

# The relationship of baseline, incremental & peak cortisol following Short Synacthen Test – single-centre analysis of three years' data

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## Background

- Worldwide, the Short Synacthen Test (SST) is the most frequently performed diagnostic test for adrenal insufficiency.<sup>1</sup>
- There is evidence that an early morning plasma cortisol (EMC) below  $\sim <160$  nmol/L is predictive of failing the SST and the corollary with an EMC above  $\sim >340$  nmol/L.<sup>2-7</sup>
- We analysed our institutions SST data, following the introduction of a new cortisol assay, to derive screening thresholds for SST and examine the relationship between basal, incremental and peak plasma cortisol.

## Aim

- To determine positive predictive value (PPV) and negative predictive value (NPV) of EMC in the SST, using different EMC cut offs.

## Methods

- Dataset: 393 SSTs from 2014-2017
- Data extracted:
  - Baseline cortisol (used as a surrogate for EMC)
  - Peak cortisol
- Cortisol assay: Abbott Architect chemiluminescent immunoassay (CVs  $<5\%$ )
- Cortisol threshold to "pass" SST  $>430$ nmol/L
- Statistical analysis:
  - Correlation coefficients with increment and peak
  - Subgroup analysis: gender & pubertal status surrogates (pre-pubertal: 0-9 years old & post-pubertal: 10-16 years old)
  - PPV & NPV of "passing" or "failing" SST calculated using different thresholds for EMC

## Results

- 393 SSTs: 209M, 184F, 175 pre-pubertal, 218 post-pubertal
- Baseline cortisol & peak cortisol correlation coefficient = 0.63 (fig 1)

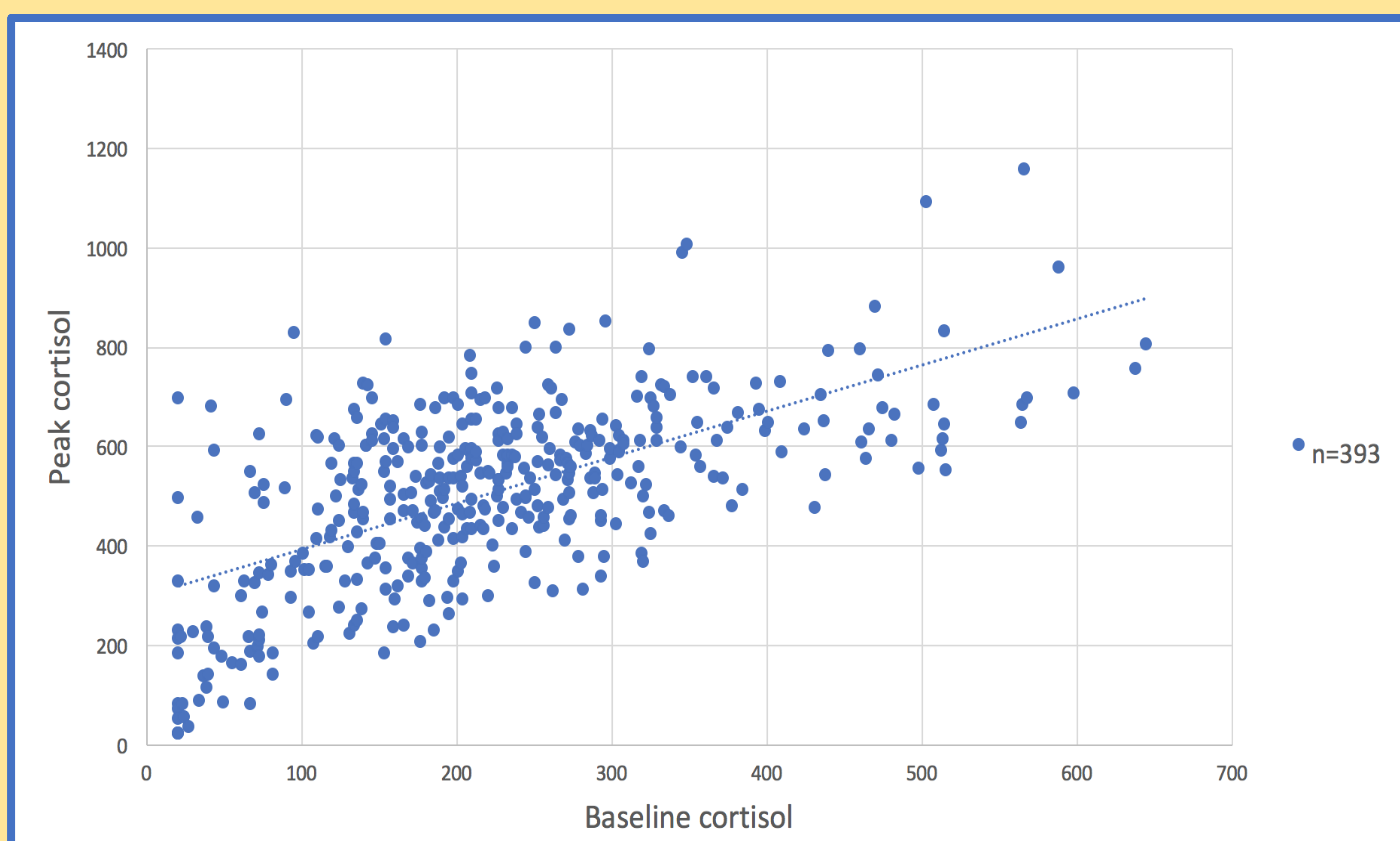


Fig 1: Correlation of baseline cortisol with peak cortisol

- Subgroup analysis (Pearson's correlation coefficients ( $\rho$ )):
  - Males = 0.62, females= 0.63
  - Pre-pubertal= 0.65, post-pubertal= 0.66
- No correlation between baseline cortisol & increment ( $\rho = -0.061$ )
- Patients with a baseline cortisol  $<160$  nmol/L
  - 31% of cohort (N= 123)
  - 58% of whom "failed" SST
  - PPV = 0.58
- Patients with a baseline cortisol  $>339$  nmol/L
  - 13% of cohort (N = 53)
  - 0% of whom "failed" SST
  - NPV= 1
- PPV & NPV with different EMC cut offs
  - Reducing the threshold of baseline cortisol to  $>320$  as a screening test for SST would result in 3 patients "missed" (table 1):

Baseline cortisol	Number	Passed SST	Failed SST	PPV	NPV
$<160$ nmol/L	123	52 (42%)	71 (58%)	0.58	/
$\geq 340$ nmol/L	53	53 (100%)	0 (0%)	/	1
$\geq 320$ nmol/L	71	68 (96%)	3 (4%)	/	0.96
$\geq 300$ nmol/L	83	80 (96%)	3 (4%)	/	0.96
$\geq 275$ nmol/L	106	99 (93%)	7 (7%)	/	0.93
$\geq 250$ nmol/L	140	130 (93%)	10 (7%)	/	0.93

Table 1: Percentage of patients failing or passing SST if the baseline cortisol (surrogate for EMC) used as a screening test. Serum cortisol  $>430$  nmol/L requires to "pass" SST.

## Discussion

- A relatively strong relationship was found between baseline and peak cortisol on the SST.
- Subgroup analysis (sex and pubertal status) did not significantly strengthen correlation.
- No relationship was found between baseline and incremental cortisol.
- No patient with a baseline cortisol of  $>339$ nmol/L "failed" the SST.
- A baseline cortisol of  $<160$ nmol/L has a high PPV (0.58) for failing the SST

There are no conflicts of interest and the authors have nothing to declare

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