A. SALT AND RELATED ISSUES

SODIUM AND CHLORIDE CONCENTRATION OF SWEAT CORRELATE WITH DIETARY SALT INTAKE IN HEALTHY SUBJECTS

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INTRODUCTION AND AIMS: There is increasing evidence that sodium is accumulating in the skin and muscle where it can be stored without being osmotically active. This might suggest that sweat is involved in the control of the human sodium balance, but this has received little attention thus far. The aim of this study was to assess whether changes in sodium intake induce parallel changes in the sodium concentration of sweat in healthy subjects.

METHODS: In this crossover study, we measured the sodium concentration of sweat (Na_sweat) in 12 healthy normotensive volunteers (aged 33.8 ± 11.8 years, 16.7% male) under two levels of dietary sodium intake. Participants followed a high salt (HS) diet (6 gr of salt per day added to their normal diet during 5 days) and, one month later, a low salt (LS) diet (5 days of their normal diet). After each diet, a 24h urine collection was performed, and Na_sweat was measured using a standardized pilocarpine test and the Macroduct sweat collection system. Differences in concentration between the two diets were tested using paired t-tests, and the relationship between 24-hour urinary sodium (Na_urea) and Na_sweat was tested using an analysis of repeated measures of correlation (Rmcorr, R package).

RESULTS: Sweat sodium concentration (Na_sweat) increased from 39.9 ± 22.5 mmol/l under LS to 49.7 ± 19.9 mmol/l under HS conditions (p = 0.05), whereas urinary sodium excretion (Na_urea) increased from 43.2 ± 30.2 mmol to 230.7 ± 89.1 mmol (p < 0.001). The changes in Na_sweat correlated significantly with changes in Na_urea (r_Mcorr = 0.71, p < 0.001; see Figure 1). The chloride concentration in sweat also increased (from 24.4 ± 16.2 to 27.5 ± 12.1 mmol/l), and correlated with Na_sweat (r_Mcorr = 0.9, p < 0.001). The increase in dietary sodium intake was associated with an increase in body weight from 65.7 ± 12.8 to 66.1 ± 11.9 kg (r_Mcorr = 0.63, p < 0.001), without changes of blood pressure (systolic rmcorr = 0.1, p = 0.53, diastolic rmcorr = 0.05, p = 0.8).

CONCLUSIONS: The sodium and chloride concentration of sweat is significantly higher under high salt conditions, suggesting that sweat might play a role in the maintenance of sodium balance in humans. Yet, the Na_sweat concentration in the sweat is highly variable within subjects and the diet-induced change is relatively modest in terms of amount.

Figure: Graphical representation of the repeated measures correlation showing Na_sweat concentration and 24h Na excretion under high salt and low salt conditions of each participant, as well as the corresponding correlation plots.