Hi-Po Emulsi-A™

High-potency liquid emulsified vitamin A

designs for health®

By David M. Brady, ND, DC, CCN, DACBN, IFMCP, FACN & Amy Berger, MS, CNS

Hi-Po Emulsi-A™ is a standalone vitamin A formula ideal for patients who may benefit from higher doses of this nutrient and who prefer using an easily titrated liquid form rather than capsules or softgels. Just one drop of this highly concentrated formula provides 5000 IU of vitamin A as retinol palmitate (1500 mcg retinol activity equivalents, or RAE).

"Vitamin A" refers to a host of related compounds called retinoids—retinol, retinal, and retinoic acid—with retinal and retinoic acid being the "active" forms.[1,2] The vitamin A found in animal foods is in the form of retinol, also called pre-formed vitamin A. It is a yellow, fat-soluble compound that serves as a precursor to retinoic acid, the most active form of vitamin A in the body. The vitamin A precursors in plant foods are provitamin A carotenoids that include β-carotene, α-carotene, and β-cryptoxanthin. These can all be converted to retinol in the body, but other commonly consumed carotenoids such as lycopene, lutein, and zeaxanthin cannot.[1,2]

True vitamin A occurs only in animal foods. The aforementioned provitamin A carotenoids can be converted into vitamin A but the efficacy of this is limited overall, varies among individuals, and is influenced by numerous metabolic and hormonal abnormalities. Some individuals may be able to synthesize sufficient vitamin A from carotenoid precursors, but others may be better served by getting pre-formed vitamin A from animal foods and/or supplementation. Supplementation may also be warranted in those with conditions affecting fat malabsorption, such as Crohn's disease, celiac disease, chronic pancreatitis, or liver or biliary disorders. Heavy alcohol consumption and use of certain pharmaceutical drugs, such as laxatives and bile acid sequestrants (for lowering cholesterol), decrease vitamin A absorption.[3]

Roles of Vitamin A:

- Supports healthy immune function
- Promotes growth and differentiation of cells lining mucous membranes in the respiratory, gastrointestinal and genitourinary tracts
- Needed for proper cell differentiation
- Critical for reproductive function in males and females
- Required for healthy fetal development
- Promotes skin health
- Supports thyroid function
- Needed for steroid hormone synthesis
- Key nutrient for visual acuity and color vision
- Helps mobilize iron stores and supports red blood cell synthesis

Absorption of β-carotene from plant foods ranges from 5% to 65% in humans.[4] The bioavailability and vitamin A equivalency of carotenoids are highly variable and are impacted by factors related to the foods themselves and to the health status of the individual consuming them. These include the food matrix, processing techniques, the concentration of the carotenoid, and the amounts of dietary fat, fiber, and preformed vitamin A in the diet, as well as an individual's vitamin A status, gut integrity, and genetic polymorphisms that affect carotenoid metabolism.[5] Hypothyroidism and type 2 diabetes are among the common conditions known to impair conversion of carotenoids to vitamin A.[3,6] Data from the US, Australia, and six European nations indicate that even in industrialized nations where frank malnutrition is rare, an adequate vitamin A intake cannot be achieved through preformed vitamin A or β-carotene alone, but rather, these must be combined.[7]

Immune function

Vitamin A plays a critical role in supporting immune function. Early research on vitamin A led scientists to conclude that anti-infective activity was one of the chief functions of this nutrient.[8,9] "Immunologists have recognized for decades that vitamin A deficiency is associated with enhanced susceptibility to most infections, and defects in both the innate and adaptive immune systems."[10] Retinoic acid (RA, a vitamin A metabolite) is produced by antigen-presenting cells (APCs), including macrophages and dendritic cells, found in the mucosal interfaces of the skin, digestive tract, urinary tract, and airway, which are the body's first lines of defense against infection. RA may regulate the differentiation, migration, and antigen-presenting capacity of dendritic cells, and the production of RA by APCs is required for the differentiation of naïve CD4 T-lymphocytes into induced regulatory T- lymphocytes (Tregs), which are crucial for maintaining mucosal integrity.[11] RA-dependent processes also stimulate production of pro-inflammatory cytokines by effector T-lymphocytes in response to infection. Animal models suggest RA may be beneficial for preventing or treating autoimmune conditions.[10,12,13]

Much research has been conducted regarding the role of intestinal integrity ("gut permeability") in immune function, specifically with regard to initiation of autoimmune processes. This largely centers around the physical integrity of the gut vis-à-vis tight junctions, but the activity of immune cells located in the intestine may also affect gut-associated immune function, partly under the influence of vitamin-A dependent processes.[14,15] Retinoic acid has been shown to play a critical role in generating mucosal dendritic cells from bone marrow as well as in the functional activity of these cells.[16,17] RA is believed to play a role in generating IgA antibody secreting cells that lodge in the small intestinal mucosa.[18]

"Vitamin A is central to immune homeostasis in the gut, coordinating both innate and adaptive immunity. RA stimulates the migration of immune cells including dendritic cells, T cells, and B cells to the intestine and helps inform their function. Vitamin A directly regulates proliferation and differentiation in the intestinal epithelium, which is crucial to the maintenance of the gut barrier."[19]

Supplement Facts

Serving Size 1 drop
Servings Per Container 1,100

Amount Per Serving		% Daily Value
Vitamin A (as Palmitate)	1,500 mcg RAE	167%

Other Ingredients: Glycerine, purified water, vitamin E.

Other roles for vitamin A

Prenatal development

Adequate vitamin A is crucial for healthy prenatal development[11] and has been called "essential for normal reproduction and development."[20] Very high doses of vitamin A are believed to be teratogenic, but reasonable doses above the RDA (currently 770mcg RAE during pregnancy and 1,300mcg RAE during lactation for women 19-50 years of age) have not been shown to result in harm. A case-control study comparing estimated periconceptual vitamin A intake between women with healthy offspring and those whose offspring had neural tube defects (NTDs) or major malformations found no association between periconceptional vitamin A intake above 10,000 IU/day and malformations in general, including cranial neural crest defects and NTDs. They concluded, "If vitamin A is a teratogen, the minimum teratogenic dose appears to be well above the level consumed by most women during organogenesis."[21]

Another study confirmed there was no evidence for increased risk of major malformations in babies born to mothers with a high vitamin A intake during the organogenetic period.[22] ("High" was defined as ≥10,000 IU/d, with a median of 50,000 IU/d and a range of 10,000-300,000 IU/d.) A study that pooled findings from animals, pregnant women and non-pregnant women determined that a daily dose of as much as 30,000 IU of vitamin A should be considered non-teratogenic.[23] The authors of a different paper came to a similar conclusion, noting, "blood levels of retinoids from women taking 30,000 IU/d of preformed vitamin A are not greater than retinoid blood levels in pregnant women during the first trimester who delivered healthy babies."[20]

Thyroid function

Vitamin A is required for activation of thyroid hormone receptors and insufficient vitamin A may depress thyroid function. Animal models have shown that vitamin A deficiency interferes with thyroid health further upstream, in the pituitary gland. Vitamin A insufficiency increases pituitary synthesis and secretion of thyroid-stimulating hormone (TSH), increases the size of the thyroid gland, reduces thyroid gland uptake of iodine, and impairs synthesis and iodination of thyroglobulin.[11]

Vitamin A given alone, even in the absence of increased iodine, has demonstrated a positive impact on thyroid function and gland size.[24] Vitamin A supplementation was shown to reduce serum TSH levels and increase T3 in premenopausal women, including a cohort of obese women, who are at increased risk for subclinical hypothyroidism.[25] Among children with goiter living in areas where iodine deficiency disorders are prevalent, the greater the severity of vitamin A deficiency, the greater the thyroid gland volume and the higher the TSH levels.[26] Compared to placebo, supplemental vitamin A significantly reduced median TSH and the rate of goiter. In rats with concurrent deficiencies in both iodine and vitamin A, vitamin A repletion alone was effective in reducing thyroid gland size and hyperstimulation.[27]

Recommended Use: Take 1 drop (5000 IU) per day, or as directed by your health care practitioner.

Warning: Not for use by children. Do not exceed the recommended dose or use long term without medical supervision. Excess vitamin A may cause reproductive harm or organ damage

For a list of references cited in this document, please visit:

https://www.designsforhealth.com/techsheet-references/hi-po-emulsi-a-references.pdf

Dosing recommendations are given for typical use based on an average 150 pound healthy adult. Health care practitioners are encouraged to use clinical judgement with case-specific dosing based on intended goals, subject body weight, medical history, and concomitant medication and supplement usage.

***These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure or prevent any disease.**

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