

Determining the Utility of the 60 Minute Cortisol Measurement in the Short Synacthen Test

Aditi Chitale¹, Patrick Musonda¹, Alan McGregor², Ketan Dhatariya^{1,3}

1. Norwich Medical School, University of East Anglia 2. King's College London School of Medicine, Department of Medicine 3. Elsie Bertram Diabetes Centre, Norfolk and Norwich University Hospital

Background: The short synacthen test (SST) was introduced over 45 years ago as a faster and safer alternative to the gold standard insulin tolerance test (ITT) for the assessment of primary adrenal insufficiency¹. The test has grown in popularity among UK endocrinologists^{2,3}. Given its widespread use, it is surprising that there remains no consensus on sampling times for serum cortisol⁴. Samples for cortisol have historically been taken at 0 and 30 minutes, with some units also taking samples at 40, 45 or 60 minutes post-synacthen administration⁴. Two UK surveys conducted 15 years apart show an increasing trend in clinicians discarding the 60 minute sampling time from the test and relying more heavily on the 30 minute sampling time^{4,5}. This is understandable because it is the only time point that has been validated against the ITT^{6,7}. Given this uncertainty, we set out to determine how often a patient would be misdiagnosed as having adrenal insufficiency if the 60 minute sample was not taken.

Aim: To establish whether there is any value in measuring serum cortisol at 60 minutes following administration of synacthen

Method: A retrospective study conducted at King's College Hospital NHS Foundation Trust (KCH), London, and the Norfolk and Norwich University Hospitals NHS Foundation Trust (NNUH) in Norwich. 250 consecutive SSTs between March 2009 and October 2010. Both centres use 550nmol/L as their cut-off value at 30 minutes⁵. There were four possible outcomes, depending on the cortisol response.

- ≥ 550 nmol/L at 30 and 60 minutes = pass
- < 550 nmol/L at 30 and 60 minutes = fail
- ≥ 550 nmol/L at 30 minutes but < 550 nmol/L at 60 minutes = pass at 30 minutes only
- < 550 nmol/L at 30 minutes but ≥ 550 nmol/L at 60 minutes = pass at 60 minutes only

Discussion: Our study shows that up to 11% of patients having an SST would be inappropriately diagnosed with adrenal insufficiency if the 60 minute sample was not used with these subjects passing the SST only at 60 minutes. Thus suggesting that they have a 'delayed response' to exogenous ACTH but in essence have normally functioning adrenal glands.

Summary: We suggest that the 60 minute cortisol measurement be retained.

1. Wood, JB et al (1965) A rapid test of adrenocortical function. *Lancet* 285, 243-245
2. Davies, MJ et al (1996) A survey of the current methods used in the UK to assess pituitary function. *JRSM* 89, 159-164
3. Gleeson, HK et al (2003) Ten years on: Safety of short synacthen tests in assessing adrenocorticotropin deficiency in clinical practice. *JCEM* 88, 2106-2111
4. Chatha, KK et al (2010) National UK audit of the Short Synacthen Test. *Annals of Clin Biochem* 47, 158-164.
5. Barth, JH et al (1995) A survey of endocrine function testing by clinical biochemistry laboratories in the UK. *Annals of Clin Biochem* 35, 442-449
6. Stewart, PM et al (1988) A rational approach for assessing the hypothalamo-pituitary-adrenal axis. *Lancet* 331, 1208-1210
7. Lindholm, J et al (1987) Re-evaluation of the clinical value of the 30 min ACTH test in assessing the hypothalamic-pituitary-adrenocortical function. *Clin Endo* 26, 53-59

ketan.dhatariya@nnuh.nhs.uk

www.norfolkdiabetes.com

Results:

Cortisol response at 30 or 60 minutes		NNUH, n=250 60 Minutes # (%)		p-value	KCL, n=134 60 Minutes # (%)		p-value	ALL, n=384 60 Minutes # (%)		p-value
		Pass	Fail		Pass	Fail		Pass	Fail	
30 Minutes	Pass	188 (75%)	0 (0%)	<0.00001*	88 (67%)	0 (0%)	0.0001*	276 (72%)	0 (0%)	<0.00001*
	Fail	18 (7%)	44 (18%)		15 (11%)	31 (23%)		33 (9%)	75 (20%)	

Pass = cortisol response greater or equal to 550 or else it is a fail. * = McNemar's test for matched pairs

