First morning pregnanetriol and 17-hydroxyprogesterone correlated significantly each other with in 21-hydroxylase deficiency

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[Disclosure Statement] The authors have no conflicts of interest in connection with this article.

Background

Biochemically monitoring 21-hydroxylase deficiency (21OHD) treatment is challenging. Serum/blood 17-hydroxyprogesterone (17OHP) measurements, especially in the early morning before medication, are traditionally used for this purpose. Urinary pregnanetriol (PT), a urinary metabolite of 17OHP, may also be used. Based on auxological data, we previously reported that the first morning PT value in the range of 2.2–3.3 mg/gCr is optimal for monitoring 21OHD treatment (Izawa M et al. Clin Pediatr Endocrinol. 2007). No report thus far has compared urinary PT and 17OHP values.

Objective

To explore the correlation between first morning urinary PT value before glucocorticoid administration (0h-PT) and the serum/blood 17OHP value at three time points, namely, before (0h-17OHP) and two and four hours after glucocorticoid administration (2h-17OHP, 4h-17OHP).

Design and Methods

Design: Prospective study done at two children's hospitals

Methods: In total, 24 patients with 21OHD aged 3-25 years were recruited. The urinary PT levels and 17OHP levels were measured for three days within a week. The 0h-PT (n=69) values were collected on all the three days.

Schedule:

Day	Day 1			Day 2	Day 3
	Before morning administration	2 hours after administration	4 hours after administration	Before morning administration	Before morning administration
Time	7:00-8:00 a.m.	9:00-10:00 a.m.	11:00-12:00 a.m.	7:00-8:00 a.m.	7:00-8:00 a.m.
Place	Home	Hospital	Hospital	Home	Hospital
Urine	①			②	③
Dried blood spot (DBS)		④	⑤	⑥	⑦
Serum		⑧			

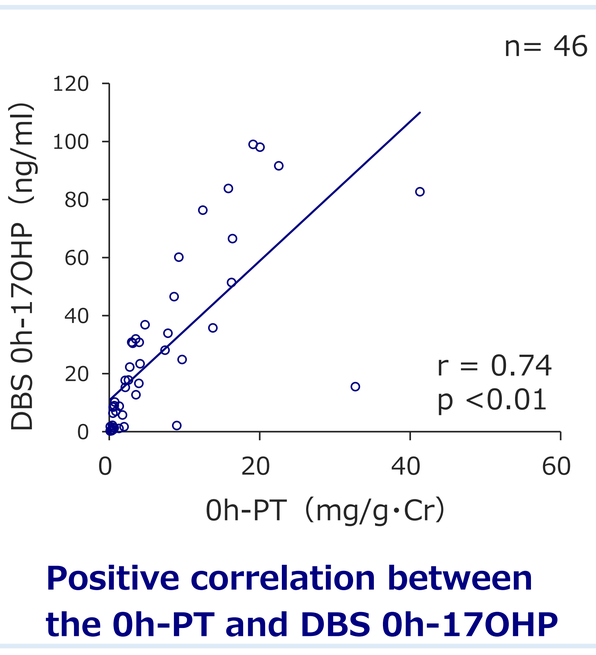
Measurements:

Urinary PT	GC-MS
DBS 17OHP	ELISA
Serum 17OHP	ELISA LC-MS/MS

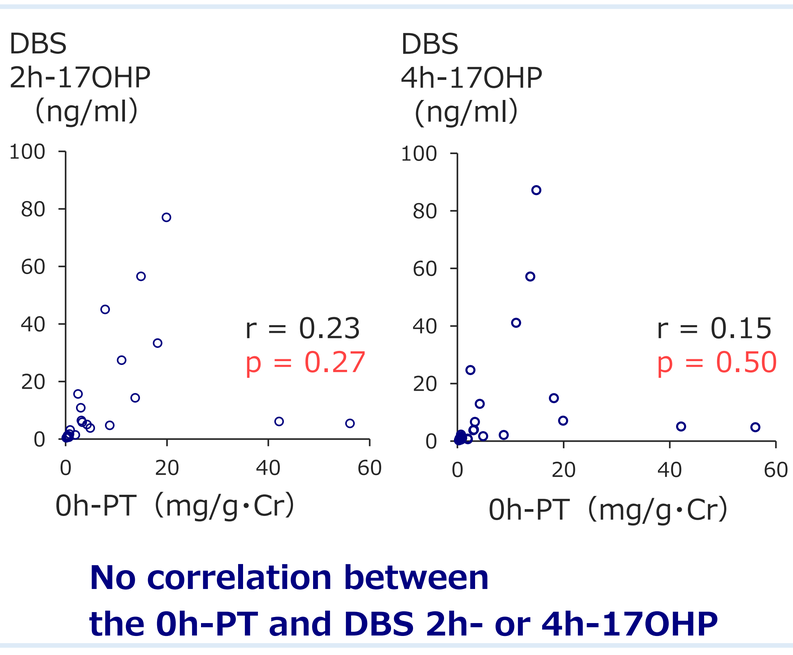
Statistics: Regression analysis was used to determine correlation about the following combinations.

Combinations	(number of above)
0h-PT and DBS 0h-17OHP	② and ⑥ ③ and ⑦
0h-PT and DBS 2h-17OHP	① and ④
0h-PT and DBS 4h-17OHP	① and ⑤
[Between methods of measurements]	
DBS 17OHP (ELISA) and serum 17OHP (ELISA)	④ and ⑧
DBS 17OHP (ELISA) and serum 17OHP (LC-MS/MS)	④ and ⑧

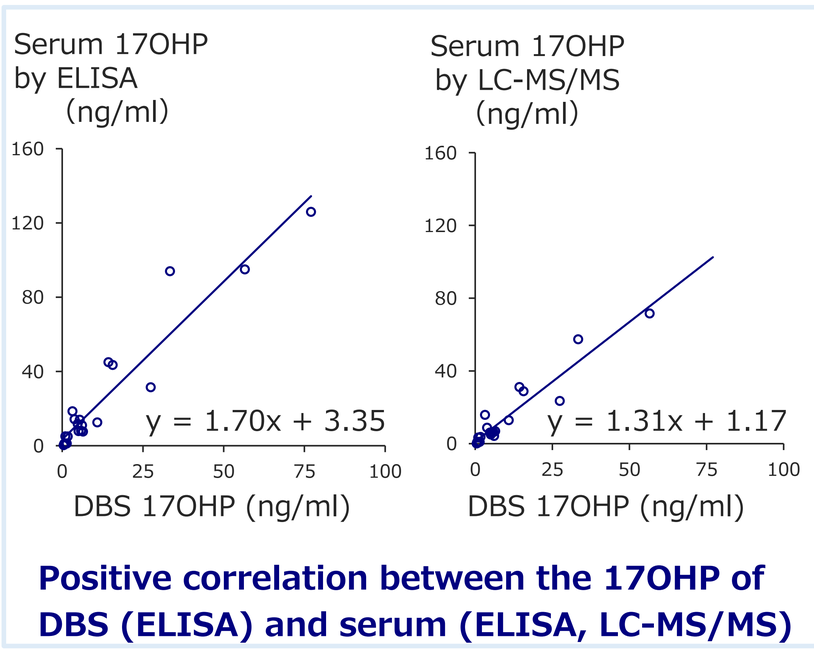
Results



Positive correlation between the 0h-PT and DBS 0h-17OHP



No correlation between the 0h-PT and DBS 2h- or 4h-17OHP



Positive correlation between the 17OHP of DBS (ELISA) and serum (ELISA, LC-MS/MS)

Discussion

1) First morning PT and 17OHP could be equivalent for biochemical monitoring because of a significant positive correlation each other.
2) It may be difficult to show the optimum range of 17OHP after glucocorticoid administration because there was no correlation between the 0h-PT and 2h- or 4h-17OHP.
3) Since early morning serum/blood 17OHP measurements are impractical for patients and caregivers and the levels do not reflect a long period of disease control.

Conclusion

First morning PT correlated significantly only with DBS 17OHP before morning medication. First morning PT measurements may be more practical and useful for biochemical monitoring of 21OHD.