Cortisol responses to the insulin tolerance test and glucagon stimulation tests in children with idiopathic short stature and idiopathic, isolated growth hormone deficiency.

H. Alsaffar, I. Ahmed, P. Blundell, L. Hatchard, K. Stirrup , Z. Yung, R. Ramakrishnan, U. Das, P. Dharmaraj, S. Senniappan, M. Didi, J. Blair

Department of Endocrinology, Alder Hey Children's Hospital, Liverpool

Introduction

- The insulin tolerance test (ITT) and glucagon stimulation test (GST) stimulate growth hormone (GH) and cortisol release.
- Normal cortisol responses are defined as peak cortisol >500nmol/L.
- Peak cortisol levels are often <500nmol/L in short children, tested for GH deficiency (GHD), with no clinical suggestion of cortisol deficiency.

Aim

To describe cortisol responses to the ITT and GST in children with idiopathic short stature (ISS) and idiopathic, isolated growth hormone deficiency (IIGHD).

Method

- Retrospective study of children tested between January 2011 - December 2014.
- Data from children with ISS (height < -2SD, birth weight SDS >-2, peak GH >6.1ug/l, no chronic illness or steroid therapies) and IIGHD (height < -2SD, birth weight SDS >-2, peak GH <6.1ug/l, no chronic illness or steroid therapies, normal pituitary MRI), were included.

Results

Data from 118 (76M) patients, age 12.9yrs (1.7-20.7) were studied. Results are given in Table 1.

Table 1. Age, gender, baseline and peak cortisol levels in children and adolescents with ISS and IIGHD in insulin tolerance and glucagon stimulation tests.

		GST n=43		ITT n=26	
		Males (23)	**Females (20)**	**Males (19)**	**Females (7)**
ISS	Age (years)	8.6 (1.7–18.5)	9.6 (2.1–16.2)	16.7(7.2–20.7)	15.9 (11.7–17.8)
	Basal cortisol (nmol/l)	232 (149-643)	249 (131-419)	279 (105–532)	260 (152-657)
	Peak cortisol (nmol/l)	450 (228-1082)	608 (309-963)	552 (408–668)	624 (488-919)
		GST n=19		**ITT n=30**	
		Males (13)	**Females (6)**	**Males (21)**	**Females (9)**
IIGHD	Age (years)	8.2 (4.8–18.2)	12.3 (4.0–16.9)	14.8 (6.9–18.9)	14.2 (10.3–17.6)
	Basal cortisol (nmol/l)	264 (125-458)	364 (252-604)	287 (149–715)	199 (114–632)
	Peak cortisol (nmol/l)	585 (414–966)	668 (417-717)	555 (508–767)	579 (497–734)

Data are shown as median (range)

Conclusion

These data suggest that the current definition of a normal cortisol response to the ITT and GST should be re-examined. In a larger cohort, the effect of age and gender could be explored, to refine guidelines for the diagnosis of adrenal insufficiency in childhood and adolescence.