

The relative contributions of genetic and environmental factors on cortisol metabolism at pre-, mid- and post-pubertal ages

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Introduction

Inter-individual differences in the metabolism of cortisol have been postulated to emerge during puberty, and might be explained by a complex interplay of genetic and environmental factors.

Aim

To estimate the relative contributions of genetic, shared environmental and unshared environmental factors on cortisol metabolism at pre-, mid- and post-pubertal ages.

Study design

218 twins, born between 1995 and 1996, were enrolled from a population-based twin registry. In total, 94 monozygotic and 124 dizygotic twins were included. Early morning urine was collected at:

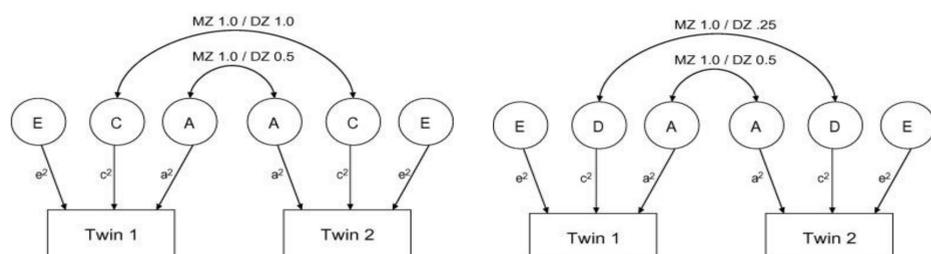
- Pre-pubertal (9 years),
- Mid-pubertal (12 years), and
- Post-pubertal (17 years) ages

Laboratory analysis: Gas chromatography-mass spectrometry

Outcome	Index
(THF + allo-THF + THE + alpha-cortol + beta-cortol + alpha-cortolone + beta-cortolone)/creatinin	Sum of cortisol metabolites (cortisol production rate)
allo-THF/cortisol	5alpha-reductase activity
THF/cortisol	5beta-reductase activity
THE/cortisone	5beta-reductase activity
cortisol/cortisone	Renal 11beta-HSD type 2 activity
(THF + allo-THF)/THE	11beta-HSD activities
6-OH cortisol/cortisol	Cytochrome P450 3A4 activity

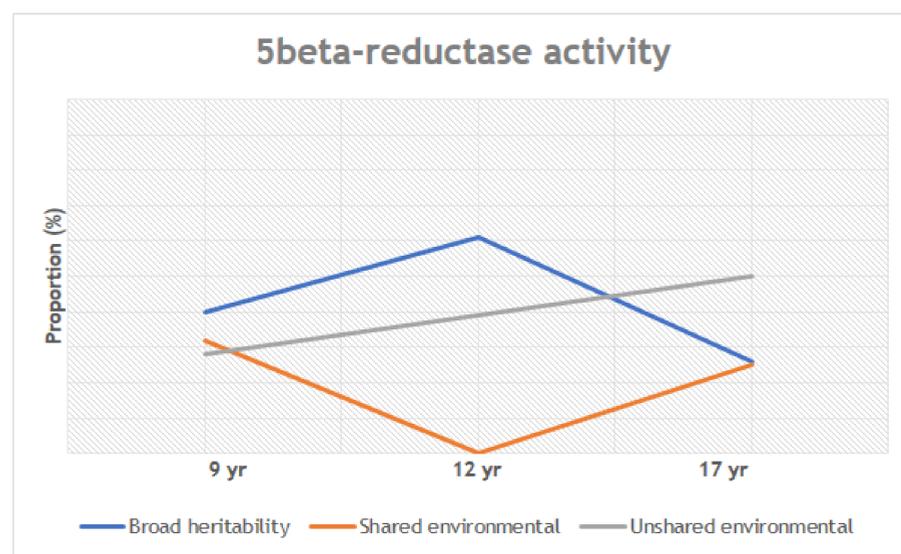
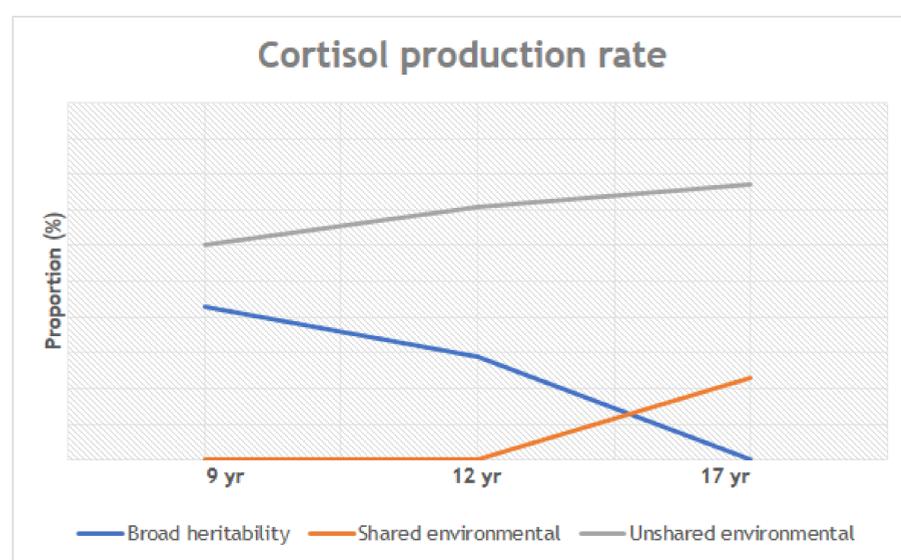
Classical twin design

- A: Genetic factors
- C: Shared environmental factors
- D: Dominance factors
- E: Unshared environmental factors



Results

The contribution of unshared environmental factors increased with age for the indices cortisol production rate (fig.), 5alpha-reductase activity, 5beta-reductase activity (fig.), renal 11beta-HSD type 2 activity and 11beta-HSD activities.



Conclusion

There were considerable differences in the relative contributions of genetic and environmental factors at pre-, mid- and post-pubertal ages. With few exceptions, the contribution of unshared environmental factors to these ratios was found to increase with age, implicating that individual circumstances seem to play a predominant role in later life.