



## THYROID FUNCTION IN PREGNANCY

# Association of thyroid function in mothers during early pregnancy with the risk of autism spectrum disorder and attention-deficit/hyperactivity disorder in children

### BACKGROUND

Adequate thyroid hormone in pregnancy is important for normal brain development in babies. During the critical stages of brain development in early pregnancy, a baby depends on thyroid hormone being delivered from mother through placenta, as a baby is not able to make his/her own thyroid hormone until much later in pregnancy.

We know that severe (overt) hypothyroidism in mothers during pregnancy can have adverse effect on the baby's development, such as lower IQ scores. However, effects of mild (subclinical) hypothyroidism or mild (subclinical) hyperthyroidism in mother during pregnancy are less clear. There has also been interest in looking at the effects of abnormal thyroid hormone levels in mothers on other outcomes of babies' brain development, such as attention-deficit/hyperactivity disorder (ADHD) and autism spectrum disorder (ASD).

This study aimed to investigate potential associations between thyroid abnormalities in mothers during pregnancy and diagnoses of ADHD and ASD in children.

### THE FULL ARTICLE TITLE

Andersen SL et al 2018 Maternal thyroid function in early pregnancy and child neurodevelopmental disorders: a Danish nationwide case-cohort study. *Thyroid* 28:537–546. Pub 2018 Mar 27. PMID: 29584590.

### SUMMARY OF THE STUDY

A total of 7,624 mother-child pairs were selected randomly from Danish Nationwide Birth Cohort in Denmark, which included pregnant women from 1997 and 2003. All of the mothers in the study had blood drawn in early pregnancy (between 5–19 weeks) and had thyroid hormone (TSH and free T<sub>4</sub>) levels measured. A total of 2,276 children in the study had diagnoses of brain development disorders that have been identified by looking at medical records, including febrile seizure (n

= 489), epilepsy (n = 375), developmental disorder (n = 174), ASD (n = 302), or ADHD (n = 1143). A total of 5,348 children without diagnoses of brain disorders were used to compare with those with diagnoses. The study assessed potential association between hypothyroidism, hyperthyroidism, and low free T<sub>4</sub> levels in mothers and diagnoses of brain development disorders in children.

Both subclinical hypothyroidism and overt hyperthyroidism in the mothers were associated with increased risk of ASD in children (70% and 118%, respectively). Interestingly, subclinical hyperthyroidism in the mothers was associated with a 65% decreased risk of ASD in children. Low thyroid hormone levels in the mothers showed a trend towards increased risk of ASD in children, but was associated with a 46% increased risk of ADHD in children. These associations were present in both boys and girls. Overt hyperthyroidism in the mothers was also associated with a 188% increased risk of epilepsy diagnosed before 1 year of age in children, but not later in life.

There were no associations between thyroid dysfunction in the mother and febrile seizures, epilepsy, or other developmental disorders in children.

### WHAT ARE THE IMPLICATIONS OF THIS STUDY?

Both subclinical hypothyroidism and overt hyperthyroidism in mothers in pregnancy were associated with increased risk of autism spectrum disorders in children. Low thyroid hormone level in mothers was associated with increased risk of ADHD in children. Because the frequency of ASD and ADHD is generally low and thyroid hormone levels are not routinely checked in pregnant women, it is difficult to study the potential relationship between thyroid dysfunction in the mother and these diagnoses in children. The advantage of this study was large number of study participants with thyroid hormone levels available during early pregnancy.





## THYROID FUNCTION IN PREGNANCY, continued

The cause of ASD and ADHD are thought to be from combination of many different factors. Therefore, it is difficult to say whether abnormal thyroid hormone levels in mothers in pregnancy is the main cause of development of ASD or ADHD in children or simply plays a role. Further, there is no evidence that treatment of the thyroid disorders in mothers would have any effect on the findings of this study. However, given the findings

of this study showing association between both low and high thyroid function in mothers in pregnancy with ASD in children, and between low thyroid function in mothers in pregnancy with ADHD in children, pregnant women with thyroid disease should be carefully monitored to ensure adequate treatment and to avoid overtreatment of thyroid disease.

— Sun Lee, MD

### ATA THYROID BROCHURE LINKS

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

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

### ABBREVIATIONS & DEFINITIONS

**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.

**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.

**Hyperthyroidism:** a condition where the thyroid gland is overactive and produces too much thyroid hormone. Hyperthyroidism may be treated with antithyroid meds (Methimazole, Propylthiouracil), radioactive iodine or surgery.

**Overt Hyperthyroidism:** clear hyperthyroidism with a decreased TSH and an increased T<sub>4</sub> level.

**Subclinical Hyperthyroidism:** a mild form of hyperthyroidism where the only abnormal hormone level is a decreased TSH.

**Hypothyroidism:** a condition where the thyroid gland is underactive and doesn't produce enough thyroid hormone. Treatment requires taking thyroid hormone pills.

**Overt Hypothyroidism:** clear hypothyroidism with an increased TSH and a decreased T<sub>4</sub> level. All patients with overt hypothyroidism are usually treated with thyroid hormone pills.

**Subclinical Hypothyroidism:** a mild form of hypothyroidism where the only abnormal hormone level is an increased TSH. There is controversy as to whether this should be treated or not.

