Institute of Medicine of the National Academies Food and Nutrition Board

Consensus Committee on Strategies to Reduce Sodium Intake

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Centers for Disease Control and Prevention

Open Session, Washington DC, January 13, 2009
Prevention and Control of High Blood Pressure - Key Topics

- Public Health Perspective
- Salt, Blood Pressure, and CVD
- Reducing Sodium Intake
- Calls for Action
- Action by CDC
- Recommended Levels of Intake
- Role of the Food Industry
- Unanticipated Adverse Consequences
- Statement of Task
Public Health Perspective
Among persons with high blood pressure:

- The proportion with controlled blood pressure (now <140/<90) has improved, but is seriously inadequate.
For major population subgroups:

- Marked disparities persist in both prevalence and control of high blood pressure
## Prevalence and Control of High Blood Pressure in Major Subgroups

<table>
<thead>
<tr>
<th></th>
<th>NHW</th>
<th>MA</th>
<th>NHB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Prevalence</strong></td>
<td>34%</td>
<td>30%</td>
<td>44%</td>
</tr>
<tr>
<td>2004</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td>37%</td>
<td>25%</td>
<td>34%</td>
</tr>
<tr>
<td>1999-2004</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 72,600,000 total
** >46,000,000 UNcontrolled

Source – CDC, NIH data in AHA Statistical Update 2007
### High Blood Pressure (%) among persons 20 years and over – U.S., 1988-94 and 2001-04

<table>
<thead>
<tr>
<th></th>
<th>1988-94</th>
<th>2001-04</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>25.5</td>
<td>30.9</td>
</tr>
<tr>
<td>WM</td>
<td>25.6</td>
<td>29.3</td>
</tr>
<tr>
<td>BM</td>
<td>37.5</td>
<td>41.5</td>
</tr>
<tr>
<td>WF</td>
<td>23.0</td>
<td>29.0</td>
</tr>
<tr>
<td>BF</td>
<td>38.3</td>
<td>44.3</td>
</tr>
</tbody>
</table>

*Health, United States, 2007*
### Blood Pressure by Age for Children and Adolescents Aged 8-17 years

#### Mean (SE) Systolic Blood Pressure, mmHg

<table>
<thead>
<tr>
<th>Age group, y</th>
<th>1988-1994</th>
<th>1999-2000</th>
<th>Difference Between Years</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-12</td>
<td>100.6 (0.46)</td>
<td>102.5 (0.54)</td>
<td>+1.9 (0.68)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>13-17</td>
<td>108.4 (0.42)</td>
<td>109.4 (0.34)</td>
<td>+1.0 (0.52)</td>
<td>.09</td>
</tr>
</tbody>
</table>

#### Mean (SE) Diastolic Blood Pressure, mmHg

<table>
<thead>
<tr>
<th>Age group, y</th>
<th>1988-1994</th>
<th>1999-2000</th>
<th>Difference Between Years</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-12</td>
<td>54.9 (0.54)</td>
<td>59.7 (0.76)</td>
<td>+4.8 (0.93)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>13-17</td>
<td>61.8 (0.50)</td>
<td>63.5 (0.49)</td>
<td>+1.7 (0.70)</td>
<td>.02</td>
</tr>
</tbody>
</table>

Source - Muntner et al., JAMA 2004;291:2107-2113
Current Status of Blood Pressure Control – Global Dimensions

- *Europe* – Higher prevalence (44% v 28%), lower proportion controlled (8% v 23% @ 35-64 years)
- *Global picture* – 972,000,000 with high blood pressure (>25% of the adult population)
Impact and Magnitude of the Problem

- 62% of strokes and 49% of CHD events attributed to elevated BP*
- 26% of adults worldwide (972 million) have hypertension**
- Estimated lifetime risk of developing hypertension is 90%***

*WHO, World Health Report 2002: Reducing Risks, Promoting Healthy Life,
Salt, Blood Pressure, and Cardiovascular Disease
Sodium Dose Response Trials: DASH Sodium Trial

Systolic Blood Pressure

Control Diet
+6.7
p<.0001

DASH Diet
+3.0
P<.0001

Population-Based Strategy: SBP Distributions

Before Intervention

After Intervention

Reduction in BP

<table>
<thead>
<tr>
<th>Reduction in SBP</th>
<th>% Reduction in Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>mmHg</td>
<td>Stroke</td>
</tr>
<tr>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>5</td>
<td>14</td>
</tr>
</tbody>
</table>

## Effects of Reduced Na on CVD Events: Results from 3 Randomized Trials

<table>
<thead>
<tr>
<th>Study</th>
<th>Intervention</th>
<th>Outcome</th>
<th>FU</th>
</tr>
</thead>
<tbody>
<tr>
<td>TONE (2001) 639 Elderly</td>
<td>↓ Na</td>
<td>21% ↓ CVD events</td>
<td>2.3 yrs</td>
</tr>
<tr>
<td>Taiwan Veterans (2006) 1,981 Elderly</td>
<td>↓ Na /↑ K Salt</td>
<td>41%* ↓ CVD Mortality</td>
<td>2.6 yrs</td>
</tr>
<tr>
<td>TOHP Follow-up (2007) 3,126 Prehypertensives</td>
<td>↓ Na</td>
<td>30%* ↓ CVD events</td>
<td>10-15 yrs</td>
</tr>
</tbody>
</table>

* *p<0.05
Reducing Sodium Intake
FIGURE 4. Sources of Dietary Sodium

The relative amounts of dietary sodium in the American diet.

- 77% Food Processing
- 12% Naturally Occurring
- 6% At the Table
- 5% During Cooking

Calls for Action
Interventions should focus on three main pillars:

- **product reformulation** (the main focus should be on the highest reduction possible in the salt content of commercialized foods and meals)
- **consumer** (including improving nutritional education about the deleterious effects of excessive salt consumption on how to read the labels and choose healthier foods)
- **the environment** (by building an environment where choosing the healthiest foods is the easiest and most affordable option to population groups at all socioeconomic levels).
AMA Policy Recommendations

- Minimum of 50% reduction of sodium in processed and restaurant foods over the next decade
- Removal by the FDA of the GRAS status of sodium
- Better sodium product labeling; warnings for foods high in sodium
- Exploration by FDA of all options to reduce sodium
- National consumer education initiative on sodium

Source: Report 10 of the Council on Science and Public Health (A-06)
Promotion of Healthy Lifestyles I: Reducing the Population Burden of Cardiovascular Disease by Reducing Sodium Intake
Sample Food Label, U.S.

<table>
<thead>
<tr>
<th>Nutrition Facts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Serving Size</strong>: 6 oz</td>
</tr>
<tr>
<td><strong>Servings Per Container</strong>: 25</td>
</tr>
<tr>
<td><strong>Amount Per Serving</strong></td>
</tr>
<tr>
<td>Calories: 690</td>
</tr>
<tr>
<td>% Daily Value</td>
</tr>
<tr>
<td>Total Fat: 3g</td>
</tr>
<tr>
<td>Saturated Fat: 3g</td>
</tr>
<tr>
<td>Cholesterol: 120mg</td>
</tr>
<tr>
<td><strong>Sodium</strong>: 408mg</td>
</tr>
<tr>
<td>Total Carbohydrate: 109g</td>
</tr>
<tr>
<td>Dietary Fiber: 3g</td>
</tr>
<tr>
<td>Sugars: 27g</td>
</tr>
<tr>
<td>Protein: 43g</td>
</tr>
</tbody>
</table>

| Vitamin A: 2% | Vitamin C: 3% |
| Calcium: 3% | Iron: 10% |

* Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

<table>
<thead>
<tr>
<th>Calories</th>
<th>2,000</th>
<th>2,500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Fat</td>
<td>Less than 65g</td>
<td>80g</td>
</tr>
<tr>
<td>Sat Fat</td>
<td>Less than 20g</td>
<td>25g</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>Less than 300mg</td>
<td>300mg</td>
</tr>
<tr>
<td>Sodium</td>
<td>Less than 2,400mg</td>
<td>2,400mg</td>
</tr>
<tr>
<td>Total Carbohydrate</td>
<td>300g</td>
<td>375g</td>
</tr>
<tr>
<td>Dietary Fiber</td>
<td>25g</td>
<td>30g</td>
</tr>
</tbody>
</table>

Calories per gram:
- Fat 9
- Carbohydrate 4
- Protein 4
Effects of Reducing Sodium by 50% in Processed and Restaurant Foods

- A decline of at least 5 mm Hg in mean systolic blood pressure
- A decline of up to 20% in hypertension prevalence
- A decline of at least 9% in coronary heart disease deaths
- A decline of at least 14% decline in deaths from stroke
- A decline of at least 7% in mortality from all causes
  - resulting in at least 150,000 lives saved annually

Recommendations for Major Reductions in Sodium

Organizations
National Research Council
National Institutes of Health
National HBP Education Program CC
Joint National Committee 7
U.S. Department of Health and Human Services
U.S. Department of Agriculture
National Academy of Sciences
American Medical Association
American Heart Association
American Public Health Association
Center for Science in the Public Interest
World Health Organization
World Hypertension League

Countries
Finland
United Kingdom
Australia
Ireland
New Zealand

1. <2,300 mg/day
2. <2,300 mg/day under age 50; <1,500 mg/day for 50-70, hypertensives, and blacks; <1,200 mg/day for age 70+
3. Minimum 50% reduction in processed and restaurant foods
4. <2,000 mg/day
CDC activities include:

- Providing testimony to FDA
- Comment on sodium as GRAS, labeling
- National Forum policy statement
- Guidance to state programs
- Consultation with WHO and others
- Co-sponsor ASTHO/CSPI meeting
- Attend industry-sponsored meetings
- Expand scientific literature
Current Status of Blood Pressure Control - Conclusions

- Prevention of high blood pressure at the population level is an urgent priority – control alone will not suffice.
Reducing sodium content of foods is a necessary and urgent strategy for blood pressure control and for prevention of heart disease, stroke, and other cardiovascular disease.
Recommended Na Intakes for the US

- 2300 mg Na/d (2005 DGs)
- 1500 mg Na/d for A-A, middle-aged and older adults, and adults with increased BP
- Current intakes ~ 3500 mg Na/d (NHANES 2005-2006)
Potential Role of the Food Industry

- History of Na in the food supply - 1924
- Elimination of other micronutrient deficiency diseases
- Current efforts
  - Food labels
  - Front of package labels
  - BBB Children’s food and beverage advertising initiative
Iodized Salt in the US

Morton develops Iodized salt to help prevent goiters, which were common at the time. The Food and Drug Administration later requests that the product be labeled with the message, “This salt provides iodide, a necessary nutrient.”

1924
The Iodine Dilemma

- Median cutpoints for I sufficiency
  150 µg/L pregnant, 100 µg/L non-pregnant
- Current levels
  153 µg/L pregnant, 124 µg/L non-pregnant; pregnant 15-19yo 137 µg/L
- 50% decrease between NHANES I and III
- Swiss model: 90% table salt and 70% salt in processed foods iodized
Charge to IOM Committee

- Dietary intake of sodium and the primary sources of sodium in the US population overall and by life stage, gender, and ethnicity.
Charge to IOM Committee

- Functions of sodium in foods and how these functions relate to product development, consumer preferences and health, e.g., the extent to which tastes drive product development and consumption.
Charge to IOM Committee

- Understandings about the physiology of taste and sensitivity, and their interface with consumer behavior and taste preferences.
Charge to IOM Committee

- Potential of food technology to develop innovative alternatives to current sodium usage in processed foods, taking into account the physiology of taste as well as consumer behaviors and preferences.
Charge to IOM Committee

- Factors that could affect sodium reduction strategies, e.g., the role of taste in product development, adaptability related to salt taste and sensitivity, age of intervention, marketing strategies that may affect sodium intake, co-variance of consumption of certain foods.
Charge to IOM Committee

- Potential unanticipated consequences, e.g., considerations focused on iodized salt and iodine deficiency.
Charge to IOM Committee

- Sodium reduction efforts in other countries, including cost-effectiveness of interventions.
Charge to IOM Committee

- Policy levers such as regulation (including labeling), investment of public monies, education, incentives, support for local capacity, health professional role, industry codes of conduct, research, monitoring progress (accountability), and leadership.
Charge to IOM Committee

- Options for public-private partnerships in the context of fostering creative and innovative approaches and programs ranging from basic and consumer research to planning for and implementing sodium reduction in diverse populations.
Thank you

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Sodium Recommendations, DGA 2005

- For *general population*:  
  - Consume less than 2,300 mg of sodium per day  
    (approximately 1 tsp of salt)

- For *special groups* (individuals with hypertension, blacks, and middle-age or older adults):  
  - Consume no more than 1,500 mg of sodium per day