Diagnosis of Cushing’s Syndrome Using Scalp Hair Cortisol
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Introduction
- Endogenous Cushing’s syndrome (CS) is characterized by overproduction of cortisol
- Diagnosing CS can be challenging due to a lack of specific symptoms
- Limitations of current first-line screening tests (urinary free cortisol, late night salivary cortisol and the dexamethasone suppression test) include:
  - No assessment of long-term cortisol exposure
  - False positive results due to medication use and stress
  - Reliance on patient adherence to instructions
  - Requirement of repeated testing
- Hair cortisol concentrations (HCC) represent long-term cortisol and could be of additional value in diagnosing Cushing’s syndrome

Aim: to establish the optimal cut-off value of hair cortisol concentrations (HCC) for the diagnosis of endogenous Cushing’s syndrome (CS)

Methods
- Scalp hair samples were collected in:
  - 174 healthy individuals
  - 35 patients with confirmed Cushing’s syndrome
  - 20 patients with a clinical suspicion, in whom CS could be excluded (non-CS patients)
- HCC were measured using ELISA

Results
- CS patients had higher HCC than controls and non-CS patients (P<0.001, Fig 1, Table 1)
- Patients with ectopic ACTH secretion had higher HCC than individuals with pituitary or adrenal CS (P<0.05, Fig 1)
- At a cut-off value of 31.1 pg/mg (Fig 2):
  - Sensitivity for CS was 94%
  - Specificity was 90% vs healthy controls
  - Specificity was 90% vs non-CS patients

Fig 1: Hair cortisol values for controls, non-CS patients, and CS patients stratified by etiology. *P<0.05, **P<0.001

• Within CS patients, hair cortisol correlated significantly with urinary free cortisol (Fig 3)

Fig 3: correlation between hair cortisol and urinary free cortisol (upper limit of normal) in CS patients

Conclusion
- Analysis of cortisol in hair can distinguish between patients with and without CS with high diagnostic accuracy
- Our method offers a collection procedure that is easily executed, and is not affected by non-adherence
- Hair cortisol seems to be a valuable screening test for endogenous Cushing’s syndrome

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