



## HYPOTHYROIDISM

### Air pollution may alter the baby's thyroid function during pregnancy

#### BACKGROUND

Thyroid hormones are critical for the growth and development of babies during pregnancy. During the first trimester of pregnancy, the mother supplies thyroid hormones. However, starting in the second trimester, the developing baby is able to produce his/her own thyroid hormone.  $T_4$  is the major form of thyroid hormone released by the thyroid gland and  $T_3$  is the most active form of thyroid hormone. Both are controlled by thyroid stimulating hormone (TSH). Chemicals that disrupt endocrine glands (endocrine disruptors) are being studied. Organic compounds, chemicals such as cadmium and cigarette smoking may affect thyroid regulation. Air pollution is a mixture of several particles, including metals, nitrate and organic materials, which have been shown to affect endocrine glands. Exposure to air pollution has also been associated with an increased risk for low birth weight and preterm birth. However, the role of air pollution on the baby's thyroid during pregnancy is not known. This study was done to determine whether exposure to air pollution during late pregnancy affects the mother's and/or the baby's thyroid function and birth weight.

#### THE FULL ARTICLE TITLE

Janssen BG et al Fetal thyroid function, birth weight, and in utero exposure to fine particle air pollution: a birth cohort study. *Environ Health Perspect*. September 13, 2016

#### SUMMARY OF THE STUDY

The authors studied 640 mother-child pairs from the East Limburg Hospital in Genk, Belgium, between February 2010 and June 2014. Mother-children pairs were part of the ENVIRONAGE birth cohort study. They obtained data from small particles in the air, with a diameter equal or less to  $2.5 \mu\text{m}$ , based on the mother's home address using a system that permits correlation with space and time from satellite images. Using this system, they were able to obtain daily air

small particle values using data from the Belgian network that studies air-quality. The outcomes were obtained for the third trimester of pregnancy and the average exposure value was used after correction for environmental factors such as temperature and humidity. Data on subject characteristics was obtained through questionnaires. They also reviewed other factors associated with pregnancies, by reviewing the medical files of the hospital. Umbilical cord and blood samples from the mother were collected at the time of delivery or up to 1 day after delivery. They had data for 499 newborns and 431 mothers.

The range of the small particles in the air was divided into 4 ranges. For each higher range, cord-blood TSH concentrations were 11.6% lower; cord-blood  $FT_4$  concentrations were 3.7% lower and cord-blood  $FT_3$  concentrations were 6.4% higher. The effect on the mother's laboratory tests did not reach significance. Only free  $T_4$  levels were associated with birth weight. An 11% decrease in cord blood free  $T_4$  was associated with a decrease of 56 grams in birth weight, after adjusting for other variables.

#### WHAT ARE THE IMPLICATIONS OF THIS STUDY?

This study shows for the first time that exposure to air pollution decreases cord Free  $T_4$  and increases cord Free  $T_3$  level. Lower cord Free  $T_4$  levels were also associated with lower birth weight. This study is important because, although the data is limited, it highlights the need to do more research in environmental health and air pollution.

— Liuska Pesce, MD

#### ATA THYROID BROCHURE LINKS

Thyroid Disease and Pregnancy: <http://www.thyroid.org/thyroid-disease-pregnancy/>

Thyroid Function Tests: <http://www.thyroid.org/thyroid-function-tests/>

**HYPOTHYROIDISM**, continued**ABBREVIATIONS & DEFINITIONS**

**Thyroxine (T<sub>4</sub>):** the major hormone produced by the thyroid gland. T<sub>4</sub> gets converted to the active hormone T<sub>3</sub> in various tissues in the body.

**Triiodothyronine (T<sub>3</sub>):** the active thyroid hormone, usually produced from thyroxine.

**TSH:** thyroid stimulating hormone — produced by the pituitary gland that regulates thyroid function; also the best screening test to determine if the thyroid is functioning normally.

**Endocrine disruptors:** chemical pollutants in the environment that can affect the action of endocrine glands. Examples include bisphenol A (BPA), polychlorinated biphenols (PCBs), perfluoroalkyl substances (PFAs) and organochlorines (OCs).

**BEING TREATED FOR HYPOTHYROIDISM?****ATA INVITES YOUR FEEDBACK ON THIS SURVEY:**

[www.surveymonkey.com/r/hypothyroidpatientsurvey](http://www.surveymonkey.com/r/hypothyroidpatientsurvey)



American Thyroid Association (ATA) encourages patients with hypothyroidism to participate, healthcare professionals to share with patients and everyone to disseminate broadly this survey intended to enhance understanding and treatment of hypothyroidism. Survey results will be discussed at the **ATA Spring Satellite Symposium: Hypothyroidism – Where are We Now?** on Friday, March 31, 2017 in Orlando, Florida by panel of thyroid experts, patients and professionals. Your responses are anonymous and should only take a few minutes to complete.

For more information regarding the ATA Spring Satellite Symposium, visit the ATA website at [www.thyroid.org](http://www.thyroid.org) or <http://www.thyroid.org/2017-hypo-symposium/>.