Pepper or Salt?

Graham A MacGregor
Professor of Cardiovascular Medicine
Wolfson Institute of Preventive Medicine,
Barts and The London School of Medicine & Dentistry
Major Underlying Factors causing Death - Worldwide

Raised Blood Pressure
- Tobacco
- High cholesterol
- Underweight
- Unsafe sex

Raised BP is responsible for
- 62% of all Strokes
- 49% of all Heart Disease

Systolic BP and Risk of Death

The risk starts at systolic 115 mmHg (83% adults)

MacMahon et al. Lancet 1990;335:765-74
Who get the strokes and the heart attacks?

A lot of people with a low risk

= 

A few people with a high risk

From Bruce Neal 2010
Worldwide Strategy for BP
(The most important cause of death & disability)

- Reduce population BP
- Treat raised BP (>140/90 mmHg)
What puts up population BP?

- Salt intake
- Lack of Fruit and vegetables
- Weight
- Lack of Exercise
- (Alcohol excess)
Evidence

- **Epidemiology**: Over 50 population studies and Intersalt
- **Migration**: e.g. Kenya
- **Intervention**: Portuguese villages. New born babies
- **Genetic**: All defects impair ability of the kidney to excrete Na
- **Mechanisms**: Plasma Na, corrected volume expansion
- **Animal**: BP caused or aggravated by salt (e.g. chimpanzees)
- **Treatment**: Meta-analysis. Dose response
- **Mortality studies**: Meta-analysis of cohort studies
- **Outcome trials**: TOHP, Taiwan (mineral salt: high K, low Na)
Dose Response: Meta-analysis (1 month or longer)

- A **6 g/day** reduction in salt intake predicts a **fall in SBP of**:
  - **7 mmHg** in Hypertensives (p<0.001)
  - **4 mmHg** in Normotensives (p<0.01)

↓ Avg. 5 mmHg

J Human Hypertens 2002;16:761
↓ Salt intake 5-6g/day

↓ Stroke 24%  ↓ CHD 18%

UK 35,000 (approx) Stroke & heart attack deaths prevented / year

Worldwide 2.5 million (approx) deaths prevented / year

Meta-analysis of cohort studies

5 g/d ↑salt intake is related to 23% ↑stroke and 17% ↑CVD

<table>
<thead>
<tr>
<th></th>
<th>Stroke</th>
<th>CVD</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 g/d higher salt</td>
<td>23% ↑</td>
<td>17% ↑</td>
</tr>
<tr>
<td></td>
<td>P=0.007</td>
<td>P=0.02</td>
</tr>
</tbody>
</table>

Strazzullo et al. BMJ 2009;339:b4567
Outcome trial

Cumulative Incidence of CVD

TOHP I
Control
Salt reduction

TOHP II
Control
Salt reduction

Follow-up (years)

↓ 25% Salt intake (↓ 2.5 g/d) → ↓ 25% CVD events

Cook et al. BMJ 2007;334:885
Summary

Salt intake (9-12 g/day)

- Population BP, rise in BP with age, hypertension
- Other effects e.g. stomach cancer, stroke, LVH, kidney disease, osteoporosis etc

Reduce salt intake

- from 9-12 g/day to 5–6 g/day
Reducing salt intake

Who is responsible?

• Public
• Government
• Food industry

Developed countries 80% salt passive

∴ Food industry is responsible & must take it out
Hidden Salt – Its Commercial Value

SALT

Producers (40% by value) → Profit

Food Industry
Highly Salted Processed Food

Dependence on salty taste (Salt Addiction)

Salt ↑

Demand for very salty foods ↑

Profit

Salt ↑

Soft Drinks
Mineral Water

Thirst ↑

Salt ↑

Meat products + Salt
Water Binding ↑

Weight No Cost

Profit

Profit

Profit
# Sea Water Comparison

(1.0 g of sodium / 2.5g of salt per 100g)

<table>
<thead>
<tr>
<th>Food</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pizza</td>
<td>60%</td>
</tr>
<tr>
<td>Chicken Curry</td>
<td>60%</td>
</tr>
<tr>
<td>Processed Cheese</td>
<td>130%</td>
</tr>
<tr>
<td>Bacon</td>
<td>200%</td>
</tr>
<tr>
<td>Sausages</td>
<td>100%</td>
</tr>
<tr>
<td>Smoked Fish</td>
<td>190%</td>
</tr>
<tr>
<td>Sweet Pickle</td>
<td>170%</td>
</tr>
<tr>
<td>Shepherds Pie</td>
<td>40%</td>
</tr>
<tr>
<td>Frozen Prawns</td>
<td>80%</td>
</tr>
<tr>
<td>Crisps</td>
<td>110%</td>
</tr>
<tr>
<td>Salad Cream</td>
<td>100%</td>
</tr>
<tr>
<td>Savoury Biscuits</td>
<td>70%</td>
</tr>
<tr>
<td>Medium Sliced White</td>
<td>50%</td>
</tr>
<tr>
<td>Granary Loaf</td>
<td>60%</td>
</tr>
<tr>
<td>Crumpets</td>
<td>80%</td>
</tr>
<tr>
<td>Digestive</td>
<td>60%</td>
</tr>
<tr>
<td>Cream Crackers</td>
<td>60%</td>
</tr>
<tr>
<td>Cheddar Cheese</td>
<td>70%</td>
</tr>
<tr>
<td>Stilton Cheese</td>
<td>90%</td>
</tr>
<tr>
<td>Processed Cheese</td>
<td>130%</td>
</tr>
<tr>
<td>Branflakes</td>
<td>100%</td>
</tr>
<tr>
<td>Cornflakes</td>
<td>110%</td>
</tr>
<tr>
<td>Tomato Ketchup</td>
<td>110%</td>
</tr>
<tr>
<td>Brown Sauce</td>
<td>100%</td>
</tr>
</tbody>
</table>

Above data collected 2001, n.b. most have been reduced by 10 – 30% (2008) UK only
How?

• Slowly 10-30% per year
• No taste problems
• Almost no technical problems
• Voluntary but threat of legislation
• Clear labelling
Hidden Salt in food
e.g. processed, fast, takeaway, restaurant food

Food industry slowly reduce
- No rejection by public

Fantastic for Public Health

Very little cost
↓ BP
No need to change diet
## CASH Strategy for Reducing Salt in UK

<table>
<thead>
<tr>
<th>Source</th>
<th>Salt intake (g/day)</th>
<th>Reduction needed</th>
<th>Target intake (g/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table/Cooking (15%)</td>
<td>1.4</td>
<td>40% reduction</td>
<td>0.9</td>
</tr>
<tr>
<td>Natural (5%)</td>
<td>0.5</td>
<td>No reduction</td>
<td>0.5</td>
</tr>
<tr>
<td>Food industry (80%)</td>
<td>7.6</td>
<td>40% reduction</td>
<td>4.6</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>9.5</strong></td>
<td></td>
<td><strong>Target 6.0 g</strong></td>
</tr>
</tbody>
</table>

::: the food industry needs to slowly reduce salt content of all foods by 40% over the next decade.
Targets set in UK by FSA & CASH

• Set targets for industry to achieve from 2005 to 2010. New targets set for 2012 over 80 categories of food

• Gradual reduction, 10-20% a year. No rejection by public

• Continuous media publicity to ensure industry collaborate

• Praise companies achieving targets, name and shame those not
Success UK by 2008

24h urinary sodium in a random sample of adults has fallen by 2008 (i.e. within 2 years of starting salt reduction)

from 9.5 to 8.6 g/d salt (10% ↓)

(i.e. 26,000 tons/yr salt removed)

≈ 6000 deaths/yr - strokes, heart attacks saved

Salt intake should reach less than 6 g/d target around 2014
NICE Public Health Guidance
Prevention of CVD at population level

The voluntary agreement came into force in 2004 and was followed by progressive targets (in 2006 and 2009). The campaigns, which cost just £15 million, led to ≈ 6000 fewer CVD deaths per year, saving the UK economy ≈ £1.5 billion per annum.

http://guidance.nice.org.uk/PH25
Salty bread ‘risking 7,000 lives’

Scientists prove that salty diet costs lives

15-year study shows link to heart disease

Calls grow louder for nationwide campaign

Nigel Hawkes Health Editor

Eating less salt reduces the chances of suffering a heart attack or stroke, the first long-term study of salt’s impact on health confirms today. The findings, from a 15-year study, offer the clearest evidence yet that cutting salt consumption saves lives by reducing the risks of cardiovascular disease. People who ate less salty food were found to have a 25 per cent lower risk of cardiac arrest or stroke, and a 20 per cent lower risk of premature death. The results, published in the British Medical Journal, underline the need for population-wide salt reductions in the diet, the scientists conclude. Despite campaigns to reduce salt...
Killing softly with salt

Strokes, heart attacks; high blood pressure: it’s not good news, especially for the young who are consuming up to six times more than they should.

Hugh Davies reports.
Salad Survey 2010 – Highest and lowest tables
(Data was collected from product packaging in store during August 2010, all figures are based on figures including dressings. See CASH website for further details)

1. Simple Swaps

<table>
<thead>
<tr>
<th>High product</th>
<th>Salt content (g) / portion</th>
<th>Low alternative product</th>
<th>Salt content (g) / portion</th>
<th>Difference (g)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASDA Chicken and Bacon Caesar Pasta (240g)</td>
<td>1.9</td>
<td>ASDA Tomato and Chicken Pasta (270g)</td>
<td>0.5</td>
<td>1.4</td>
</tr>
<tr>
<td>Boots Delicious... Chicken Fajita Pasta salad (271g)</td>
<td>1.4</td>
<td>Boots Delicious... Honey and Mustard Chicken Pasta Salad (224g)</td>
<td>0.7</td>
<td>0.70</td>
</tr>
<tr>
<td>Café Nero Tuna &amp; Cannellini Bean Salad (256g)</td>
<td>1.6</td>
<td>Café Nero Chicken &amp; Orzo Pasta Salad (228g)</td>
<td>0.5</td>
<td>1.10</td>
</tr>
<tr>
<td>EAT Spicy Crayfish Noodles</td>
<td>3.51</td>
<td>EAT Superfood (with Dressing)</td>
<td>0.6025</td>
<td>2.91</td>
</tr>
<tr>
<td>Marks &amp; Spencer A Taste of Asia, Lochmuir Smoked Salmon Rice Salad, Asian Style Vegetables Salad, Edamame Soya Beans, 2 Cucumber Mandi with a Soy &amp; Lime Dressing (258g)</td>
<td>2.83</td>
<td>Marks and Spencer Simply Fuller Longer King Prawns with Mixed Rice &amp; Lentils &amp; a Sweet Chilli &amp; Coriander Dressing (230g)</td>
<td>0.80</td>
<td>2.03</td>
</tr>
<tr>
<td>McDonald's Crispy Chicken &amp; Bacon Salad (with Low Fat Caesar Salad Dressing)</td>
<td>2.6</td>
<td>McDonald's Grilled Chicken Salad (with Low Fat Balsamic dressing)</td>
<td>1.7</td>
<td>0.9</td>
</tr>
<tr>
<td>Pret A Manger Super (Duper) Houmous Salad (with Dressing)</td>
<td>3.2</td>
<td>Pret A Manger No Bread Tricolore (with Dressing)</td>
<td>0.2</td>
<td>3.00</td>
</tr>
<tr>
<td>Sainsbury’s Greek Salad Tabouleh (277g)</td>
<td>1.59</td>
<td>Sainsbury’s Be Good To Yourself Orzo Sunbaked Tomato Salad (270g)</td>
<td>0.26</td>
<td>1.33</td>
</tr>
<tr>
<td>Subway Sweet Onion Teriyaki (with Sweet Onion Sauce) (434g)</td>
<td>2.1</td>
<td>Subway Chicken Breast (with Honey Mustard Sauce)</td>
<td>1.3</td>
<td>0.8</td>
</tr>
<tr>
<td>Tesco Cheese and Tomato Pasta (300g)</td>
<td>2</td>
<td>Tesco Chicken, Tomato and Basil Pasta (350g)</td>
<td>0.7</td>
<td>1.30</td>
</tr>
<tr>
<td>The Co-operative Chicken &amp; Bacon Pasta Salad</td>
<td>1.3</td>
<td>The Co-operative Healthier Choice Sweet Chilli Chicken Noodle Salad (limited edition)</td>
<td>0.6</td>
<td>0.70</td>
</tr>
<tr>
<td>Waitrose Special Edition King Prawn Thai Rice Salad (230g)</td>
<td>2.25</td>
<td>Waitrose Special Edition Poached Salmon Pasta Salad (220g)</td>
<td>0.91</td>
<td>1.34</td>
</tr>
</tbody>
</table>
FEELING BLOATED AFTER A SALAD LUNCH? HIDDEN SALT MAY BE TO BLAME.

OPTING FOR A SALAD FOR LUNCH COULD RESULT IN YOU UNKNOWINGLY CONSUMING OVER HALF YOUR MAXIMUM RECOMMENDED DAILY SALT INTAKE AND CAUSING THAT BLOATED FEELING

26.08.10. A survey of 270 salad and pasta bowls from supermarkets, high street cafes and fast food chains found that whilst we should eat less than 6 grams of salt a day, a salad can unexpectedly give you more than half of your daily maximum intake. The new research, carried out by Consensus Action on Salt and Health (CASH), has found surprisingly high levels of salt hidden in salads [Ref 1] with one in ten salads containing more salt than a Big Mac [Ref 2].

The worst offender, a Spicy Crayfish Noodle salad from EAT., contains a massive 3.51g of salt per portion which is over 17 times saltier than a Pret No Bread Tricolore with Balsamic Dressing which contains just 0.2g salt per portion.

The 5 saltiest high street café/fast food salads are:

- EAT Spicy Crayfish Noodles (3.51g salt per portion)
- Pret Super (Duper) Humous Salad with French Dressing (3.2g salt per portion)
- KFC Zinger Salad with Caesar Dressing or Low Fat Vinaigrette Dressing (3.1g salt per portion)
Media coverage

SALT SHAKER
Some High Street salads are saltier than a Big Mac

Daily Mail
Is your lunchtime salad less healthy than a Big Mac or a Mars Bar?
World Action on Salt & Health
>400 members, >80 countries

**Worldwide:**

- Highlight foods high in salt
- Implement salt reduction plan
- Working with WHO

**Individual Countries:**

- Facilitate expert groups (similar to CASH) e.g. Canada, Australia
- Convince government of evidence, action by food industry
- Public health campaign to ↓ salt consumption at home

To join, please contact wash@qmul.ac.uk

http://www.worldactiononsalt.com
Summary

1. ↓Salt intake → ↓BP → ↓Stroke
   ↓Heart Attacks
   ↓Heart Failure
   ↓Stomach Cancer & Osteoporosis

2. ↓Salt intake (cheap/practical) →
   “Biggest improvement in public health since clean water and drains (19th Century)”