

Defective Cortisol Secretion in Response to Spontaneous Hypoglycemia but Normal Cortisol Response to ACTH stimulation in neonates with Hyper-insulinemic Hypoglycemia (HH).

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Introduction:

- Hyperinsulinemic Hypoglycemia (HH) is the most common cause of recurrent and persistent hypoglycemia in the neonatal period.
- Cortisol and GH play important roles as counterregulatory hormones during hypoglycemia. Both antagonize the peripheral effects of insulin and directly influence glucose metabolism

Patients and Methods:

We studied cortisol and GH secretion in newborn infants with HH during spontaneous hypoglycemia. In addition, their basal ACTH level was measured and cortisol response to a standard dose ACTH test was performed.

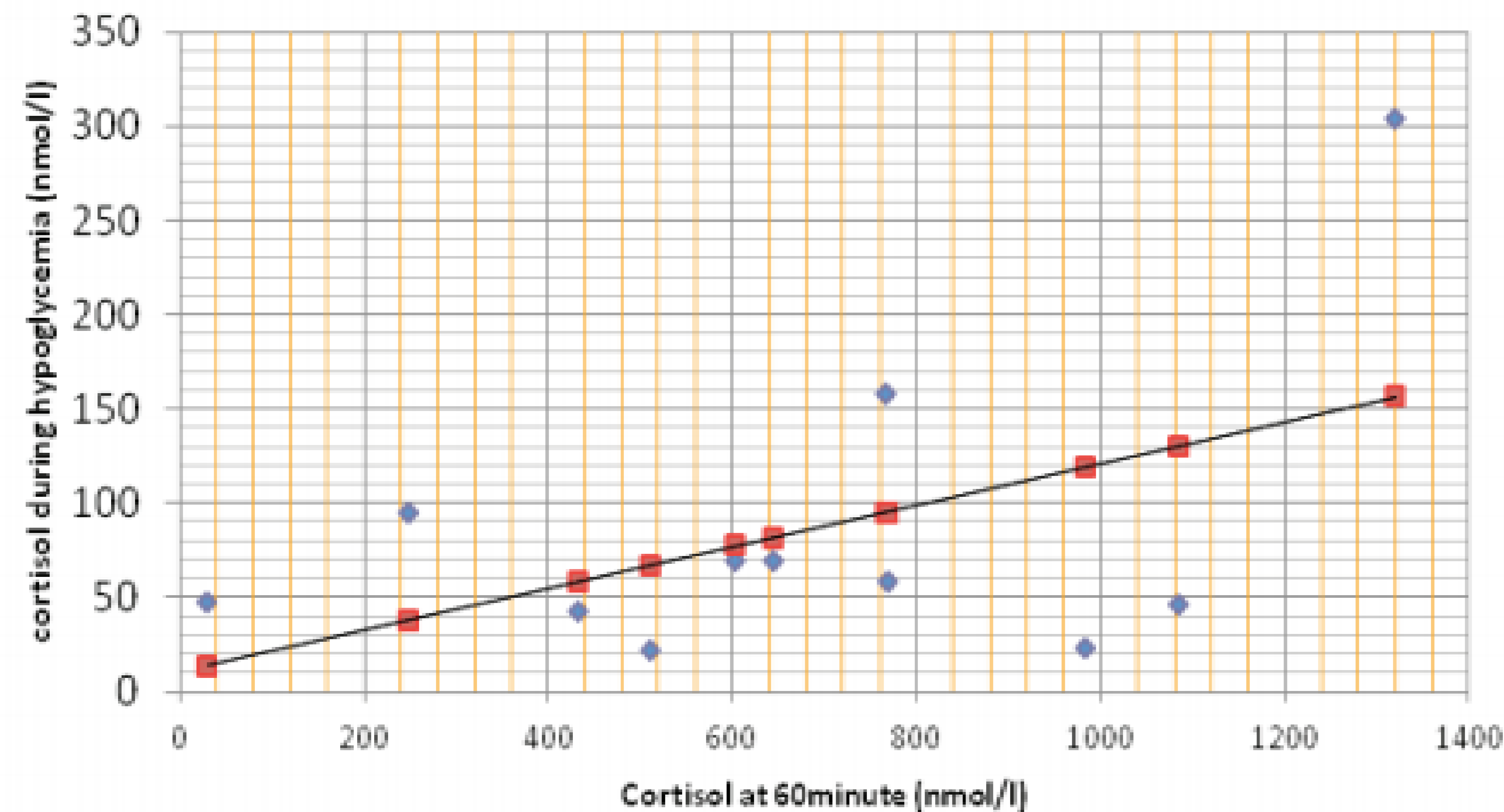


Figure 1. Correlation between cortisol level during hypoglycemia and the peak after ACTH stimulation test ($r = 0.50$, $p = 0.011$)

Results:

- Nine newborns with HH were studied during the first 2 weeks of life.
- During HH, their mean glucose concentration was 1.42 ± 0.7 mmol/L, mean beta hydroxybutyrate level was 0.08 ± 0.04 mmol/L, and mean serum insulin level was 17.78 ± 9.7 μ U/mL.
- Their cortisol and GH levels at the time of spontaneous hypoglycemia were 94.7 ± 83.1 nmol/L and 82.4 ± 29 mIU/L respectively.
- They had relatively low level of ACTH (range: 14 :72 pg/ml, mean: 39.4 ± 20 pg/mL) during hypoglycemia.
- All infants underwent ACTH test. Their basal serum cortisol levels did not differ compared to cortisol levels during hypoglycemia, and all had a normal peak cortisol response (> 500 nmol/L) in response to i.v. ACTH stimulation test
- All infants had GH concentration > 20 mIU/L at the time of hypoglycemia.

Conclusions:

- Infants with HH have low cortisol response to spontaneous hypoglycemia with normal response to exogenous standard-dose ACTH. All HH infants had appropriate elevation of GH during hypoglycemia.
- Checking hypothalamic-pituitary axis (HPA) axis later in infancy using low dose ACTH may be useful to diagnose persistent HPA abnormalities in these infants.

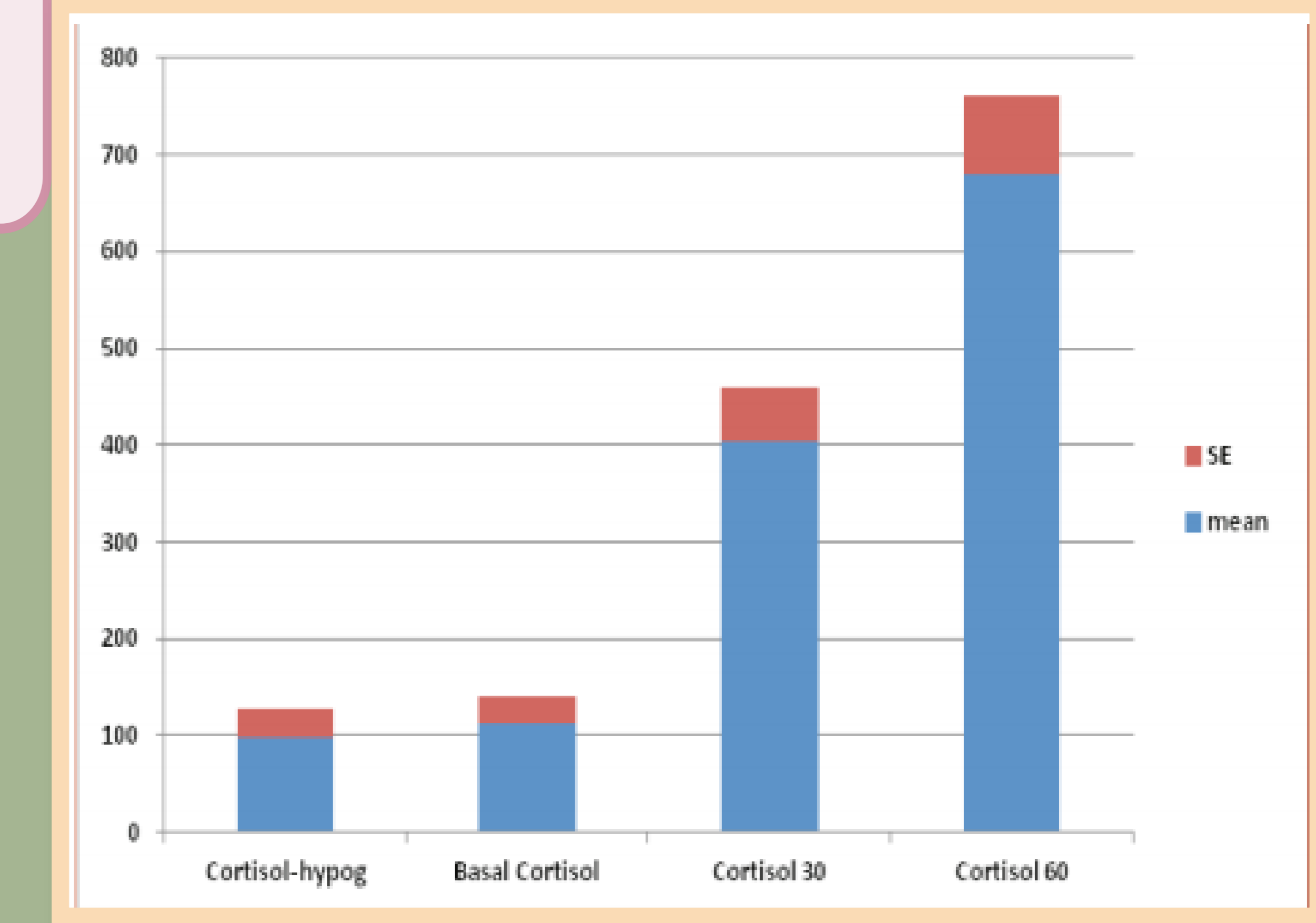


Figure 2. Cortisol secretion in response to spontaneous hypoglycemia versus values at 30 and 60 minutes after ACTH stimulation test (mean \pm standard error)

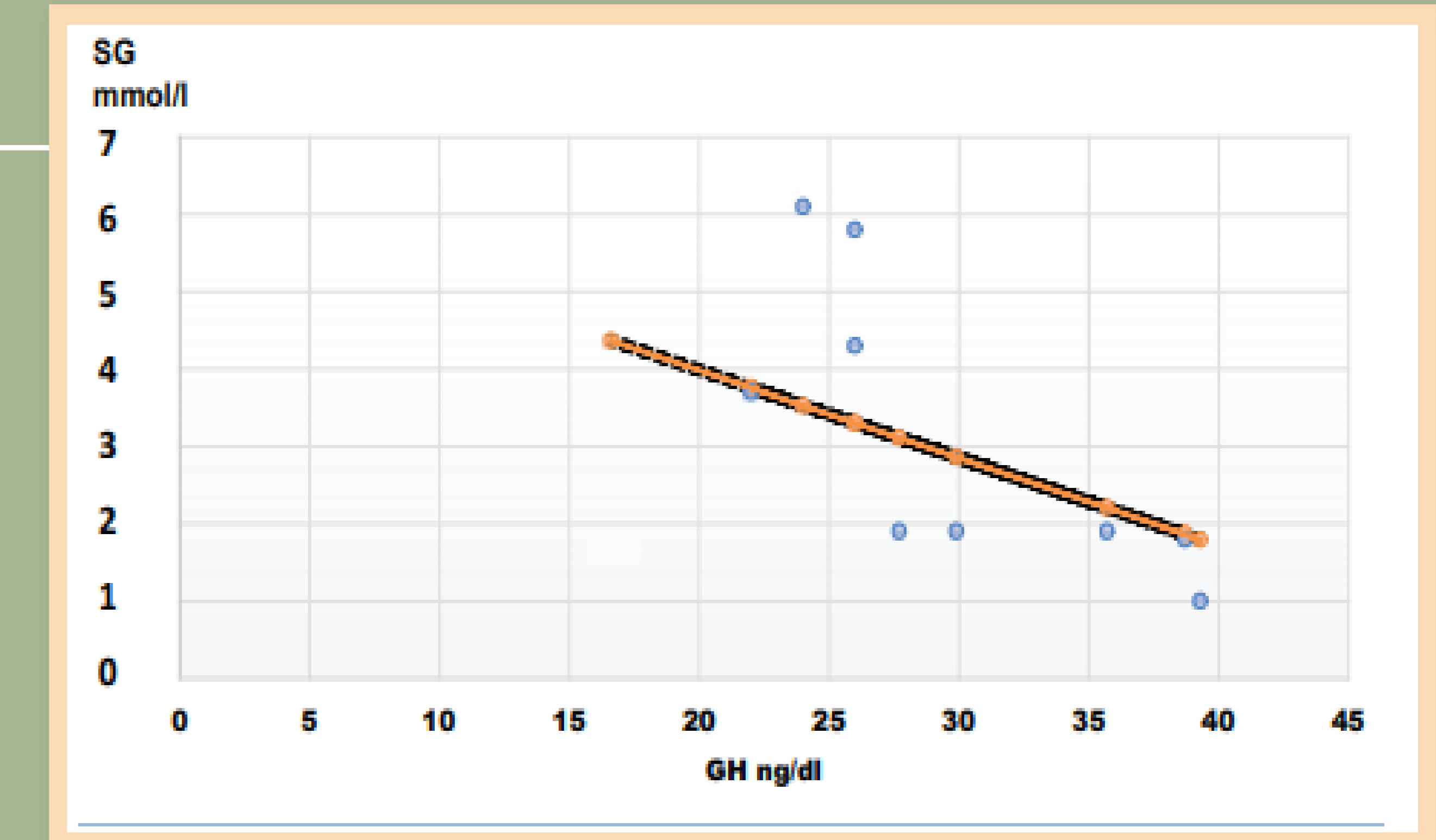


Figure 3. Correlation between SG (serum glucose) and growth hormone (GH) during hypoglycemia ($r = 0.45$, $p = 0.018$).