Elevation of serum fibroblast growth factor 21 in congenital hypothyroidism

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1. Introduction

Fibroblast growth factor 21 (FGF21) is one of the FGF superfamily, which regulates energy expenditure, glucose metabolism and lipid metabolism. FGF21 elevates of glucose uptake in peripheral tissues, and regulates body temperature in brown adipose tissue.

2. Objective and hypotheses

This study is to reveal which ecdocrine diseases in children have elevation of FGF21, and to reveal which congenital hypothyroidism in childre has elevation of FGF21 compared with healthy conrols and transient elevation of TSH.

3. Methods

We collected blood from 253 pediatric endocrine diseases and healthy controls from April to December 2012 at Kurume University Hospital. All individuals were under 19 years of age.

- Idiopathic short stature (ISS): 90
- Growth hormone deficiency (GHD): 20
- Short stature children born SGA (SGA): 13
- pan-hypopituitarism (panH): 5
- Graves' disease (GD): 7
- Hashimoto' s disease (HD): 4
- Transient hyper-TSH (T-hypoTSH): 22
- Congenital hypothyroidism (CH): 50
- Type 1 diabetes mellitus (T1DM): 22
- Type 2 diabetes mellitus (T2DM): 3
- 21-hydroxylase deficiency (21OHD): 4
- Central precocious puberty (CPP): 9
- Hypochpmdroplasia (HCH): 2
- Achondroplasia (ACH): 2
- Healthy controls (Cont): 59

FGF21 was measured by ELISA (BioVendor, Czech). Kruskal-Wallis test and Dunn' s multiple comparisons test were used for statistical analysis.

4. Results

Figure 1. FGF21 levels with pediatric endocrine diseases and controls.
Only CH had significantly elevated FGF21 compared to controls.

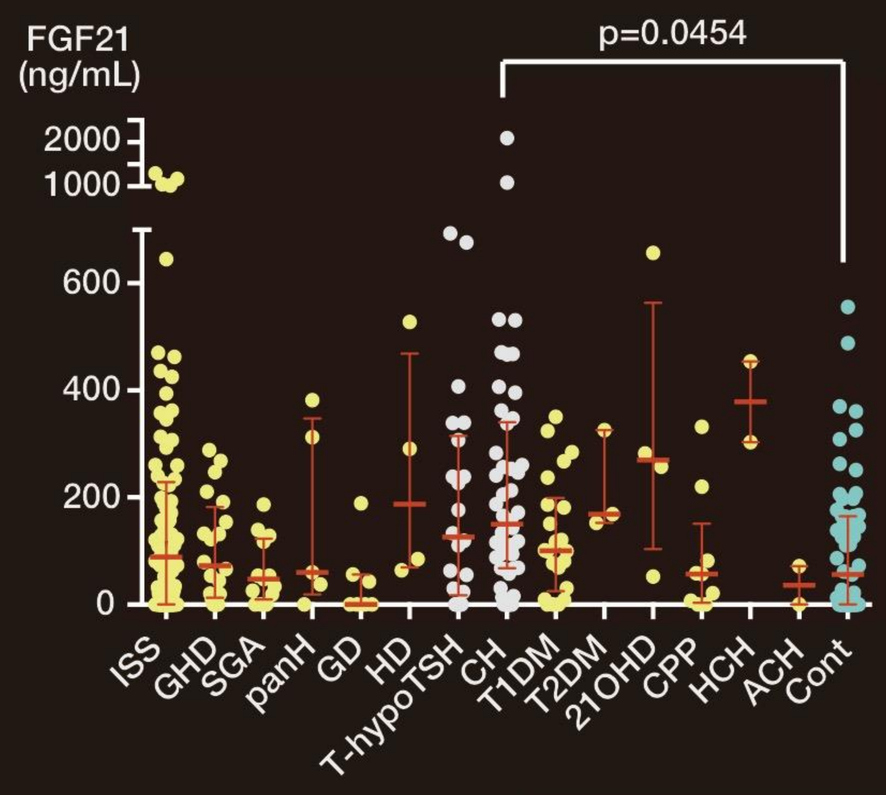


Figure 2. FGF21 levels between transient hypo-TSH, CH and controls.
CH had significantly elevated FGF21 compared to controls.

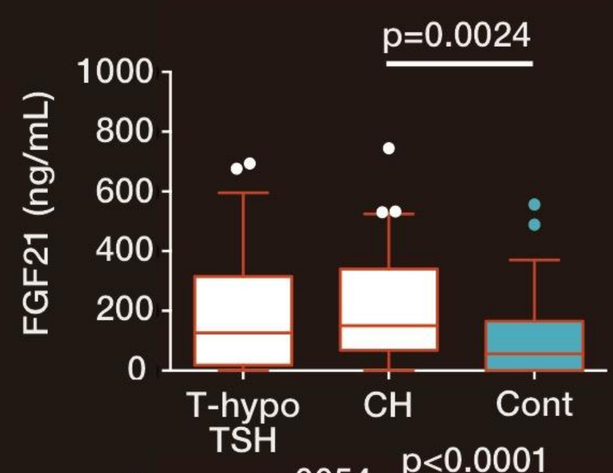


Figure 3. TSH levels between transient hypo-TSH, CH and controls.
CH and transient hypo-TSH had significantly elevated TSH compared to controls.

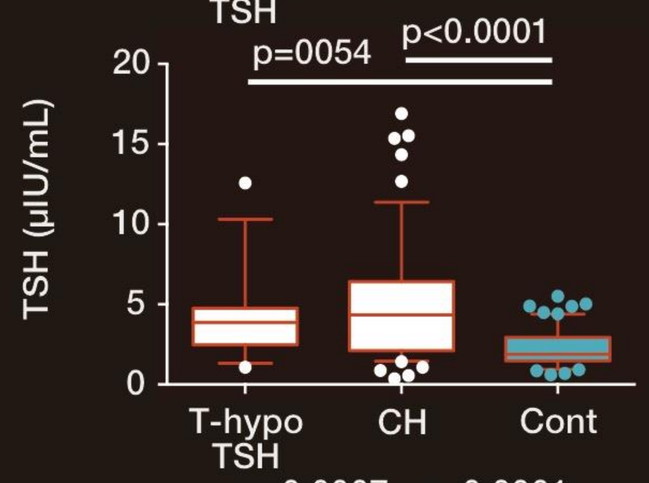
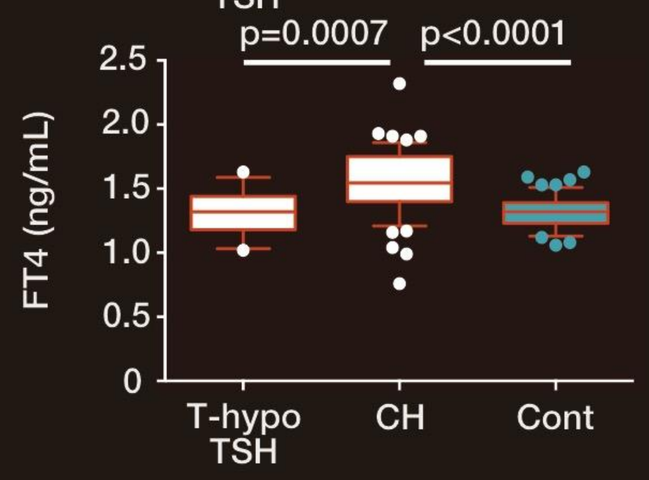


Figure 4. FT4 levels between transient hypo-TSH, CH and controls.
CH had significantly elevated FT4 compared to controls and transient hypo-TSH.



5. Discussion

Elevation of thyroid hormone increases FGF21 via THβ receptor and/or PPARα. This result implicated that administration of levothyroxine may be overdosed in CH. This study replicated previous literatures, in that T1DM had decreased FGF21, T2DM had increased FGF21, and diseases in relationship with growth was not related to FGF21.

6. Conclusions

CH had elevated FGF21, indicating that levothyoxine may be overdosed in CH. FGF21 may be a new biomarker for optimal kevothyroxine dose in CH.

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Thyroid

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