



# TRACE ELEMENTS Newsletter

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## Hypothyroidism and Hypertension

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Typically when one thinks of high blood pressure it is logical to assume that it would be associated with an increased metabolic rate as seen in sympathetic dominant individuals. Sympathetic dominance is associated with an increase in thyroid and adrenal activity. However, hypertension can also occur in parasympathetic individuals who have subclinical or overt hypothyroidism as well as adrenal insufficiency.

### Thyroid Hormone and the Heart

Thyroid hormone effects heart cells, or cardiac myocytes through genomic and non-genomic pathways. Thyroxine increases the heart rate and cardiac output as well as the metabolic rate and increases sympathetic activity by potentiating the effect of catecholamines.

### Hyperthyroidism

Hyperthyroidism is associated with an expansion of blood volume, due to the release of rennin and sodium reabsorption as well as increased stroke volume that results in systolic hypertension. Subclinical hyperthyroidism also contributes to cardiovascular changes in the long-term. The heart rate is chronically increased, contributing to cardiac rhythm irregularities and changes in the mass and volume of the left ventricle.

### Hypothyroidism

Overt hypothyroidism affects 1 to 4 percent of the population, but the prevalence of subclinical hypothyroidism affects 5 to 10 percent of the population. Subclinical hypothyroidism is defined as a symptom-free or minimally symptomatic state, characterized by abnormally elevated serum levels of TSH (thyroid stimulating hormone) with normal serum concentrations of free thyroxin. It is caused by the same disorders of the thyroid gland as those that cause overt hypothyroidism including autoimmune thyroiditis, use of antithyroid drugs, etc. Patients with subclinical hypothyroidism have higher total cholesterol, LDL, triglyceride, apo B levels and

LDL/HDL ratio compared to control groups. (Cabral, et al. 2004) Hypothyroidism affects cardiac muscle contraction and contributes to high blood pressure due to increase stiffness of blood vessels and peripheral vascular resistance. Studies have shown that subclinical hypothyroidism may be an independent risk factor for the development of coronary artery disease, as well as congestive heart failure in older adults who have elevated TSH levels. (JAMA 2006)

### Case Study

The following is an interesting case report appearing in Lancet, of a 39-year-old physician who decided to have a health check-up since over the past year he had experienced hair loss and other symptoms. Laboratory tests revealed that his cholesterol was high, which was a family characteristic, and his blood pressure was elevated at 160/105. Other laboratory findings included an elevated creatine phosphokinase (CPK) of 745 U/L. Electrocardiogram findings were also abnormal. The hair loss and elevated CPK lead his doctors to suspect a hypothyroid condition. Further testing revealed his thyroid-stimulating hormone (TSH) was elevated at 146 mU/L (normal <5 mU/L) and his thyroxin was 3.1 pmol/L (normal 11-22). The individual was placed on treatment with 100 ug. of thyroxin and after 3 months his blood pressure was down to 135/80, and his CPK had returned to normal. After 6 months his hair loss subsided and growth had returned to normal. His electrocardiogram also returned to normal. The authors state that years ago when TSH measurements were difficult to perform routinely and were very expensive, CPK was referred to as "poor man's thyrotropin" since it is often elevated in patients with hypothyroidism. (Smulders et al., 2005) We can see from this case study that improving the thyroid function can lower blood pressure while at the same time raises the metabolic rate. Therefore, hypertension needs to be addressed based upon the individual causation. In some cases, raising the metabolic rate can lower high blood pressure and in other types of hypertension requires a lowering of the metabolic rate.

## **Weight Gain and Hypothyroidism**

Not only is hypothyroidism related to high blood pressure and unhealthy cholesterol and other lipid levels, but also overweight conditions. This can be explained based upon HTMA patterns and metabolic types. Generally speaking, parasympathetic dominant individuals have a reduction in their metabolic activity resulting in subsequent weight gain. However, this involves more than just reduced thyroid expression. Other hormones may be involved such as insulin, and parathyroid hormone. It is known that an increase in free intracellular calcium in adipocytes reduces their lipolytic response to catecholamines. In other words excess calcium has an effect of blunting the fat burning enzymes in fat cells, thus contributing to weight gain or an inability to lose weight. Parasympathetic dominant individuals who have hypothyroidism can often have a corresponding elevation of PTH, which increases calcium concentrations in fat cells. (McCarty, et.al. 2003)

Insulin can also reduce the metabolic rate due to insulin's antagonistic effect upon the stimulatory, or thermogenic action of thyroid and adrenal hormones. Patients with adult onset diabetes have the typical triad of hyperinsulinism, parathyroid dominance and hypothyroidism. These endocrine changes are present long before clinical manifestations of diabetes. These factors individually or in combination lead to the susceptibility of abnormal lipid profiles and development of cardiovascular disease. It is therefore important to assess overall endocrine activity when treating individuals who may have a reduction in their metabolic rate. Doing so will aid in improving the resting metabolic rate, improve glucose control, normalize lipids as well as aid in weight loss. (Piolino, et al 1990)(Itaka, et al. 2000)

## **The Thyroid-Adrenal Connection**

It is apparent from HTMA studies that a synergistic relationship exists between the adrenal and thyroid glands. Typically when thyroid function is decreased, adrenal function follows suit. Conversely, when thyroid function is elevated adrenal activity is also increased. Unfortunately, we often see individuals who have been on long-term thyroid support alone with little evidence of their effectiveness such as improvement in metabolic activity, increase in body temperature, reduction in fatigue, joint stiffness, depression as well as other symptoms associated with hypothyroidism. This lack of response may be explained by the thyroid-adrenal relationship.

## **Adrenal Support For Improvement in Thyroid Expression**

Symptoms of hypothyroidism and adrenal insufficiency can be very similar. Often, thyroid support alone does not aid in improving metabolic activity unless adrenal support is initiated. Many individuals who have been diagnosed and treated for hypothyroidism may in fact be suffering from adrenal insufficiency and therefore, thyroid replacement therapy may often be unwarranted.

A number of cases have been reported of individuals having signs of hypothyroidism with elevated TSH, and low free thyroxin concentration in conjunction with adrenal insufficiency. Adrenal hormone support resulted in normalization of thyroid function without any type of thyroid support. It is also reported by other researchers that patients with Addison's disease or adrenal insufficiency also presented with hypothyroidism and became euthyroid following adrenal support. (Abdullatif, et al. 200)( Candrina, et al,1987)

## **Conclusion**

This is a limited discussion regarding the little recognized relationship between hypertension and hypothyroidism. One should be well aware of the dozens of factors that can contribute to a reduction in thyroid activity. These include naturally occurring food substance, medications, illness, autoimmune conditions, excess intake of certain vitamins, and excess accumulation of minerals, as well as deficiency or imbalances between minerals and vitamins as well as other endocrine involvement such as estrogen, testosterone, and progesterone imbalances. Environmental factors such as chemical exposure and heavy metal accumulation can also impact thyroid expression. The following link provides further information on the nutritional relationships to the thyroid.

<http://www.traceelements.com/Docs/The%20Nutritional%20Relationships%20of%20Thyroid.pdf>

We can see that subclinical hypothyroidism is a very prevalent condition that can lead to a number of metabolic consequences, particularly coronary heart disease and is often overlooked in most patients. The widespread recommendation for the use of cholesterol-lowering statin drugs seems to be aimed at treating the symptoms related to the potential development of atherosclerosis rather than treatment of the individual's underlying condition. Determining and treating this common condition could reduce the incidence of atherosclerosis by correcting the underlying cause or mechanism instead of resorting to symptomatic or end-point treatment with the use of statin drugs.

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