



Congenital Hypothyroidism Information for Health Professionals

Congenital hypothyroidism (CH) is inadequate thyroid hormone production in newborn infants. This can occur because of an anatomic defect in the gland, an inborn error of thyroid metabolism, or iodine deficiency. There are several types of primary CH, the most common form resulting from abnormal fetal development of the thyroid gland. The thyroid gland may be absent, ectopic, or malformed. Transient hypothyroidism may occur in some infants as a result of maternal exposure to excess iodine, antithyroid medications (propylthiouracil or PTU), or exposure of the infant to maternal antithyroid antibodies. The use of iodine-based skin disinfectants on neonates, especially premature neonates, can inhibit thyroxine production resulting in transient hypothyroidism. Untreated maternal hypothyroidism also can result in low fetal levels of thyroxine.

✓ **Clinical Symptoms**

Most newborns do not have symptoms. Subtle clinical signs, which usually present after the newborn period, of CH include the following symptoms: feeding problems, lethargy, prolonged postnatal jaundice, delayed stooling and constipation, enlarged protruding tongue, hoarse cry, protruding abdomen with an umbilical hernia, cold mottled skin, sluggish reflexes, patent posterior fontanelle with widely spread cranial sutures or delayed skeletal maturation for gestational age. If untreated, thyroxine deficiency causes irreversible mental and physical retardation.

✓ **Incidence**

CH occurs in 1 out of every 5,000 births. The incidence of CH is higher in Hispanic individuals and lower in black individuals. There is a 2:1 incidence in females compared with males, and there is an increased risk in infants with Down syndrome. Incidence is believed to be still greater among Native American and Asian populations.

✓ **Genetics of congenital hypothyroidism**

Mutations in the DUOX2, PAX8, SLC5A5, TG, TPO, TSHB, and TSHR genes cause congenital hypothyroidism.

Gene mutations cause the loss of thyroid function in one of two ways. Mutations in the PAX8 gene and some mutations in the TSHR gene prevent or disrupt the normal development of the thyroid gland before birth. Mutations in the DUOX2, SLC5A5, TG, TPO, and TSHB genes prevent or reduce the production of thyroid hormones, even though the thyroid gland is present.

Mutations in other genes that have not been well characterized may also cause congenital hypothyroidism.

✓ **How do people inherit congenital hypothyroidism?**

Most cases of congenital hypothyroidism are sporadic and occur in people with no history of the disorder in their family. An estimated 15 to 20 percent of cases are inherited. Many inherited cases are autosomal recessive. Most often, the parents of an individual with an autosomal recessive condition each carry one copy of the mutated gene, but do not show signs and symptoms of the condition.

Some inherited cases (those with a mutation in the PAX8 gene or certain TSHR mutations) have an autosomal dominant pattern of inheritance.

✓ **Treatment**

Immediate diagnosis and treatment of congenital hypothyroidism in the neonatal period is critical to normal brain development and physical growth. Treatment is usually effective if started within the first few weeks of life. Delayed treatment may result in decreased intellectual capacity. Recommended treatment is lifetime daily administration of levo-thyroxine. Dosage will need to be gradually increased as the infant grows. Avoid generic thyroid preparations, at least in the first three years of life.

✓ **Screening Methodology**

Primary newborn screening for CH utilizes fluorometric assay to determine the thyroid stimulating hormone level. False positive and false negative results are possible with this screening.

✓ **What to do After Receiving Presumptive Positive CH Screening Results**

- 1) Seriously elevated TSH requires prompt follow-up and, when notified of these results, the clinician should immediately check on the clinical status of the baby.
- 2) Refer the infant to a pediatric endocrinologist.
- 3) Collection of serum TSH and free T4 level also is recommended.
- 4) Suspect abnormal results (moderately elevated TSH) indicate the need for repeat filter paper screening.
- 5) Call KS Newborn Screening Program at 785-291-3363 with questions about results
- 6) Report Clinical Findings to Newborn Screening Program at 785-291-3363
- 7) Same birth siblings (twins, triplets) of infants diagnosed with CH should be re-screened; additional testing of these siblings also may be indicated.

✓ **Confirmation of Diagnosis**

The diagnosis is confirmed with a repeat measurement of TSH and free thyroxine using a blood sample. Further tests can include thyroid scans and x-rays. Diagnostic testing is arranged by a specialist at your regional treatment center.

✓ **Communication of Results to Parents**

If a baby has a **presumptive positive congenital hypothyroidism newborn screening result, additional testing needs to be performed to confirm a diagnosis.** In accordance with Kansas Administrative Regulation 28-4-502, it is the responsibility of the attending physician or other birth attendant to obtain repeat specimens when needed to complete the screening process.

If a baby is diagnosed with CH, the following points should be conveyed to parents:

- ***Parents should understand that treatment for primary congenital hypothyroidism will be lifelong.***
- ***Parents should understand that treatment is not curative and that all morbidity cannot necessarily be prevented. Long-term management, monitoring and compliance with treatment recommendations are essential to the child's well-being. A multidisciplinary approach is recommended and should include the following specialties: pediatrics and endocrinology. Infants and children with congenital hypothyroidism should have regular follow-up appointments with a pediatric endocrinologist. Periodic hearing evaluations also are recommended for children with CH, as hearing disorders are sometimes associated with congenital hypothyroidism.***
- ***Genetic counseling services may be indicated. A list of counselors and geneticists, whose services are available in Kansas should be given to the parents if they have not already seen a geneticist.***

For consultation, contact:

KU Medical Center	Kansas City KS	913-588-6326
Children's Mercy	Wichita, KS	316-500-8900
Wichita Endocrinology	Wichita, KS	316-777-6404
Cotton-O'Neil Clinic	Topeka, KS	785-368-0460
Pediatric Endocrinology	Lawrence, KS	785-505-2551