Glucose regulation in children with primary adrenal insufficiency: preliminary data.

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**Background:** During treatment of adrenal insufficiency (AI) with hydrocortisone (HC), cortisol concentrations are supra-physiological following doses, and low before doses. We speculated that this cortisol profile may result in periods of hyperglycaemia and hypoglycaemia. We describe glucose profiles in the first 18 children recruited to a study of metabolic and cardiovascular profiles in AI.

**Methods:** Children with primary AI, treated with HC underwent continuous glucose monitoring (CGM) for 7 days using the Dexcom G6 device, blinded to participants. Data were interpreted using published data from 57 healthy children [1] and are shown in table 1.

**Results:** Eighteen children (9M, two Addison’s disease, 16 congenital adrenal hyperplasia (CAH)]), aged 8.1yrs (range 2-16) participated. Mean HC dose was 10.8 mg/m2/day (5.6-22.5), height SDS -0.07 (-2.03-2.59) and body mass index (BMI) SDS 0.70 (-0.7-3.7). Total number of glucose measurements was 1846 (688-2017). One child could not tolerated CGM.

| Table 1 Table showing glucose data compared to healthy controls [1]. |
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| Parameter | Grace study (*n* = 17) | Reference data 6 to <12y (*n* = 27) | Reference data 12 to <18y (*n* = 30) |
| Mean glucose (1SD) | 6.05 (±0.51) | 5.50 (±0.39) | 5.40 (±0.39) |
| Standard deviation of measurements | 1.01 (±0.47) | 0.89 (±0.39) | 0.83 (±0.33) |
| % of time < 3 mmol/l (median, IQR) | 0.00 (0.00-0.24) | 0.00 (0.00-0.20) | 0.00 (0.00-0.40) |
| % of time >10 mmol/l | 1.26 (0.00-1.52) | 0.00 (0.00-0.10) | 0.00 (0.00-0.00) |

**Hypoglycaemia:** Three out of eighteen children had glucose measurements < 3 mmol/l for 1-2% of readings. In one child, glucose was <3 mmol/l on 2% of readings and <4 mmol/l for 11% of readings. Their BMI SDS was 0.6 and HC dose 9.2mg/m2/day.

*Hyperglycaemia:* Four out of eighteen children had glucose measurements > 10 mmol/l for 1-2% of readings, and >14nmol/l for 1% of readings in one. HC doses in these children were 7.8-9.4mg/m2/day and BMI SDS -0.7-0.7. Hyperglycaemia was more likely following morning and evening doses of hydrocortisone.

**Conclusion:** To our knowledge, these are the first data describing glucose profiles in children with primary AI. These preliminary data suggest both hypoglycaemia and hyperglycaemia may occur more commonly than in healthy children, with an overall trend for higher mean glucose concentrations. Disturbance in glucose metabolism may contribute to differences in cognitive function reported in childhood (hypoglycaemia), and impaired quality of life, metabolic and cardiovascular disease reported in adults (hyperglycaemia, increased glycaemic excursions).

**Reference:** 1. Shah, V.N., et al., *Continuous Glucose Monitoring Profiles in Healthy Nondiabetic Participants: A Multicenter Prospective Study.* J Clin Endocrinol Metab, 2019. **104**(10): p. 4356-4364.