Salt intake and the risk of heart failure

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Background

• High salt (sodium chloride/NaCl) intake is one of the major causes of high blood pressure and an independent risk factor for coronary heart disease (CHD) and stroke
• In addition to CHD and stroke, hearth failure (HF) is one of the major cardiovascular diseases in Europe and globally
• To the date the role of high salt intake in the development of HF has not been established
Background (cont.)

- High salt intake is one of the major lifestyle-related risk factors for CVD
- WHO recommendation for salt intake is a maximum of 5 grams per day
- Salt is essential for human body but the biological need is only 2-3 grams per day
- In most populations salt intake is higher than the biological need or WHO recommendation
- Estimation of individual salt intake is methodologically challenging
  - Suitable population-based cohorts are rare
  - Sodium extraction is considered as the gold standard for salt intake estimation at individual level. At least 24-hour urine should be collected.
Purpose and key points about methods

• To estimate the relationship of salt intake and the risk of HF
• A large population-based cohort of 4630 men and women aged 25-64 at baseline who participated in the North Karelia Salt Study or the National FINRISK Study between 1979-2002
• Baseline measurements: questionnaire on health behavior, clinical measurements, blood samples, and collection of 24-hour urine sample
• One gram salt intake was calculated as equal of 17.1 mmol sodium excretion
• Twelve-year follow up of an incident HF diagnosis through national health records: Causes of death, hospital discharge and drug reimbursements
• During the follow-up 121 men and women developed new HF
• Cox proportional hazard models were used to estimate the risk of HF at different levels (quintiles) of salt intake
## Results: Hazard ratio of a new HF diagnosis at different levels of salt intake

<table>
<thead>
<tr>
<th>Salt intake (quintiles)</th>
<th>Adjusted for age and sex</th>
<th>+SBP, BMI and S-chol</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st (below 6.77 g/day)</td>
<td>1.0 (reference)</td>
<td>1.0 (reference)</td>
</tr>
<tr>
<td>2nd (6.77-8.80g/day)</td>
<td>0.83</td>
<td>1.13</td>
</tr>
<tr>
<td>3rd (8.81-10.95g/day)</td>
<td>1.40</td>
<td>1.45</td>
</tr>
<tr>
<td>4th (10.96-13.73g/day)</td>
<td>1.70</td>
<td>1.56</td>
</tr>
<tr>
<td>5th (over 13.73g/day)</td>
<td>2.10</td>
<td>1.75</td>
</tr>
<tr>
<td>P for the trend</td>
<td>0.002</td>
<td>0.009</td>
</tr>
</tbody>
</table>
Conclusions

- High salt intake increases the risk of HF markedly
- Salt related increase of HF risk is independent of blood pressure, BMI and serum cholesterol level
- Subjects consuming over 13.7 grams salt daily had two times higher risk of HF, compared to those consuming less than 6.8 grams
  - Due to methodological reasons, these risks observed may be underestimates, e.g. regression dilution bias due to a single baseline measurement
- Optimal salt intake is most probably even lower
- For more detailed risk estimation, larger pooled population cohorts are needed