Impaired intestinal integrity & function
- Resection of portions of stomach and/or small intestine
- Parasitic infection
- Elderly population

## Signs & Symptoms of B-12 Deficiency

### Initial Stage

- Fatigue
- Skin that is paler than normal
- Low iron
- Shortness of breath
- Heart palpitations

### Final Stage

*(caused by Megaloblastic Microcytic Anemia)*

- Severe Fatigue
- Weakness
- Headaches
- Irritability
- Difficulty concentrating
- Shortness of breath
- Heart palpitations

### Neurologic Problems

*(can occur with or without other symptoms)*

- Clumsiness
- Poor coordination
- Numbness and/or pain in extremities
- Abnormal gait
- Loss of coordination, proprioception, vibration sense or touch in ankles & toes
- Swelling of fibers or breakdown of protective coating around nerve cells (demyelination)
- Irritability, memory loss, disorientation, hallucinations, psychosis, dementia

If you are experiencing any of the above symptoms, please contact your sport dietitian or sports medicine doctor.

## Assessing Vitamin B-12 Status

Assessment	Reason	
Complete Blood Count (CBC)	Mean corpuscular volume & red cell distribution width may increase with reduced B-12 availability	*There is no reference or gold standard for measuring B-12 deficiency; it is therefore best to test multiple markers.  *High folate intake can mask B-12 deficiency. Assess dietary folate intake especially if biochemical tests for B-12 deficiency are negative.
Serum B-12	Commonly measured to reflect both intake & status	
Methylmalanoic Acid (MMA) <i>(or plasma HCY concentration)</i>	May be the most representative marker of metabolic insufficiency, especially urinary MMA standardized for creatinine	

## Treating Vitamin B-12 Deficiency

### Consume sufficient B-12 from food

- RDA = 2.4 mcg/day minimum

### Supplements *(upon recommendation by sport dietitian or medical provider)*

- Effective alternative for those who do not want to consume animal products
- Accessible & affordable way to treat deficiency
- Nasal spray: for malabsorption disorders
- Multivitamins are not recommended (vitamin C & copper can degrade B-12)

### Intramuscular Injections

- Expensive & may pose complication/risk
- Only administered under a physician's care for those with absorption issues
- *Oral B-12 administration has been proven equally as effective as intramuscular injections*

***If diagnosed with a B-12 deficiency, a sport dietitian may recommend supplements or sports medicine doctor may order you an injection.***

## Vitamin B-12 Food Sources

Food Source	Vitamin B-12 (mcg)
Clams, mixed species (3 oz)	84
Liver, beef, cooked (3 oz).	70
Oysters, Eastern (3 oz)	11
Salmon, sockeye, cooked (3 oz)	4.8
Nutritional yeast (B-12 fortified) (1 tbsp)	4.4
Tuna fish, light, canned (3 oz)	2.5
Beef, sirloin (3 oz)	1.4
Milk, low fat (1 c)	1.2
Cheese, Swiss (1 oz)	0.9
Yogurt, low fat (1 c)	0.9
Pork, loin (3 oz)	0.6
Egg (1)	0.6
Cereal (B-12 fortified) (1 serving)	0.6
Chicken, breast (3 oz)	0.3
Nori (sushi seaweed) (0.3 g)	0.2

## Performance & B-12 Supplements

B-12 supplementation has not been shown to benefit or improve performance unless a true nutritional deficiency exists.