ESCUELA DE MEDICINA
UNIVERSIDAD SAN SEBASTIAN

HPM
HOSPITAL PUERTO MONTT

Thyroid Function During the Fetal and Neonatal Periods.

Función tiroidea durante los periodos fetal y neonatal.

DOI: 10.1542/neo.21-1-e30

Liane Eng, MD,* Leslie Lam, MD*
*Division of Pediatric Endocrinology and Diabetes, The Children's Hospital at Montefiore, Albert Einstein College of Medicine, Bronx, NY

Interno Bruno Merino N.
Neonatología USS – HPM.
14 de Febrero 2020.

Autores

Liane Eng, MD
Pediatric Endocrinology

Leslie Lam, MD.
Pediatric Endocrinology & Diabetes.

Hospital

The Children's Hospital at Montefiore,Bronx New York, USA.

Universidad

Albert Einstein College of Medicine, Bronx, NY, USA.

Introducción

- Niveles de hormona tiroidea materno, desarrollo adecuado del cerebro y crecimiento fetal
- La pesquisa precoz y el tratamiento temprano de hipotiroidismo en mujeres embarazadas y recién nacidos
- Embriología de la glándula tiroides
- Génesis del eje hipotálamo-hipofisis-tiroides (HHT)

Glándula Tiroidea Fetal

- Se origina del endodermo (4ta semana)
- Las hormonas tiroideas (HT) durante el embarazo son esenciales para la neurogenesis fetal
- Los niveles de HT fetal son bajos los primeros dias, el 2do trimestre comienza su ascenso.
- Hipotalamo fetal secreta TRH
- Bajos niveles de TSH

Función de T4 y T3 en el Feto

- Desarrollo cerebral y crecimiento
- Niveles fetales bajos hasta 2do Trimestre
- Feto dependiente de concentraciones Madre
- Los niveles de T4 maternos corresponden al 30-50% de los niveles medidos en sangre de cordon
- Importancia de niveles eutiroideos de la madre en el CI a futuro del niño y RDSM

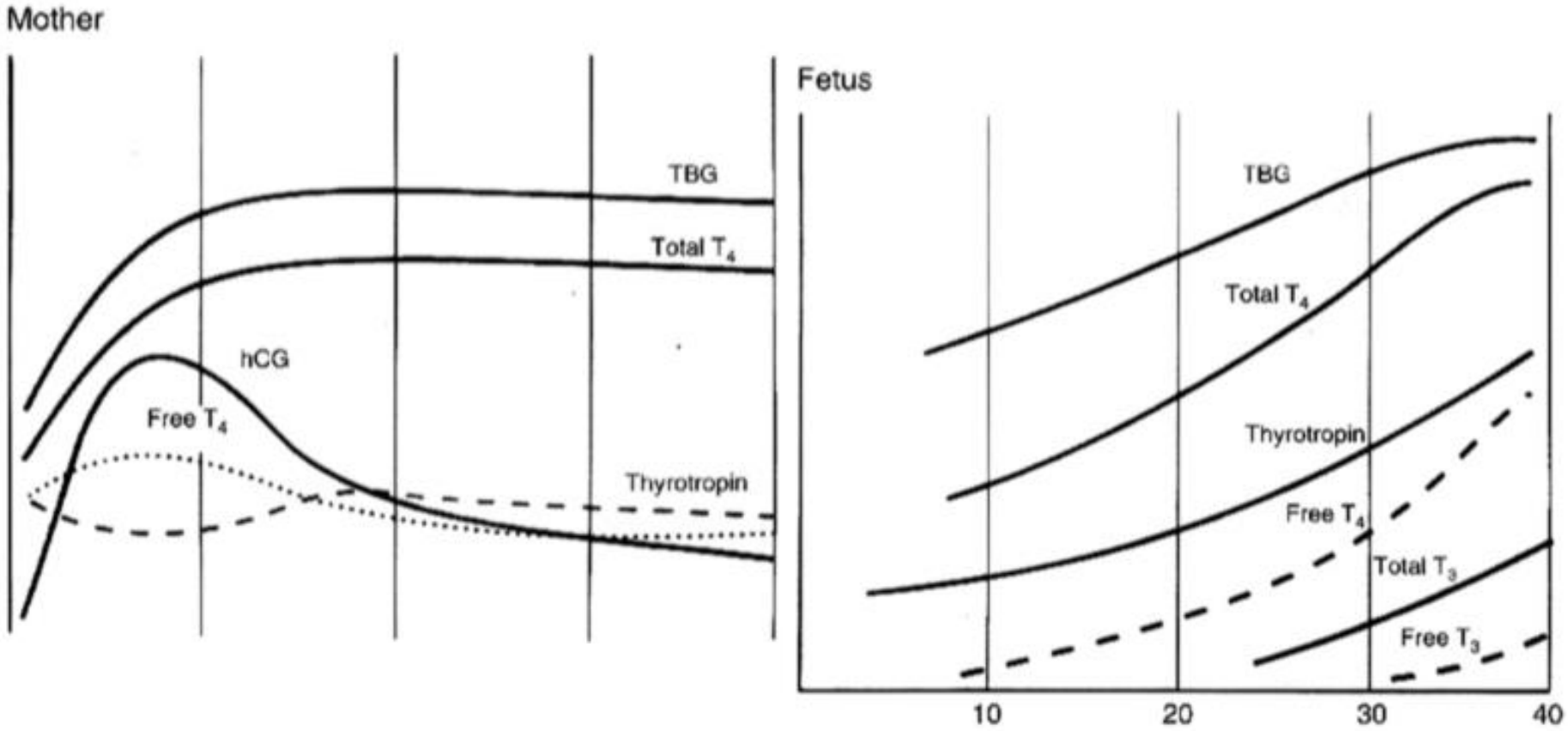
Función de T4 y T3 en el Feto

- Aumento de la TBG y requerimientos de yodo
- Deficit de yodo materno durante el embarazo → hipotiroidismo y cretinismo
- TRH y T4 atraviesan placenta pero también anticuerpos.

Producción de Hormona tiroidea fetal a neonatal

Al momento del parto ocurren cambios que estimulan la producción de hormona tiroidea neonatal

- El cambio de T° del ambiente
- El aumento brusco de TRH y TSH
- Aumento exagerado y sostenido de T4 (peak 48horas)
- Por consiguiente aumento de T3


Mother
TBG
Total T_4
hCG
Free T_4
Thyrotropin
Fetus
TBG
Total T_4
Thyrotropin
Free T_4
Total T_3
Free T_3
10
20
30
40

Screening del RN por Hipotiroidismo congénito

- Idealmente se mide como primera línea la TSH entre el 2do y 4to ddv
- En caso de ser un RNPT debe ser entre los primeros 7 ddv
- Como segunda linea se hace la medicion de T4
- El uso de la medicion de TSH puede fallar en la deteccion del hipotiroidismo central o en deficit de TBG
- Medicion de T4 como primera linea con reflejo de TSH en casos de anormalidades limite

Casos especiales

- RNPT < 34 semanas tienen niveles bajos de T4
  - Hipotiroxinemia del prematuro
  - Suele corregirse solo a medida que el eje madura, puede tardar semanas mas de la EGC esperada
- Enfermedades criticas no tiroideas
- Enfermedad de Graves neonatal
  - Madres no controladas o dg en embarazo
  - Niveles fetales elevados de T4 y T3
  - TRAbs stimulantes → upregulation
  - Riesgo del RN de Hipertiroidismo o incluso Hipotiroidismo

Conclusión

- El desarrollo de la glandula tiroidea y del eje HHT es un proceso complejo muy dependiente de la funcion tiroidea de la madre
- Son importantes tambien las reservas de yodo de la mujer gestante, particularmente en el primer trimestre

1. Thyroid hormones play a critical role in fetal development. Which of the following statements regarding thyroid hormones during pregnancy is correct?
   A. Fetal thyroid hormone production typically begins at the 30th week of gestation.
   B. Thyrotropin-releasing hormone (TRH) is not produced by the fetus and therefore, the fetus depends on maternal signaling to initiate thyroid-stimulating hormone (TSH).
   C. TSH concentration in fetal circulation remains low until 18 to 20 weeks of gestation when the thyroid gland functionally matures.
   D. During the fetal period, free triiodothyronine (T_3) levels are always higher than free thyroxine (T_4) levels.
   E. Both T_4 and T_3 exert a strong inhibitory signal on TSH secretion in utero because of a hyperresponsive negative feedback response in the fetus.
2. Because of relatively low thyroid hormone production by the fetus, maternal contribution of thyroid hormone plays an important role in development. For infants born at term, what percentage of the T_4 measured in cord blood consists of maternal T_4?
   A. Zero.
   B. 10%.
   C. 30%–40%.
   D. 50%–60%.
   E. 90%.
3. A pregnant woman presents during her third trimester with a history of hypothyroidism and inconsistent adherence to thyroid hormone replacement therapy. Which of the following statements regarding hypothyroidism during pregnancy is correct?
   A. Children born to mothers with low T_4 levels during pregnancy have lower IQs than children born to mothers with normal T_4 concentrations.
   B. Maternal hypothyroidism during the third trimester, more so than earlier during pregnancy, appears to confer the highest risk for delayed neurodevelopment in the child.
   C. T_4, but not TRH, crosses the placenta from the pregnant woman to her fetus.
   D. To supply fetal development, the pregnant woman's T_4 concentration increases by 100% to 200% during pregnancy.
   E. The mainstay of treatment for maternal hypothyroidism in developed countries is iodine supplementation, as levothyroxine is contraindicated during pregnancy because of its teratogenic effects.
4. A term newborn receives routine newborn screening, which includes screening for congenital hypothyroidism. Which of the following statements about screening is correct?
   A. Because it is not an established benefit, screening for hypothyroidism in 2019 occurred in only 25 states.
   B. Newborn screening is ideally performed on the second to fourth day after birth in term neonates and within the first 7 days after birth in preterm neonates.
   C. Using TSH level as the primary screening test is the most sensitive method for thyroxine-binding globulin deficiency and central hypothyroidism.
   D. Using T_4 as first-tier screening will be close to 100% sensitive for primary hypothyroidism presenting as delayed TSH elevation.
   E. Most states use both TSH and T_4 as the first-line screening test.

ESCUELA DE MEDICINA
UNIVERSIDAD SAN SEBASTIAN

HPM
HOSPITAL PUERTO MONTT

Thyroid Function During the Fetal and Neonatal Periods.

Función tiroidea durante los periodos fetal y neonatal.

DOI: 10.1542/neo.21-1-e30

Liane Eng, MD,* Leslie Lam, MD*
*Division of Pediatric Endocrinology and Diabetes, The Children's Hospital at Montefiore, Albert Einstein College of Medicine, Bronx, NY

Interno Bruno Merino N.
Neonatología USS – HPM.
14 de Febrero 2020.