

Comparison: B (water-soluble) and G (alcohol-soluble) Fractions of Vitamin B Complex	
B fraction	G fraction
Primarily thiamine, pantothenic acid	Primarily riboflavin, niacin
heat stable	heat labile
B1 (thiamin pyrophosphate (cocarboxylase)), B4, B5 (pantothenic acid), B12	B2 (riboflavin-5-phosphate), niacinamide, para-aminobenzoic acid (PABA), folate, choline, inositol, betaine
Nerve promoting	Nerve relaxing
Vasoconstrictive	Vasodilative
Improves low blood pressure and vascular tone	Lowers blood pressure in hypertensives
Heart correlations: bradycardia, irregular heart beat - atrial fibrillation, heart block, split S1 and/or S2	Heart correlations: tachycardia, ventricular ectopic beats (PVCs), pre-angina, pre-myocardial infarction, S1 and S2 equally spaced
Muscle tone decreased (flaccidity)	Muscle tone increased (spasticity)
Mental correlations: increased psychotic tendencies, apprehensive, intolerant to noise and bright lights	Mental correlations: excessively worried, apprehensive, moody, depressed, suspicious
Digestive correlations: Digestive correlations: supports HCl and pancreatic enzyme production via carbonic anhydrase, lack of appetite, drowsiness after meals	Digestive correlations: aids stomach and pancreatic enzyme production via improving vagal tone, improves biliary delivery of bile and pancreatic chyme, spastic gall bladder
Helps carbohydrate metabolism	Helps fat metabolism
Neurological correlations: lack of vibration sense, headaches like a tight band around the head, increased lactic acid - burning in soles of feet and tenderness in calves	Neurological correlations: helps increase acetylcholine activity, helps cholinesterase activity, restless legs/jumpy, shaky legs
Sleep difficulty correlations: frequent nocturnal urination, awakens and cannot return to sleep, back pain - especially at night	Sleep difficulty correlations: whole body or limb jerks upon falling asleep, can hear heartbeat on pillow
Skin correlations: itchy symptoms, seborrheic dermatitis	Skin and mucous membrane correlations: cheilosis - cracking at corners of mouth, friable skin - especially on face and neck (shaving), bright red tip of tongue, strawberry tongue (purple), thin upper lip, irritated mucous membranes - rectum, vagina, eyes
Decreased breath holding time, shortness of breath, decreased respiratory rate, frequent yawning, fatigue, low body temperature	
Promotes estrogen breakdown to prevent spider nevi, breast swelling, premenstrual water retention, long and heavy periods, short intervals between periods, generalized bloating, thyroid inhibition	Visual correlations: burning or itching of eyes, photophobia, blepharospasm, bloodshot eyes (corneal injection), see only parts of printed words, transient ischemia of eye (looking through a fish bowl), pallor temporal halo of optic disc
Note: Shellfish, salted herring, and clams are high in thiaminase	



Here’s an extra - some coverage on subclinical nutrient deficiency and my take on subclinical pellagra and beriberi. It’s from a chapter I wrote for Applied Kinesiology: Clinical Techniques for Lower Body Dysfunctions/

**Biochemical individuality and subclinical nutrient deficiency**

Cheraskin, Ringsdorf, and Williams have each proposed models of biochemical individuality wherein each individual has an utterly unique biochemistry based on their genetic constitution, epigenetic history, and environment -- often resulting in inborn errors of metabolism. These inborn errors can result in resistance to the influence of nutrients on enzyme systems and predispose patients to a need for higher levels of nutritional supplementation than the average population. (Bucher, 2011; Cheraskin, 1977; Cheraskin, 1976; Williams, 1956) AK adds to the physician’s nutritional knowledge an ability to determine, to a certain extent, the effects of various nutritional products on the biochemical individuality of the patient being evaluated. Zinc, magnesium, and vitamin D are good examples of this as they are commonly deficient upon laboratory exam and can underlie a wide array of symptoms in patients that would appear to be sufficiently nourished based upon an analysis of their diet. (Hambidge, 2007; Holick, 2006; Whang, 1987)

Sub-clinical B12 deficiency is now recognized as a valid clinical entity with subtle manifestations of the classic deficiency pattern and being responsive to B12 supplementation, especially in the elderly. (Herrmann, 2003) Based upon this principle, consider sub-clinical protein, thiamin, or niacin deficiency in patients with otherwise idiopathic edema of the lower extremity. (Padhila, 2011; Igata, 2010; Singleton, 2001)

Morabia has argued that laboratory testing is inadequate to diagnose these syndromes and that clinicians must still rely on observation of patients’ patterns of signs and symptoms for adequate differential diagnosis. (Morabia, 2011)

McCarty has proposed a model for subtle nutrient deficiency leading to aberrant physiology and functional illness when he states “many nutritional agents involved in bioenergetics (regulating mitochondrial and antioxidant functions) are often functionally sub-saturated.” (McCarty, 1981)

Rudin (1982) has proposed a model for pellagraform and beriberiform diseases that present as syndromes mimicking true pellagra and beriberi, but lack the developed pathologies associated with these classic nutrient deficiency diseases. Rudin calls these disorders substrate pellagra and substrate beriberi. Rudin proposed that the interdependency of B vitamins and their cofactor substrate essential fatty acids (primarily omega3 fatty acids) for production of structural and regulatory proteins and lipids could be compromised by malnutritional synergy -- the combined subclinical deficiencies of proteins, fats, vitamins, and minerals.

According to Rudin,  
 “...since substrate essential fatty acids are processed by many B vitamin catalysts, an EFA deficiency will mimic a panhypovitaminosis B, i.e., a mixture of substrate beriberi and substrate pellagra resembling vitamin beriberi and pellagra but exhibiting as even more diverse endemic disease. This would constitute a second stage of the modern malnutrition and explain why some workers now hold the dominant diseases of modernized societies to be new, nutritionally based, pellagraform yet lipid-related and to range, once again, from heart disease to psychosis.”

Table 1 may help the clinician understand the etiology for some presentations of edema in the lower extremities. It is important to note here that we not claiming that true kwashiorkor, beriberi, and pellagra are common diseases; they are, indeed, very rare, especially in industrialized societies. What we are attempting to make the clear is that functional (rather than pathological) nutrient deficiencies are more prevalent than commonly supposed.

<b>Nutrient Deficiencies Associated With Edema</b>		
<b>Kwashiorkor</b>	<b>BeriBeri</b>	<b>Pellagra</b>

<b>Nutrient Deficiencies Associated With Edema</b>		
<b>Kwashiorkor</b>	<b>BeriBeri</b>	<b>Pellagra</b>
Pedal edema, ascites, enlarged and fatty liver, thinning hair, loss of teeth, skin depigmentation, dermatitis, irritability, anorexia.	Lower extremity edema, weight loss, emotional disturbances, impaired sensory perception (Wernicke's encephalopathy), paresthesias, arrhythmia, mental confusion/speech difficulties, vasodilation, awakening at night, short of breath, tachycardia, shortness of breath with activity.	Dermatitis (red skin lesions desquamation, erythema, scaling, keratosis of sun-exposed areas), photophobia, aggression, anxiety, mental confusion, insomnia, dementia, sensitivity to odors, neuralgia, neuritis, ataxia, weakness, alopecia, edema, glossitis (smooth, beefy red), diarrhea, dilated cardiomyopathy.
<b>Protein deficiency</b>	<b>Thiamin deficiency</b>	<b>Niacin deficiency</b>
Adequate hydrochloric acid and pancreatic enzymes are required for absorption; cooking all proteins may result in deficiency of heat-labile amino acids, small intestine absorption must be sufficient, and the urea cycle must be functional to have adequate protein metabolism.	Provide B1 (thiamine); a phosphorylated form may be needed as many patients ineffectively phosphorylate synthetic forms (i.e. thiamin hydrochloride). Refining removes naturally occurring thiamin from foods and sulfites degrade it. Refined carbohydrates increase tissue demand for thiamin.	Provide B3 (niacin); a phosphorylated form may be needed. Avoid corn, corn-derived sugars, and excessive sun exposure. Niacin is synthesized in the liver from tryptophan; tryptophan is heat-labile and a lack of uncooked protein sources may predispose to tryptophan deficiency.