

Altered adrenal and gonadal steroids biosynthesis in patients with burn injury

MARIA BERGQUIST^{1*}, FREDRIK HUSS^{2,4}, FILIP FREDÉN^{3,4}, GÖRAN HEDENSTIERNA¹, JOHANNA HÄSTBACKA⁵, ALAN L ROCKWOOD^{6,7}, MARK M. KUSHNIR^{6,7}, JONAS BERGQUIST^{7,8}

1 Department of Medical Sciences, The Hedenstierna Laboratory, Uppsala University, Uppsala, Sweden

2 Department of Surgical Sciences, Plastic Surgery, Uppsala University, Uppsala, Sweden

3 Department of Surgical Sciences, Anaesthesiology and Intensive Care, Uppsala University, Uppsala, Sweden

4 Uppsala Burn Center, Uppsala University Hospital, Uppsala, Sweden.

5 Department of Anaesthesia and Intensive Care Medicine, Helsinki University Central Hospital, Helsinki, Finland

6 ARUP Institute for Clinical & Experimental Pathology, 500 Chipeta Way, Salt Lake City, Utah 84108-1221, USA

7 Department of Pathology, University of Utah School of Medicine, Salt Lake City, USA

8 Department of Chemistry –BMC, Analytical Chemistry and SciLife Lab, Uppsala University, P.O. Box 599, SE-751 24 Uppsala, Sweden

Introduction

Burn injury inevitably leads to changes in the endogenous production of cytokines as well as adrenal and gonadal steroids. Previous studies have reported gender differences in outcome following burn injury, which suggests that gonadal steroids may play a role.

Methods

For this single-center, retrospective descriptive study, we used high-sensitivity liquid chromatography tandem mass spectrometry (LC-MS/MS) based steroid quantification to determine endogenous steroid concentrations in plasma samples of male patients with burn injury.

Results

The median (range) burn surface in the sixteen patients was 32 (15-72) % of total body surface area (TBSA). The median concentrations of testosterone, androstenedione and DHEA were highest on the admission to the burn center. Concentrations of cortisol, corticosterone, 11-deoxycortisol, androstenedione, 17OH-progesterone, 17OH-pregnenolone and pregnenolone correlated positively to the area of the burn injury. During the study period, testosterone concentrations were up to ten times lower than reference values for healthy adult

men, while estrone concentrations were elevated. No difference was observed between patients with severe and moderate burn injury during the first 21 days after injury.

Conclusion

Our data indicate that burn injury alters endogenous steroids biosynthesis, with decreased testosterone concentrations and elevated estrone concentrations during the first 21 days after the injury. In addition, several of the measured steroids were found to correlate positively with the area of the burn injury. Further studies are needed to delineate the underlying mechanisms behind alterations in steroid biosynthesis after burn injury.