NUTRIENTS

Vitamins: Vitamin B12

What is it?

Vitamin B12 represents a family of compounds that contain the mineral cobalt. For this reason cobalamin is the term used to refer to compounds having vitamin B12 activity.

Absorption

Absorption of vitamin B12 occurs in a unique way. Vitamin B12 is released from food by digestion, especially by stomach acid. The vitamin B12 binds with intrinsic factor which is produced in the stomach. The resulting complex travels to the last section of the small intestine, called the ileum. Ileum cells then absorb vitamin B12. Absorption is very poor unless the intrinsic factor is present.

Functions - what does it do?

Vitamin B12 is necesssary for the formation of proteins and red blood cells, and for the functioning of the nervous system. It participates in a variety of cellular reactions to release energy from carbohydrates, fats and protein.

Folate metabolism. Vitamin B12 (in coenzyme form) accepts carbon groups from folate as folate removes it from other compounds. This process regenerates folate to its active form so that it can continue to remove carbon groups. Therefore, a vitamin B12 deficiency can contribute to a deficiency of the active form of folate.

Healthy nervous system. Vitamin B12 helps maintain the myelin sheath that insulates nerve fibres from each other. People with vitamin B12 deficiency show irregular destruction of the myelin sheaths, which eventually causes paralysis and death.

Requirements - How much do we need?

	Recommended Dietary Allowance* (µg/day)	
Life-Stage (years)	**Males**	**Females**
0 - 0.5 (0 - 6 months)	0.4#	0.4#
0.5 - 1 (7 - 12 months)	0.5#	0.5#
1 - 3	0.9	0.9
4 - 8	1.2	1.2
9 - 13	1.8	1.8
14 - 18	2.4	2.4
Ages 19+	2.4	2.4
Life-Stage (years)	**Pregnancy**	**Lactation**
18 and younger	2.6	2.8

19 - 30	2.6	2.8
Ages 31+	2.6	2.8

*The Recommended Dietary Allowance (RDA) is the average daily dietary intake level that is sufficient to meet the nutrient requirements of nearly all (97-98%) healthy individuals in each life-stage and gender group.

#Adequate Intakes (AI) are used as no RDA is established. The AI is a recommended daily intake level based on observed or experimentally determined approximations of nutrient intake by a group of healthy people who are assumed to be maintaining an adequate nutritional state.

Sources - Where is it found?

Vitamin B12 is produced by bacteria and fungi.

Food Groups	Food Sources	Nutrient Density		
		High	Medium	Low
Meat, poultry, fish, dry beans, eggs, and nuts	Organ meats (esp. liver, kidneys, heart), Seafood, Beef, Eggs, Ham			
Milk, yoghurt and cheese	Milk and Milk Products			
	Generally not present in plant products			

Those vegetarians who totally exclude animal products from their diet need supplemental vitamin B12 to meet their requirements.

Deficiency - When you have too little

Absorption of vitamin B12 from foods requires the normal function of the stomach, pancreas, and small intestine. Deficiency may occur as a result of an inability to absorb vitamin B12 from food. Generally, most individuals who develop a vitamin B12 deficiency have an underlying stomach or intestinal disorder that limits the absorption of vitamin B12.

Characteristic symptoms of B12 deficiency include fatigue, weakness, nausea, inflammation of the tongue, constipation, loss of appetite, and weight loss.

Neurological changes. Deficiency can also lead to neurological changes including numbness and tingling in the hands and feet, difficulty in walking, memory loss, disorientation, and dementia.
Some of these symptoms can also result from a other medical conditions besides vitamin B12 deficiency. It is important to have a physician evaluate these symptoms so that appropriate medical care can be given.

Pernicious anaemia. Vitamin B12 is absorbed in the stomach when it binds to intrinsic factor, a substance necessary for its absorption. A lack of intrinsic factor prevents normal absorption of vitamin B12 which results in the blood disorder called pernicious anaemia.

Pernicious anaemia. A form of anaemia caused by a lack of intrinsic factor, a substance needed to absorb vitamin B12 (cobalamin) from the gastrointestinal tract.
Anyone with pernicious anemia usually needs injections of vitamin B12. Pernicious anaemia is a chronic condition that should be monitored by a physician, and requires lifelong supplemental vitamin B12.

Toxicity - When you have too much

No toxic or adverse effects have been associated with large intakes of vitamin B-12 from food or supplements in healthy people.

	Upper Limit+ (µg/day)	
Life-Stage (years)	**Males**	**Females**
All ages	ND	ND
Life-Stage (years)	**Pregnancy**	**Lactation**
All ages	ND	ND

+Upper Limits (UL) = The maximum level of daily nutrient intake that is likely to pose no risk of adverse effects. Unless otherwise specified, the UL represents total intake from food, water, and supplements.

ND = Not determinable due to lack of data of adverse effects in this age group and concern with regard to lack of ability to handle excess amounts. Source of intake should be from food only to prevent high levels of intake.

For further, personalized and more detailed information, please contact a dietitian registered with the Health Professions Council of South Africa.*References from the scientific literature used to compile this document are available on request.*

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