PRACTICE PREVENTION

Iodine deficiency is the most common preventable cause of developmental disabilities and thyroid disease in the world.

Why? THE THYROID GLAND.

The thyroid is crucial to human brain development from before birth in the womb, in children and even into one's twenties. In adults, it plays a role in many functions of our basic systems. Researchers have recently turned an eye toward the thyroid to examine it in light of environmental effects.

Just what is this thing called the thyroid anyway?

- The thyroid is a small gland that is located near the brain at the base of the neck. It is part of the endocrine system.
- The thyroid requires iodine in order to make its two primary hormones, T3 and T4.
- Iodine deficiency can result in hypothyroidism (too little hormone). Symptoms include weight gain, fatigue, dry skin, mood swings and goiter.
- Hyperthyroidism (hormone overproduction) may cause anxiety, heart palpitations, insomnia, hair loss, weight loss and goiter.

…And just what does this gland do?

Thyroid hormone is critical to fetal brain development. It controls synapse development, neuron formation, and the growth of myelin (the outer sheath of neurons). It also tells the neurons where they belong once formed in the brain. In adults, it regulates many systems such as metabolism, heart rate, blood pressure and body temperature.

Our brains would not grow without it!

Brain formation begins in the fetus as soon as the first few weeks of gestation. It is the thyroid hormone, produced by the mother, which triggers such brain growth. This is true for all vertebrates. In humans, our own thyroid system is not mature until the third trimester, so it is necessary for the mother's hormone to be in constant supply until birth. In adults, the thyroid works in conjunction with the pituitary gland to form a self-regulating system which maintains a constant supply of hormone in the blood stream.

Even a small disruption in a mother's hormone level at critical stages in brain development can have devastating effects. Children of mothers with low circulating thyroid hormone have been shown to have trouble with motor coordination, balance and other psychomotor skills. One study shows a five to six IQ-point deficit in these children. ADHD has been linked to hypothyroidal mothers as well as a higher-than-average incidence of difficulties with spacial relations, perception, memory and language. It is for these reasons that the thyroid deserves – and has gained – researchers' close attention.

Thyroid and the Environment

Research around the thyroid is a difficult endeavor indeed. There are 90 known compounds that can disrupt thyroid hormone production and 12 different ways it can be disrupted. Chemicals are one of the most common types of offenders.

Chemicals affect the thyroid's delicate balance by inhibiting iodine intake or increasing liver metabolism of the hormone, by interrupting reception in cells, causing tumors, or suppressing hormone production. It is important to realize that each family of chemicals comprises many similar, but not identical, compounds that may or may not cause the same types of reactions in the thyroid. Many chemicals known to interrupt reproductive hormones are suspected to harm thyroid production as well.

Some facts about chemicals and thyroid activity:

- The usual suspects include PCBs, PBDEs (flame retardants), EBDCs (fungicides), dioxins (paper production and other sources) and percholorate (in rocket fuel).
- Research on rats show that environmental chemicals definitely affect the thyroid.
- Like with other environmental hazards, it is difficult to isolate one chemical culprit.
- Researchers deduce that there are chemicals effecting human thyroid function by noting iodine deficiencies in iodine-rich areas.

What YOU can do to prevent thyroid problems and their effects

- **Make sure there is a sufficient amount of iodized salt in your daily diet.** Iodine deficiency is one of the four major deficiency diseases in the world, yet it is the easiest to control.[1] In 1924 salt producers in the United States cooperated with public health authorities by providing iodized salt to American consumers, significantly limiting iodine deficiency. Although these deficiencies are now uncommon in Western societies, the U.S. population has shown a trend of significantly decreasing iodine intake from 1988–1994.[2] If this trend continues, iodine deficiency diseases may become more common in the U.S.
- **Eat an adequate amount of seafood**. Foods that are rich sources of iodine include seafood and kelp.
- **Include a variety of dairy products** in your diet. Dairy products may contain iodine if the animal giving milk is fed iodine-rich foods.
- **If you are a strict vegetarian who avoids salt, consider supplementing your diet with 150 mcg iodine per day.** This amount is adequate to prevent a deficiency.
- If you are a woman of child-bearing age who anticipates becoming pregnant anytime in your lifetime, **consider having a simple thyroid test**.

Thyroid problems affect an estimated 25 million Americans, the vast majority of them women. Few women, however, are aware of the critical relationship between the thyroid gland – our master gland of metabolism – and nearly every aspect of child-bearing, most especially during the critical period of fetal brain development.

Some doctors recommend routine thyroid testing during a woman's prepregnancy consultation or add it to the routine prenatal diagnostic testing.

There are also inexpensive at-home thyroid tests which consist of a laboratory analysis that measures a chemical substance in the blood called thyroid stimulating hormone (TSH). The test provides you with an accurate, convenient, and inexpensive way to discover your own TSH level in the privacy of your own home. One can find information on these tests on the web at sites such as *www.checkmyhealth.com/* or *www.testsymptomsathome.com/BIO07.asp*.

May 2005

NOTE: This column was originally drafted by the Healthy Children Project of the Learning Disabilities Association of America and was taken in part from "Disrupting a Delicate Balance" by Valerie Brown, published in *Environmental Health Perspectives,* Vol. 111, Number 12, September 2003, pages A642-9.

For more information or for other Practice Prevention columns, visit the Institute for Children's Environmental Health online at www.iceh.org or call 360-331-7904.

---

[1] Latham, MC. Human Nutrition in the Developing World. Rome: Food and Agriculture Organization of the United Nations. 1997.

[2] Hollowell JG, Staehling NW, Hannon WH, et al. Iodine nutrition in the United Staes. Trends and public health implications: iodine excretion data from National Health and Nutrition Examination Surveys I and III (1977-1974 and 1988-1994). *The Journal of Clinical Endocrinology and Metabolism*. 1998; 83:3104-8.