

# Topical corticosteroid-induced adrenal insufficiency

Chiraz Ghaddhab<sup>1</sup>; Carine De Beaufort<sup>1</sup>

<sup>1</sup>Centre Hospitalier du Luxembourg, service d'endocrinologie pédiatrique, Luxembourg, Luxembourg

## Background

- Topical corticosteroids are often used for the treatment of dermatological diseases
  - Systemic adrenal insufficiency may result from their overuse
- Young children and patients with damaged skin barriers are especially at risk for development of adrenal insufficiency

## Case presentation

### Case History

- 11 year-old boy, referred because of suspicion of Cushing syndrome
- He was addressed by a dermatologist who treated his dishydrotic eczema of the hands with 0.05% betametason cream during three years
- He used the cream only during exacerbations (twice a day on the hands during one week)
- He has no medical history or allergy

### Physical Examination

- Obesity, a weight of 79kg height of 157 cm, (body mass index [BMI] 32.3kg/m<sup>2</sup>)
- His sitting blood pressure was 121/60mm Hg



### Initial investigations, Diagnosis and Treatment

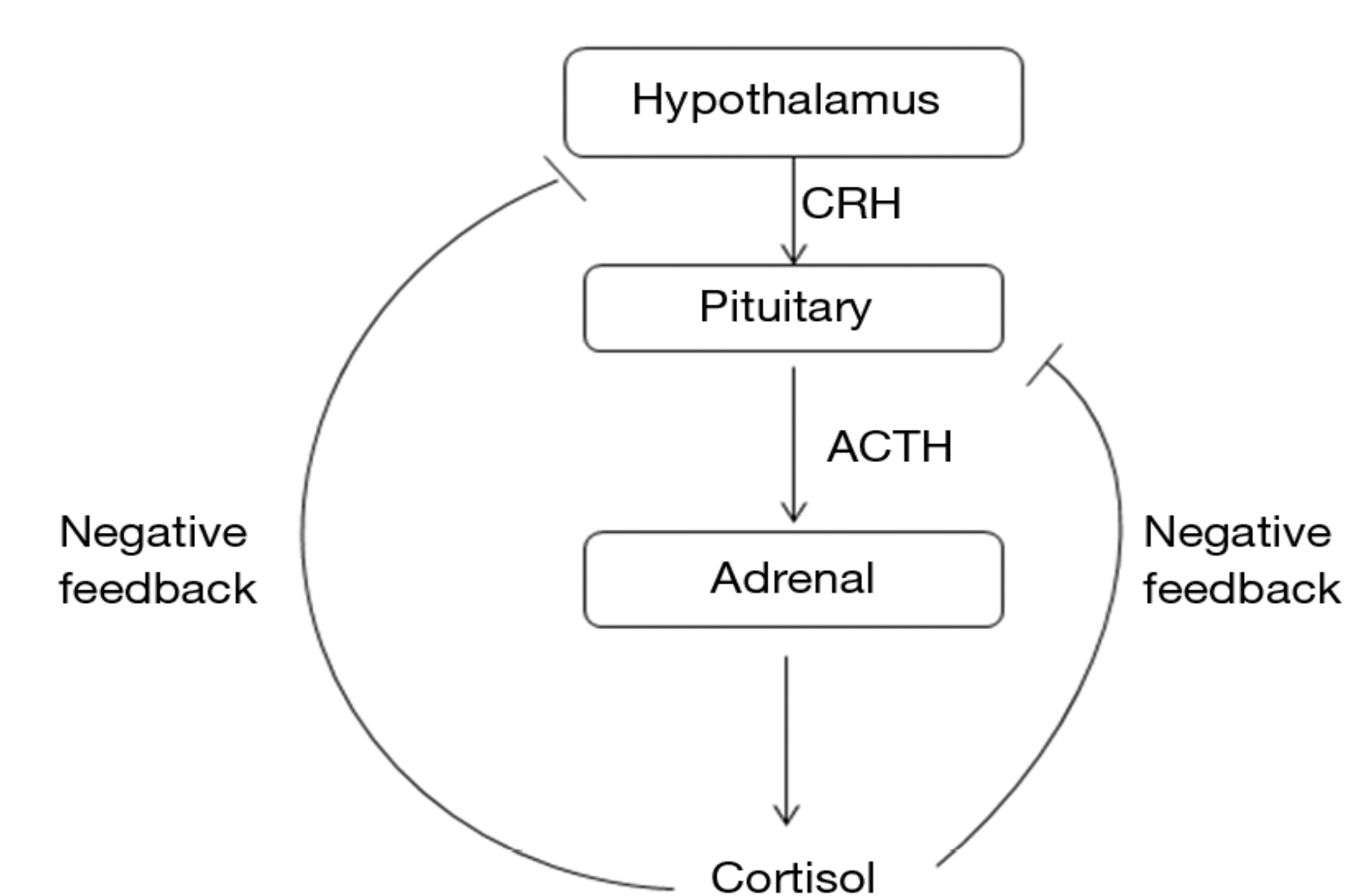
- Fasting blood glucose 98mg/dL
- Plasma sodium 140mEq/L, plasma potassium 4.3mEq/L, hemoglobin 14.4g/dL
- Free T4 1.11ng/dL [0.8–1.7], TSH 1.2mU/L [0.7–4.65]
- Basal serum cortisol levels (at 8 :00 AM) were <1 µg/dL [3.7–19.4] and basal ACTH was 1.3ng/L [7.2–63.3]
- Twenty four hours urinary cortisol was <16 µg/24hours [16–176]
- Secondary adrenal insufficiency was diagnosed and topical corticosteroid was stopped
- Hydrocortison at physiological doses (10 mg/m<sup>2</sup>/day) was started as well as recommendations in case of fever or disease

### Further investigations and Follow-up

- Four months later, a 250 µg cosyntropin stimulation test (Synacthen®) was performed
- Cortisol levels were 241 ng/mL [62–180], ACTH was 77.3 pg/mL [7.2-63.3], DHEAS 139 µg/dL[35-430], 17 OH-progesterone 4.5 nmol/L [2.7-10]
- The hypothalamic-pituitary-adrenal (HPA) axis was no longer suppressed
- Hydrocortison was stopped
- Five months later, twenty four hours urinary cortisol was performed: 45 µg/24hours [16–176]
- Physical examination showed a weight of 86 kg, a height of 160 cm, (body mass index [BMI] 33.7kg/m<sup>2</sup>), His sitting blood pressure was 119/63mmHg
- The obesity was probably not due to a topical corticosteroid

## Discussion

- Percutaneous absorption of topical steroids depends on various factors: age of the patient, body site and area treated, amount of topical steroid used, structure and potency of the drug, vehicle of the drug (solvent used), frequency of application, duration of the therapy, use of occlusion, nature of the skin, coexistent hepatic or renal disease, hydration of stratum corneum, local hyperemia, vigorous rubbing into the skin, use of keratolytic agents or dimethyl sulfoxide,...
- The stratum corneum acts as a barrier for percutaneous absorption of drug into systemic circulation
- Damaged skin has impaired barrier function → enhanced percutaneous absorption
- The horny layer also acts as a reservoir → drug penetration into the body continues even after a single application
- Therefore, even small doses of topical steroids can produce systemic side effects like suppression of HPA axis, iatrogenic Cushing's syndrome and growth retardation in children



A K. Younes et al. 2017

## Conclusions

- Among the adverse effects associated with topical corticosteroid use, the most dangerous is HPA axis suppression, which in some cases, can be life threatening
- Therefore, it should be used with an increased awareness of the potential risk of adrenal axis suppressive effects

## References

- Marquez et al. Topical corticosteroid and secondary adrenal insufficiency: a relationship in the shade. Endocrinol Nutr. 2013;60 (9)19-20
- Areej K. Younes and Norr K. Younes. Recovery of steroid induced adrenal insufficiency. Transl Pediatr 2017;6(4) 269-273
- Levin et al. Topical corticosteroid induced adrenocortical insufficiency: clinical implications. Am J Clin Dermatol. 2002;3(3) 141-7
- Young et al. Unrecognised Cushing's syndrome and adrenal suppression due to topical clobetasol propionate Br J Clin Pract. 1991; 45 (1) 61-2
- Dhar S. et al. Systemic side-effects of topical corticosteroids. Indian J Dermatol 2014; 59(5):460-464

## Acknowledgements

We thank the parents for their cooperation and Dr Ulrike Schierloh, Michael Witsch and Marianne Becker for their suggestions and comments

