Newborn Critical Care Center (NCCC) Guidelines

Thyroid Screening and Therapy for Congenital Hypothyroidism

BACKGROUND

Congenital Hypothyroidism (CH) is the most common preventable cause of intellectual disability worldwide.[1] It occurs in 1:2000 to 1:4000 of all newborns.[2] Incidence is increased in premature and low birth weight infants due to insufficient development of the hypothalamic-pituitary axis, with incidence in VLBW infants estimated to be 1:250.[3,4] Untreated infants will progress to severe neurodevelopmental impairment as well as psychomotor dysfunction and impaired growth.[2]

Regardless of the type of screening approach used, 0.1-1% of newborns with congenital hypothyroidism will have normal screening hormone concentrations due to errors in sample collection and processing, delayed TSH rise, and mild forms of disease.[5] This could be higher in individuals with Down Syndrome because of pituitary thyroid axis dissociation.[5] Premature and VLBW infants are also at risk of falsely normal NBS due to delay in TSH rise secondary to incomplete development of hypothalamic-pituitary axis.[4] These populations therefore require additional monitoring and screening for thyroid abnormalities.[4,6]

INITIAL SCREENING

- Newborn Metabolic Screen (fluro-immuno assay): obtain the NBS specimen after 24 hours of life (preferably between 48 to 72 hours) and before hospital discharge or 1 week of life, whichever is sooner.[2] T4 and TSH are performed on all specimens by the NC State Laboratory.

TEST RESULTS FOR INITIAL NBS		
TSH (mU/L)	**T4 (µg/dL)**	**Action**
>40	Any value	Abnormal • Obtain serum Free T4, TSH **within 24 hours of abnormal result notification** • Consult Pediatric Endocrinology
30-39.9	Any value	Borderline • Repeat NBS
20-29.9	<12.9	Borderline • Repeat NBS
<20	<5	Borderline • Repeat NBS

* *For any borderline value above, repeat NBS. (Compared to immediate serum TSH and free T4 testing, repeating the NBS is a more cost-effective approach for confirmatory testing.)*

REPEAT SCREENING[2]

If the first NBS is normal for congenital hypothyroidism, perform a second NBS at 30 days of life in newborns who:

- are acutely ill (admitted to a NICU)
- are preterm (<32 weeks gestation)
- have very low birth weight (<1500 g)
- received a transfusion before obtaining the NBS
- have a monozygotic twin (or a same-sex twin, if zygosity is not known) or multiple birth
- have trisomy 21
- have congenital heart disease

For the above patients:

- If a second NBS performed before 36 weeks corrected gestational age is normal, repeat NBS testing is recommended 4 weeks later (6–8 weeks of life) or at 36 weeks corrected gestational age, whichever is earlier.

Repeat newborn screen at 30 days of life for all infants who remain admitted to NCCC.

Commented [JTV1]: AAP recommends repeating at 2-4wks if critically ill/still admitted to NICU. Chose a specific day to decrease practice variability in unit

TEST RESULTS FOR REPEAT NBS		
TSH (mU/L)	**T4 (µg/dL)**	**Action**
> 20	Any value	• Obtain serum FT4, TSH • Consult Pediatric Endocrinology
Any value	< 5	• Obtain serum FT4, TSH • Consult Pediatric Endocrinology

NOTE: These values are consistent with the recommendation that if the initial and repeat NBS are borderline, TSH and free T4 should be obtained.

LOW T4 WITH NORMAL TSH:

- Diagnosis may be transient hypothyroxinemia of prematurity (THOP), TBG deficiency or sequelae of a non-thyroidal illness. Consult Pediatric Endocrinology for further evaluation.

TREATMENT AND MONITORING

- Begin treatment with levothyroxine (Synthroid)* with guidance from Pediatric Endocrinology on initial dosing, as treatment will depend on the underlying cause of hypothyroidism.
- The timing of additional thyroid function testing should be discussed with Pediatric Endocrinology.
- Levothyroxine can be administered at any time of day in infants, but timing must be consistent.
- Avoid administration of levothyroxine with soy, fiber, iron, or calcium as these can impair absorption.
- Arrange out-patient follow-up with Pediatric Endocrinology for long term management.

- ✳ *Synthroid should never be compounded. It needs to be in tablet form then crushed into a small amount of formula/breast milk (do not use soy-based formula). Synthroid is preferred - generic levothyroxine may have variable absorption in the newborn period. Administration of Synthroid should be separated from any iron-containing medications by at least 6 hours.*

References:

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Reviewed May 2025 – Van Steyn MD / Aliaga MD / MacIver MD (Endo) / Duffus MD (Endo)