

# Impaired adrenal function in pediatric patients with Diabetes Mellitus type 1 evaluated with low-dose Synacthen test

Marialena Kalymniou<sup>1</sup>, Meropi Dimitriadou<sup>1</sup>, Aris Slavakis<sup>2</sup>, Athanasios Christoforidis<sup>1</sup>

<sup>1</sup> 1<sup>st</sup> Paediatric Department, Aristotle University, Thessaloniki, Greece

<sup>2</sup> Hormone Assay Laboratory, Department of Biochemistry, Ippokratio General Hospital, Thessaloniki, Greece

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## Background

- Primary adrenocortical insufficiency (**Addison's disease**) is reported to be five more times frequent in adult patients with type 1 diabetes mellitus (**T1DM**) than in the general population with a multifactorial aetiology involving autoimmune, inflammatory and metabolic mediators
- Recent data indicate that more than half of children with T1DM show subnormal cortisol response

## Objective

To evaluate adrenal function in pediatric patients with T1DM and correlate these results with demographic and anthropometric data as well as data from metabolic control, presence of severe or recurrent hypoglycemia, other autoimmune diseases and the presence of autoantibodies against adrenal cells.

## Methods

Patients with T1DM, aged > 6 years, with no history of corticosteroids or immunosuppressive drugs use were assessed with a low-dose Synacthen test.

## Low-dose Synacthen test (500ng per 1.73m<sup>2</sup> of body surface)

The test was performed three hours after the insertion of a vein catheter and blood samples for serum cortisol measurements were collected at time intervals 0, 5, 10, 15, 20, 25, 30, 35, 40 and 45 minutes after Synacthen administration. A cortisol response below 18.125 mcg/dl or an elevation below 7.25 mcg/dl from baseline value was considered abnormal.

## Results

Thirty-five patients (19 boys and 16 girls) with T1DM and a mean age of  $13.26 \pm 4.10$  years (range: 6-19 years) were finally analyzed. In 30 of them a history of recurrent hypoglycemia was recorded. Mean glycosylated hemoglobin (HbA1c) was  $7.60 \pm 1.19$  and duration of diabetes was  $5.46 \pm 3.58$  years, widely ranging from 1 to 15 years.

In 10 patients (28.57%) a subnormal cortisol response was recorded with predominance in male patients (9 out of 10,  $p=0.01$ ).

No statistical significant difference was observed between patients with normal and sub-normal cortisol response regarding HbA1c levels, age, z-scores of anthropometric parameters (weight, height, BMI), or the presence of other autoimmune diseases. Years since diagnosis were lower in patients with normal compared to those with subnormal response to Synacthen test with a difference that was approaching significance ( $4.76 \pm 3.31$  versus  $7.20 \pm 3.82$ ,  $p=0.07$ ).

No patient in our study showed positivity to adrenal autoantibodies.

Table 1.

	Normal cortisol response	Subnormal cortisol response	p
Number of patients (%)	25 (71.43)	10 (28.57)	
Male	10/25 (40%)	9/10 (90%)	0.010
Age (years)	$12.80 \pm 4.40$	$14.40 \pm 3.17$	0.304
Disease duration (years)	$4.76 \pm 3.31$	$7.20 \pm 3.82$	0.075
HbA1c (%)	$7.50 \pm 1.03$	$7.85 \pm 1.54$	0.784
Height Z-score	$0.14 \pm 0.72$	$0.27 \pm 0.90$	0.342
BMI Z-score	$0.03 \pm 1.10$	$0.24 \pm 0.63$	0.674

## Conclusion

Approximately one-third (1/3) of pediatric patients with T1DM in our study showed subnormal response in low-dose Synacthen test despite the absence of autoantibodies against adrenals and this should be taken into consideration especially when evaluating T1DM patients with recurrent hypoglycemia

## References

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