

Tomoyo Itonaga, Shinji Higuchi et al. Levothyroxine Dosage as Predictor of

Permanent and Transient Congenital Hypothyroidism: A Multicenter Retrospective Study in Japan. *Hormone Research Paediatrics*; Sept 25, 2019.

**Background :** Congenital hypothyroidism (CH) can be divided into 2 types, transient CH (T-CH) and permanent CH (PCH), depending on the requirement of levothyroxine (LT4) for life long treatment. Several studies have recently reported that the LT4 dosage is useful for predicting the LT4 requirement, but none of the studies have followed their patients to puberty.

**Objective :** To determine the cutoff value for the LT4 dosage as a predictor of the thyroxine requirement after puberty in patients with CH.

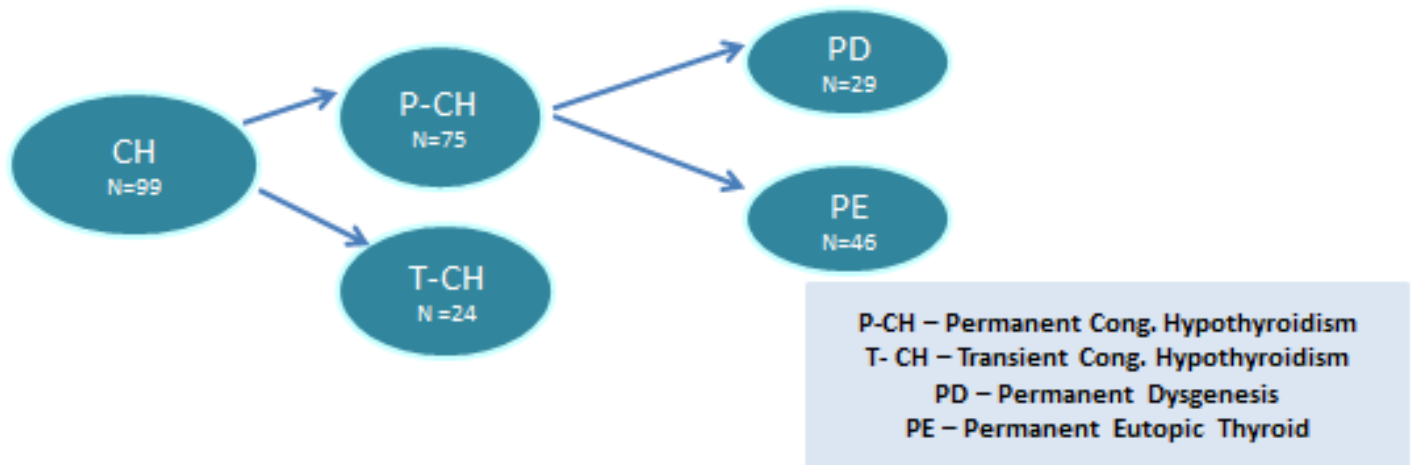
**Design :** Retrospective multicentric study. The clinical data on 99 patients with CH who were followed at the participating hospitals from the neonatal period to 15 years of age or older were analyzed. The participants were divided into the P-CH group (n = 75), who were treated with LT4, and the T-CH group (n = 24), who did not require LT4 treatment at 15 years. Group P was further divided into 2 subgroups, a permanent dysgenesis (PD, n=29) and permanent-eutopic (PE, n=46) group according to the imaging findings. Follow-up parameters including body weight, LT4 dosage, and serum TSH and fT4 levels were evaluated at diagnosis, 1, 2, and 3 years of age +/- 3 months, and at the last visit which was 15 - 28 years

## ACADEMIC P.E.A.R.L.S

Pediatric Evidence And Research Learning Snippet



### LEVOTHYROXINE DOSE AS A PREDICTOR OF PERMANENT CONGENITAL HYPOTHYROIDISM



#### Results:

- The median serum TSH level and LT4 dosage in group P at diagnosis were significantly higher than those of group T (TSH levels: 69.5 vs. 25.7  $\mu$ IU/mL,  $p < 0.05$ ; LT4 dose: 9.04 vs. 6.31  $\mu$ g/kg/day,  $p < 0.01$ ).
- At age 1 year, a higher LT4 dosage was required for the P-CH group (median 3.75 vs. 2.88  $\mu$ g/kg/day;  $p < 0.001$ ). When the LT4 dosage cutoff value at age 1 year was set at 4.79 and 1.74  $\mu$ g/kg/day, the specificity of P-CH and T-CH was 100 and 97%, respectively.
- When the cutoff at age 2 years was 4.39 and 1.56  $\mu$ g/kg/day for the respective groups, the specificity of both P-CH and T-CH was 100%.
- The analysis of patients with a eutopic thyroid gland (subgroup PE) and group T produced almost identical results indicating that only lower thyroxine doses may be required in children with eutopic gland.

#### Conclusion:

- This study demonstrated that the LT4 dosage at ages 1 and 2 years predicts whether LT4 treatment of CH patient would be permanent or transient
- The serum TSH level at diagnosis was not superior to the LT4 dosage at a later age, as the levels of TSH at birth can overlap in both transient and permanent hypothyroidism

#### Key Message:

- LT4 dosage for Congenital hypothyroidism treatment at 1 & 2 years may be able to predict the permanent and transient forms of the disease.
- An LT4 dosage above 4.7  $\mu$ g/kg/day and below 1.8  $\mu$ g/kg/day at age 1 year may help predict P-CH and T-CH, respectively.

### EXPERT COMMENT



“Levothyroxine doses on follow up of children with congenital hypothyroidism may give a clue whether the condition is transient or permanent and may help in deciding to stop LT4 at 3 years, especially if thyroid scintigraphy is not done at birth”.

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#### Reference

Itonaga T, Higuchi S, Shimura K, Nagasaki K et al. Levothyroxine Dosage as Predictor of Permanent and Transient Congenital Hypothyroidism: A Multicenter Retrospective Study in Japan. *Horm Res Paediatr.* 2019;92(1):45-51. doi: 10.1159/000502418. Epub 2019 Sep 25.

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