Increased Risk of Heart Failure in Subclinical Hypothyroidism

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Cardiac changes occur in both hypothyroidism and hyperthyroidism. A new study shows that mild subclinical hypothyroidism doubles the risk of congestive heart failure.

Understanding thyroid disease

The vast majority of thyroid disorders are autoimmune in origin. Hypothyroidism is a term for decreased thyroid hormone levels, and hyperthyroidism refers to increased levels of thyroid hormone. The effects of excess thyroid hormone are referred to as thyrotoxicosis. In overt thyroid disorders, levels of thyroid hormone are abnormal.

Overt hypothyroidism and less frequently overt hyperthyroidism have long been associated with heart diseases, including congestive heart failure. In hyperthyroidism, congestive heart failure is most likely to occur in elderly patients with atrial fibrillation. A new study shows that in addition to overt hypothyroidism, subclinical hypothyroidism also causes a two-fold increase in the risk of developing heart failure. This study was presented in 2007 at the American Thyroid Association’s annually meeting in New York and involved more than 3,000 individuals 65 years of age and older.

Subclinical Hypothyroidism

Subclinical hypothyroidism is defined as an elevated level of the pituitary hormone TSH in conjunction with normal levels of the thyroid hormones FT4 and FT3. In the study presented at the Thyroid Association meeting the high end of the reference range for TSH was listed as 4.5 μL. According to experts at the American Association of Clinical Chemistry, the upper limit for TSH is 2.5 μL with levels higher than 2.5 suggesting subclinical hypothyroidism in the presence of normal FT4 and FT3 levels.

Subclinical Hyperthyroidism

Subclinical hyperthyroidism, which is defined as a TSH level less than 0.3 μL with normal FT4 and FT3 levels, has not been associated with congestive heart failure.

Previous studies have shown that some patients with subclinical hypothyroidism have changes in cardiovascular function that are similar but smaller than those seen in overt hypothyroidism. Cardiac changes previously reported in subclinical hypothyroidism include decreased rate of isovolumic relaxation, diastolic flow, and systemic vascular resistance.

Congestive Heart Failure
According to the American Thyroid Association press release, even a slightly elevated TSH level causes increased risk for congestive heart failure (CHF). Congestive heart failure results when the heart is incapable of supplying adequate blood to the organs. Symptoms and signs of CHF include fatigue, ankle swelling, and shortness of breath, and may eventually result in death.

**Risk Factors**

Patients with hypothyroidism are more likely to have risk factors for congestive heart disease, such as elevated lipid levels, reduced physical activity, and hypertension, particularly diastolic hypertension.

**Angina**

Hypothyroidism also causes increased risk for angina pectoris, and symptoms of angina are often relieved when thyroid replacement hormone is started.

**Hyperthyroidism**

Overt hyperthyroidism typically increases the resting heart rate, cardiac output, respiratory rate, and minute ventilation. In addition, there are predictable decreases in systemic vascular resistance and increases in cardiac output, systolic blood pressure, heart rate, left ventricular ejection fraction, cardiac contractility and mass, and blood volume. Sinus tachycardia and atrial fibrillation rarely occur in hyperthyroid disorders. Both overt and subclinical hyperthyroidism account for 5 percent or fewer of all cases of atrial fibrillation.

**Cardiac Effects of Thyroid Hormone**

In patients with hypothyroidism treated with replacement hormone, thyroid hormone causes effects similar to those seen in hyperthyroidism including increased blood flow to the skin, muscles, kidney and heart, associated with decreased systemic vascular resistance.

**Resources:**

American Thyroid Association,  
http://www.thyroid.org/professionals/publications/news/07_10_04_bauer.html