

Environmental links to Thyroid Disease

By Marianne Marchese, ND

Thyroid disease seems to be epidemic in this country. Over half of the women who come to see me have some sort of thyroid disorder ranging from hypothyroidism, hyperthyroidism, Graves disease to Hashimotos. The thyroid gland produces two hormones that affect almost every organ in the body and regulates metabolism. The main hormone produced by the thyroid gland is thyroxine, T4, and a small amount of triiodothyronine, T3. T3 is mostly made from the conversion of T4 in the blood or other tissues of the body.

Hypothyroidism is where the thyroid gland does not produce enough thyroid hormone and metabolism slows down.

Signs of hypothyroidism include:

- Fatigue or weakness
- Weight gain
- Infrequent or absent menstrual periods
- Loss of sex drive
- Being cold or chilled easily
- Constipation
- Muscle aches
- Puffiness around the eyes
- Brittle nails
- Hair loss and dry skin

Hyperthyroidism is where the gland is overactive and producing too much thyroid hormone causing metabolism to increase.

Signs of hyperthyroidism include:

- Fatigue
- Weight loss
- Change in vision
- Nervousness
- Rapid heart beat
- Increased sweating
- Being hot or overheating easily
- Menstrual spotting or frequent menses
- Frequent or loose bowel movements
- Tremors
- Anxiety and panic

Graves' disease is an autoimmune disorder where the body produces antibodies against the thyroid gland causing it to produce too much thyroid hormone and thus leading to hyperthyroidism. Hashimoto's disease is an autoimmune condition as well but it causes hypothyroidism.

What causes thyroid disease? It depends on what type of thyroid disease but in general there are common elements affecting the production of T4 and T3 from the thyroid gland.

Common factors include: [1,2,3]

Pregnancy- 1 out of 50 women are diagnosed with hypothyroidism during pregnancy

Estrogen therapy

Stress

Elevated cortisol

Caloric restriction and anorexia

Low selenium

Low or high iodine intake

Genetic factors

Smoking

Infections

Systemic diseases

Family history

Medications such as lithium

Exposure to radiation

Environmental chemicals

In my practice I have been successful at treating thyroid disease from an environmental medicine perspective. Some patients have been able to get off of medication by identifying and removing chemicals that triggered the thyroid disease. But first we have to know which toxins are linked to thyroid problems and know how chemicals interfere with the thyroid gland.

The ways in which chemicals affect thyroid function include:[4, 14]

1. Alteration of thyroid hormone metabolism
2. Direct toxic affect on the gland changing function and regulation
3. Production of thyroid antibodies (leading to autoimmune thyroid disorders)
4. Interaction with thyroid carrier proteins
5. Block iodine uptake by the thyroid gland

The main chemicals that affect thyroid function are;

Polychlorinated biphenols (PCBs) and Dioxins. PCB's were once used in electrical transformers, capacitors, plasticizers and adhesives. Although many are no longer used in the U.S. they still persist in the environment. Eating fish from contaminated waters, and farm-raised fish, are a major source of PCB's as well as dairy and meat products. Dioxin is formed as a by-product of industrial processes involving chlorine such as waste incineration, chemical and pesticide manufacturing and paper bleaching. Dioxin was the primary toxic component of Agent Orange. The main way we are currently exposed to dioxin is through our food. It is a contaminant in meat, dairy and fish. PCB's and Dioxins induce thyroid hormone metabolism through an enzyme called UDP-glucuronyl transferase. This simply means they alter liver function of the enzyme that metabolizes thyroid hormone. They also directly attack the thyroid gland and thyroid hormone carrier proteins. [5] There are numerous studies linking PCBs and Dioxins to thyroid dysfunction. [6,7]

Pesticides have also been linked to thyroid disease in numerous studies. We are exposed to pesticides everyday whether we chose to be or not. They contaminate our air, water, food, soil, playground equipment, personal care products and more. There are numerous studies that link

pesticides to thyroid dysfunction. Specifically **Maneb and mancozeb** which are sprayed on fruits such as bananas and has been found to alter thyroid stimulating hormone (TSH), inhibit thyroid peroxidase enzyme, and cause thyroid nodules. [8]

A recent study of women married to men who sprayed pesticides on agriculture for a living had increased rates of thyroid disease. The study was published in the American Journal of epidemiology, online, January 8th 2010. It looked at 16,500 women living in Iowa and North Carolina who were married to men using pesticides at work in the 1990's. 12.5 percent of the women developed thyroid disease. This is a 1.2 to 1.4 fold increase than the general female population. It is interesting to note that these women didn't actually use the pesticides themselves but were exposed second-hand through their husbands.

Pentachlorophenol (PCP) is a chemical used in industry and agriculture. We are exposed without even knowing it exists. It is used as a wood preservative and produces toxic by-products that contaminate our air, food and water. It too is linked to alteration of thyroid hormones and the formation of a goiter. [9] A goiter is an enlargement of the thyroid gland. It is not cancer but typically is a signal that something is wrong with the gland.

Bisphenol-A (BPA) is another common chemical that we are exposed to everyday through the lining of metal food cans, dental sealants and plastic bottles. It too is linked to thyroid disorders. Even at low doses consistent with what the average person would be exposed to there are links to changes in thyroid hormones. [10]

Heavy metals are found to affect the thyroid as well. One of the main heavy metals studied is cadmium. **Cadmium** is a component of cigarette smoke and a product of industry. It is in the air, soil and water of most cities. We are exposed through cigarette smoke, food grown in contaminated soil, air pollution and water contamination. There are numerous studies linking thyroid disease to cadmium exposure. In one study 636 children in Germany had their blood tested for thyroid hormones and correlated abnormalities to urine and blood levels of heavy metals. It was determined that children with alterations in thyroid hormones had high blood levels of cadmium. [11]

Mercury is also linked to thyroid disease in women and children. Methylmercury, which is found in fish, is linked to alterations in thyroid hormones via the mechanism of depleting selenium. Selenium is a mineral that is essential for proper thyroid function. [12]

Lead is another heavy metal that we are exposed to on a daily basis through our food, air and water. It too is linked to thyroid disorders in many studies. One of note shows how sensitive a woman's hormonal system is compared to men. Women's hormones appear to be more interconnected than men's hormones. For example many women develop thyroid disease during pregnancy due to increases in estrogen and progesterone. One study compared men and women's blood levels of lead and mercury to alterations in thyroid hormones and found women were more affected by the heavy metals. [13]

Infants and Thyroid Disease. A recently published study showed a link between the chemical **perchlorate** and infant thyroid disorders. Perchlorate is used to make rocket fuel and explosives including fireworks. It is a contaminant in drinking water, breast milk and infant formula. A high urinary level of perchlorate was linked to high Thyroid Stimulating Hormone, TSH, levels which correlate with hypothyroidism. The thyroid disorders were only in infants with low iodine levels

as well. Perchlorate and other chemicals are known to block iodine uptake by the thyroid gland thus spelling out a mechanism of action for high TSH levels. [14]

Perfluorooctanoic Acid (PFOA) is found in stain and water resistant coatings for carpet, furniture, fast-food containers, paints, and foams. We are often exposed without knowing. These chemicals build up in our adipose tissue, or fat, and alter thyroid function. The National Health and Nutrition Examination Survey (NHANS) looked at 3,973 adults and measured PFOA levels. It determined high concentrations of PFOAs are linked to thyroid disease. [15]

Summary

When a patient comes to see me for treatment or management of a thyroid disorder I always ask why? Not why did they come to see me but why do they have a thyroid problem. I feel too many doctors simply just treat the symptoms of hypo or hyperthyroidism and never ask why their thyroid is not functioning properly. They simply discuss hormone options or a few supplements.

How do I treat thyroid? I try to treat the cause. The most common cause I see is environmental chemicals. I always take an environmental history on a patient, test for chemicals in the blood or urine and initiate a cleansing program to remove chemicals from the body. If heavy metals are present I include chelation with the cleansing program. Of course I rule out other causes that are mentioned at the begging of this article. Often times it is hard to pinpoint one cause, chemical related or otherwise, however by beginning a gentle cleanse while working up the case you are moving in the right direction.

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