

Functional muscle capacity and daily physical activity deficits in patients with endogenous Cushing's syndrome

A.Assimakopoulou¹, Z. Louvaris², M. Balomenaki¹, M. Tzanela¹, N. Chynkiamis², I.Vogiatzis², and S. Tsagarakis¹

1. Department of Endocrinology, Diabetes and Metabolism "Evangelismos Hospital", 10676 Athens, Greece
2. Department of Physical Education and Sports Science, National and Kapodistrian University of Athens, Greece

OBJECTIVES

The aim of the present study was to examine the impact of endogenous hypercortisolism on functional muscle capacity and daily physical activity levels

PATIENTS

We studied:
•23 subjects with endogenous CS (age: 40.73±2.17 years)
•22 healthy aged and sex matched controls.

METHODS

Assessment of the degree of hypercortisolism was based on: cortisol day-curve (Fmean), midnight cortisol (F23:00), cortisol post LDDST and 24h urine cortisol levels (UFC)

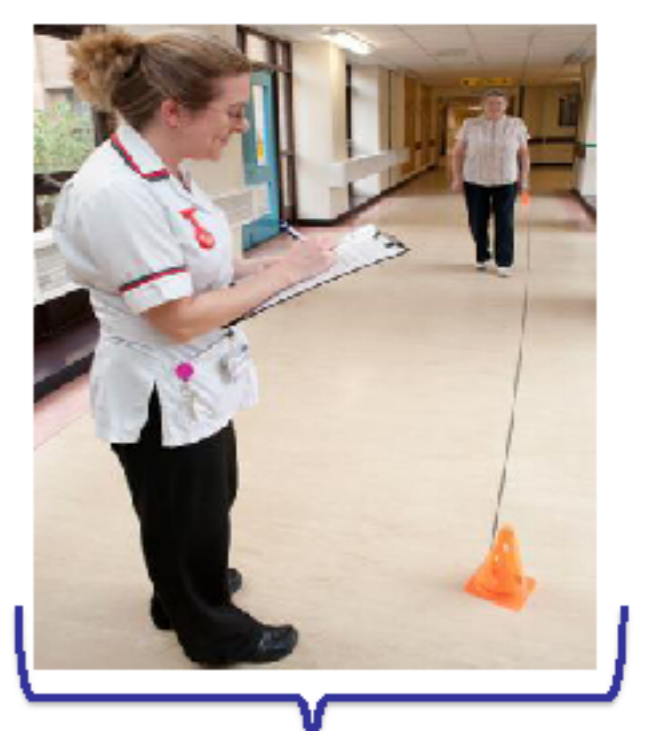
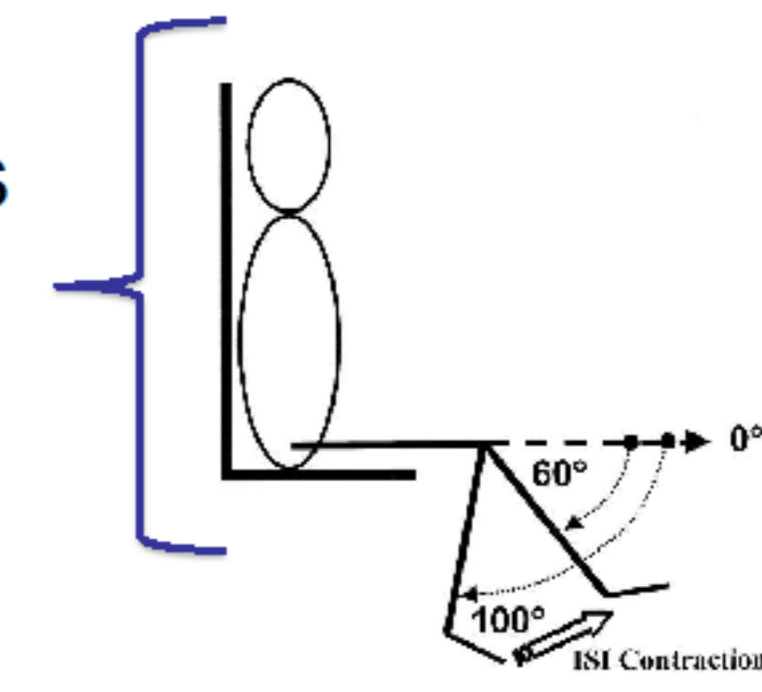
Functional muscle capacity was assessed by quadriceps muscle strength and endurance during maximal isometric voluntary contraction test (QMVC):



Body composition was measured by bioelectrical impedance method (BIA)



Daily physical activity was recorded by a triaxial accelerometer (Actigraph GT3X) during 7 consecutive days



Physical activity was assessed by the 6-minute walking distance test (6MWD)

RESULTS

Table 1. Anthropometric measurements
Increased fat mass and BMI in CS compared to controls

	Cushing's	Controls	p
Age(years)	40.7±2.1	46.5±1.9	ns
Height (cm)	167±1.6	166±2.1	ns
Weight (kg)	87±4.3	72.7±3.6	ns
BMI	31.6±1.8	26.1±0.9	0.01
FAT Mass (kg)	35.8±3.3	23.8±2.1	0.005
Lean Mass (kg)	51.3±3.3	49.1±2.3	ns
FFMI (kg/m ²)	18.4±0.5	17.5±0.4	ns

Table 2. Biochemical indices of hypercortisolism.

F 8:00 (µg/dl)	28.5±3.3
F23:00 (µg/dl)	23.3± 3.2
F mean (µg/dl)	24.9±9.6
UFC (µg/24h)	693±150
Months from diagnosis	4.9±2.0
Months from symptoms onset	47.2±12.2

Figure 1. Negative correlation of physical activity (VMU/min) with biochemical indices of hypercortisolism.

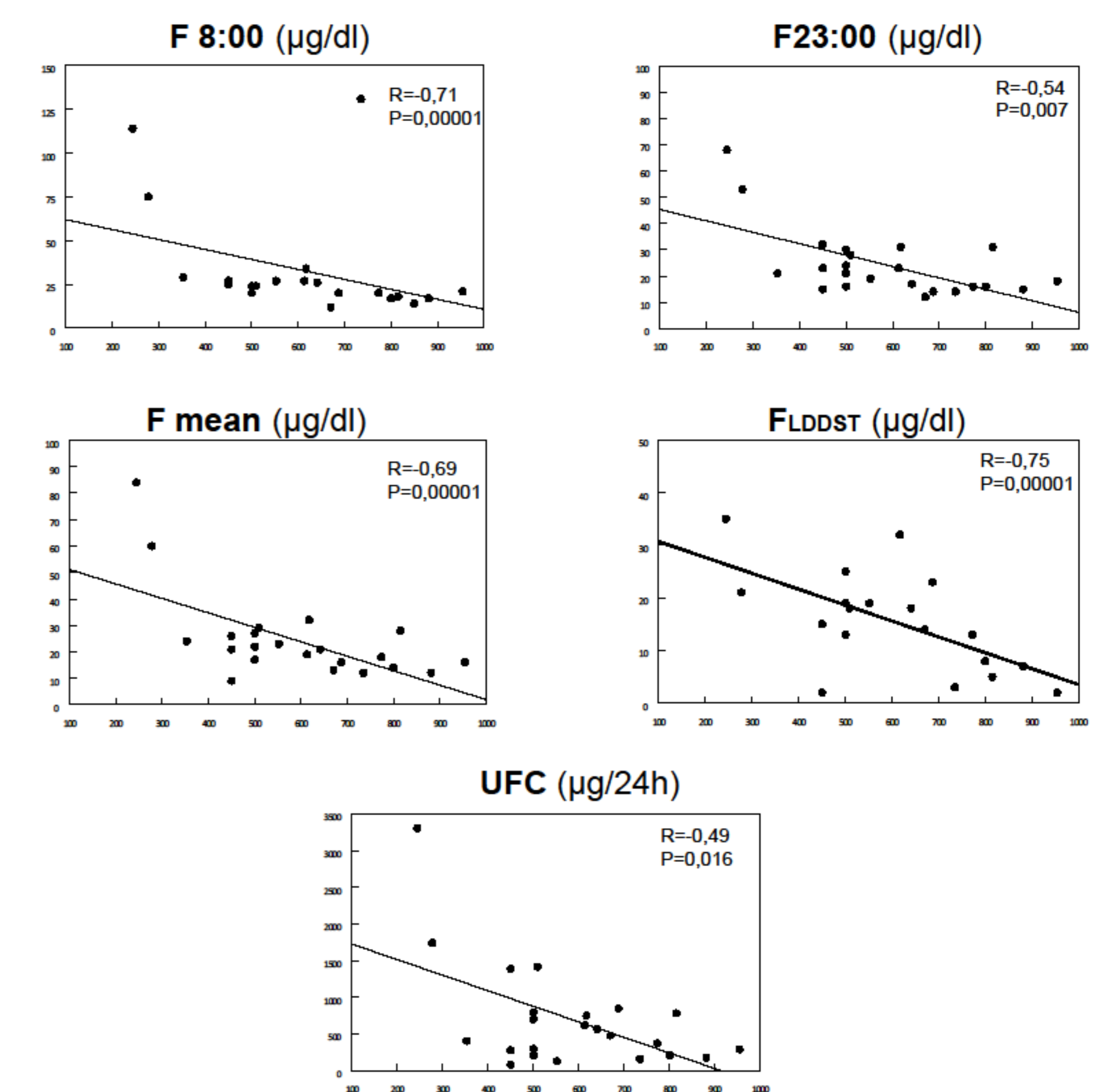


Table 3. Decreased physical activity (6MWD) and quadriceps functional capacity in CS
No difference in respiratory functional capacity (MIP, MEP)

	Cushing's	Controls	p
6MWD (meters)	419±17.8	521±12.8	0.001
MIP(cmH2O)	-67±6.8	-71±10.2	ns
MEP(cmH2O)	79±5.6	78±6.2	ns
MUSCLE FORCE(Kg)	24.9±1.7	30.3±1.9	0.04
MUSCLE ENDURANCE(sec)	33.5±3.8	45.1±3.9	0.04

Table 4. Compromised daily physical activity in CS

	Cushing's	Controls	p
VMU/min	621±53.8	819±53.5	0.0001
Steps/day	4222±425	7775±633	0.0001

CONCLUSIONS

Endogenous hypercortisolism has a profound negative influence on various parameters related to functional capacity and daily physical activity.

These measurements may be a useful marker for assessing the effect of various treatment modalities in patients with Cushing's syndrome

References

- Nieman LK, Biller BM, Findling JW, Newell-Price J, Savage MO, Stewart PM, et al. The diagnosis of Cushing's syndrome: an Endocrine Society Clinical Practice Guideline. *J Clin Endocrinol Metab.* 2008 May;93(5):1526-40.
- Schakman O, Gilson H, Thissen JP. Mechanisms of glucocorticoid-induced myopathy. *J Endocrinol.* 2008 Apr;197(1):1-10.
- Pirlich M, Biering H, Gerl H, Ventz M, Schmidt B, Ertl S, et al. Loss of body cell mass in Cushing's syndrome: effect of treatment. *J Clin Endocrinol Metab.* 2002 Mar;87(3):1078-84.
- Minetto MA, Lanfranco F, Botter A, Motta G, Mengozzi G, Giordano R, et al. Do muscle fiber conduction slowing and decreased levels of circulating muscle proteins represent sensitive markers of steroid myopathy? A pilot study in Cushing's disease. *Eur J Endocrinol.* 2011 Jun;164(6):985-93.

