Choline
Hypothyroidism negatively affects choline function in the brain, which can affect mood and cognition.\(^{29,30}\)

Carnitine
Decreased tissue levels of carnitine in both hypo- and hyperthyroidism contribute to muscle fatigue.\(^{24,25,26}\)

Lipoic Acid
Improves endothelial function in people with subclinical hypothyroidism; Protects thyroid cells from oxidative stress; May interfere with T4 therapy.\(^{27,28}\)

Selenium
Converts thyroid hormones T4 (thyroxine) into T3 (triiodothyronine); Deficiency reduces T3 levels causing classic hypothyroidism symptoms such as fatigue, depression and/or weight gain.\(^{18,19,20,21}\)

Asparagine
This amino acid is part of the structure of thyroid stimulating hormone which regulates communication with other hormones.\(^{22,23}\)

Selenium
Vitamin A
Activates gene that regulates TSH (thyroid stimulating hormone).\(^{12,13,14}\)

Vitamin C and E
Partially restores thyroid function when liver detoxification ability is compromised.\(^{2,8,9,10,11}\)

B Vitamins
A deficiency in B6, B12 or B9 (folate) can cause elevated homocysteine, which is linked with hypothyroidism. Folic acid levels have been linked to levels of thyroid stimulating hormone (TSH).\(^{3,4,5,6,7}\)

Zinc
Increases thyroid hormone T3 in deficient subjects.\(^{15,16,17,20,21}\)

Copper
Low levels seen in experimentally induced hypothyroidism; Indirectly affects thyroid status by its antioxidant role via superoxide dismutase.\(^{17}\)

Glutathione
Hypothyroidism decreases efficacy of some antioxidants, such as glutathione peroxidase and superoxide dismutase.\(^{1,2}\)

Copyright 2012 SpectraCell Laboratories, Inc.
All rights reserved. Doc 373 08.12
REFERENCES


18. Moncayo R, Kroiss A, Oberwinkler M et al. The role of Se, vitamin C, and zinc in benign thyroid diseases and of Se in malignant thyroid diseases: low Se levels are found in subacute and silent thyroiditis and in papillary and follicular carcinoma. *BMC Endocr Disord* 2008;8:2.


