Differences in Sodium Intake Determine the Blood Pressure Phenotype of Pregnant Rats

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INTRODUCTION

- In pregnancy, plasma volume expansion by high aldosterone levels is considered crucial to maintain an appropriate utero-placental perfusion and to prevent placental ischaemia, a condition linked to maternal arterial hypertension.
- High aldosterone levels support sodium (Na^+) retention.

HYPOTHESIS

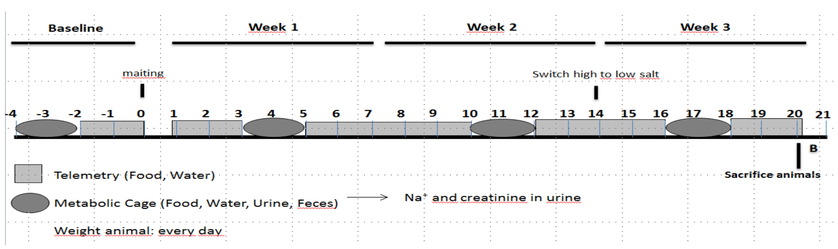
We hypothesise that in pregnancy complementing the aldosterone effects by an appropriate salt intake will lead to an further favourable maternal blood pressure response.

AIMS

1. Identification of blood pressure responses in pregnancy to extremes of salt uptake
2. Assess the impact of sudden changes of salt intake

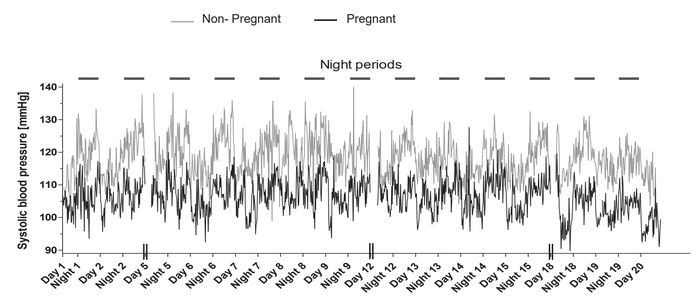
MATERIAL AND METHODS

- Blood pressure was measured by an implanted telemetry device in Sprague-Dawley rats before and throughout pregnancy.
- Upon mating, four experimental groups were set-up and followed by telemetry and metabolic measurements receiving either
  - a normal Na^+ diet (NS; 0.4%),
  - a high Na^+ diet (HS; 8%),
  - a low Na^+ diet (LS; 0.01%) throughout pregnancy, or
  - a high Na^+ diet (8%) for the first 14 days of pregnancy followed by a switch to a low Na^+ diet (0.01%) from gestational day 14 to day 20 (HS/LS).
- On day 20 the animals were sacrificed.
- Food, water and Na^+ intake and urinary excretion of creatinine and Na^+ was recorded.

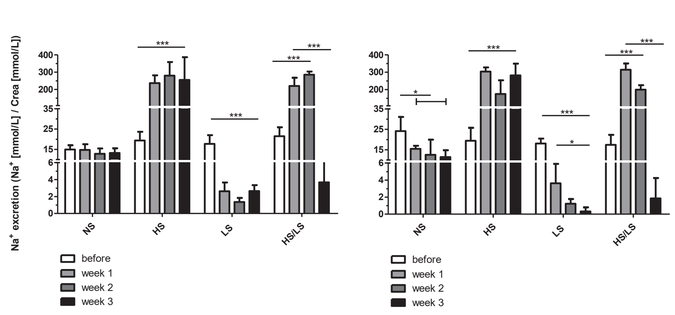


RESULTS

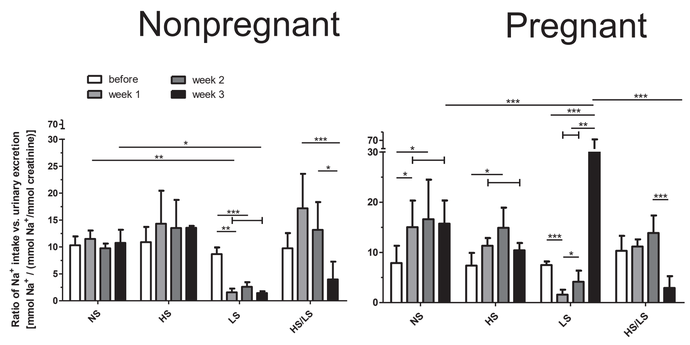
Typical telemetry data obtained during the experimental period



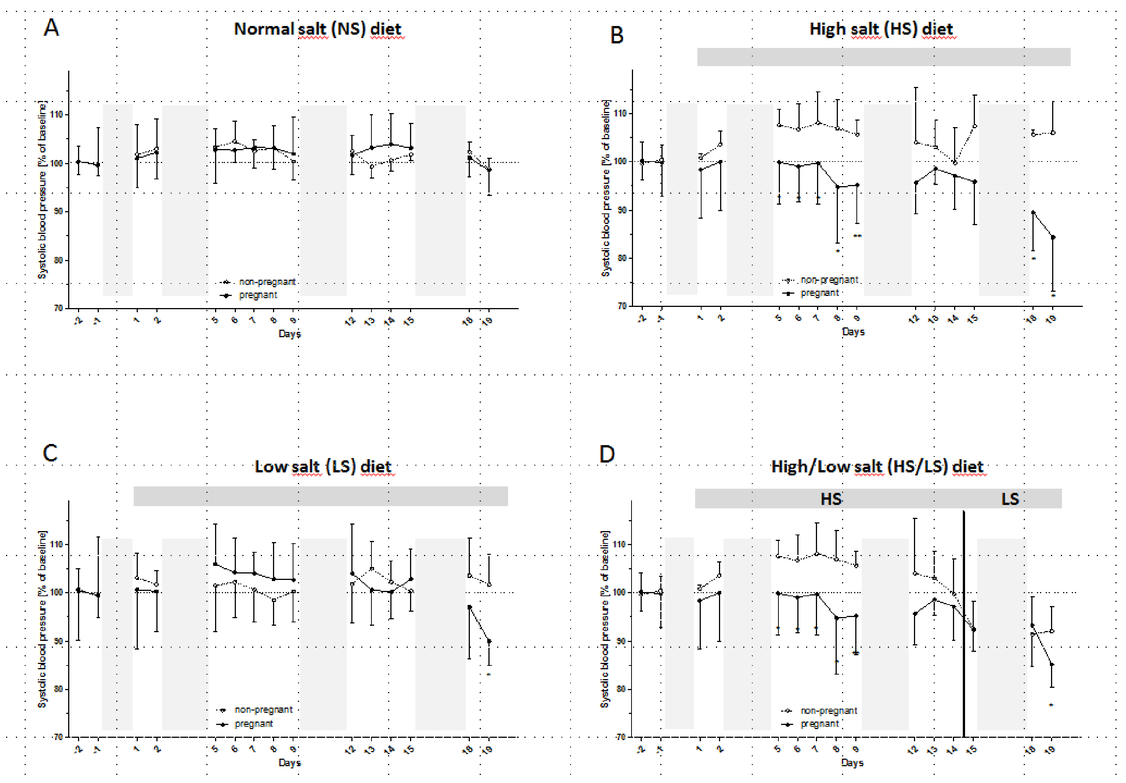
Na^+ excretion is adapted to pregnancy

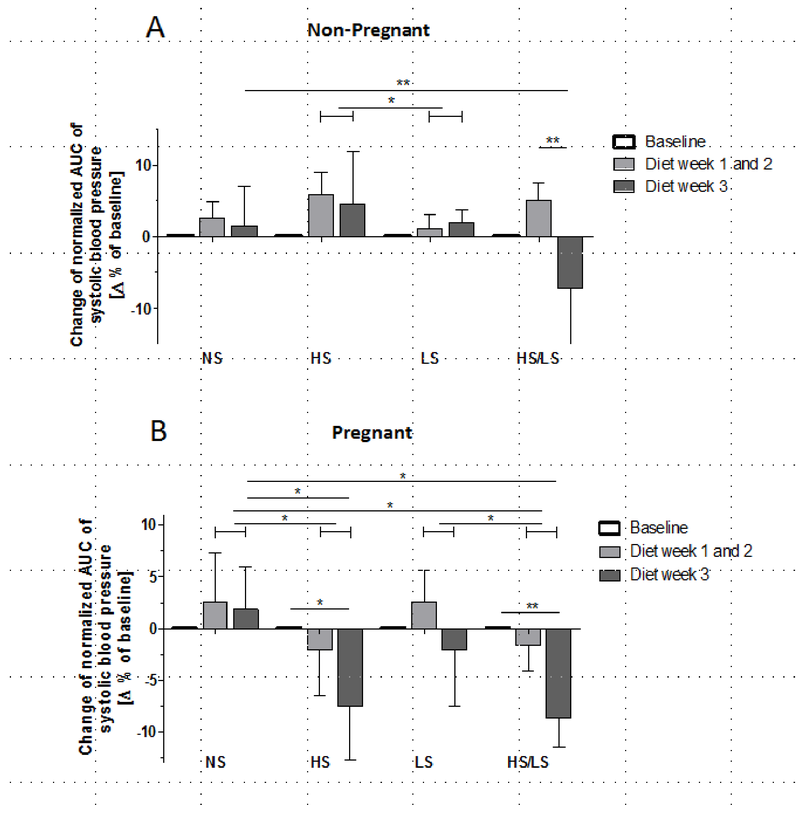


Pregnant rats conserve Na^+

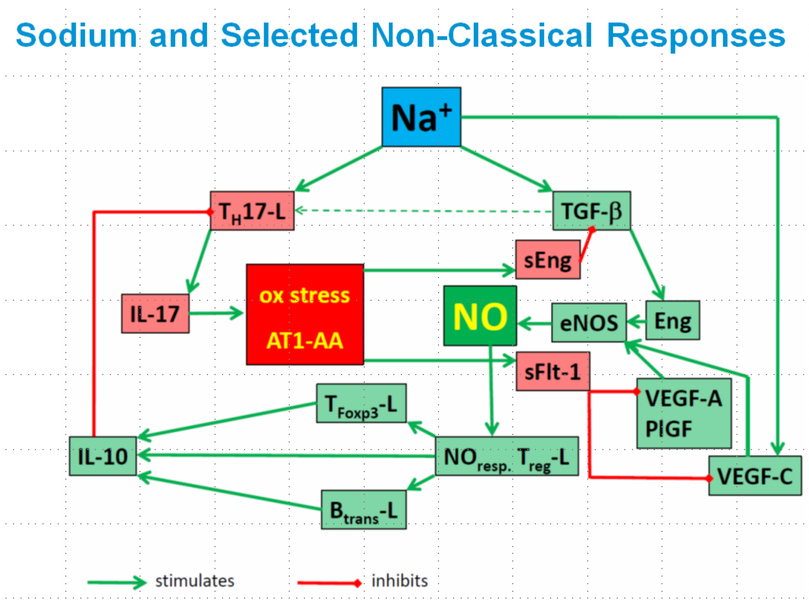


In pregnancy high Na^+ availability coincides with low blood pressure





Proposed mechanism of Na^+ in pregnancy



CONCLUSION

- In conclusion,

pregnancy determines the response to dietary changes in salt intake aiming to preserve salt thus overcoming periods of low salt availability as shown in our HS/LS model.

- An

increased salt intake reduces maternal blood pressure in pregnancy. Though the exact dose and temporal relationship still needs to be elucidated, these results highlight the important role of environmental factors, such as salt, for a successful pregnancy.

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