



POLICY- SODIUM

Policy Goal:

Given that the Institute of Medicine of the National Academies has established a daily Adequate Intake (AI) for sodium of 1200 mg and a daily Tolerable Upper Intake Level (UL) of 2300 mg for healthy adults¹, and these values have been adopted by the Canadian and American governments for setting public health policy, the goal is to have Canadian adults reduce their sodium intake to within this range.

Rationale:

- The World Health Organization estimates hypertension is the leading risk factor for death.
- Hypertension is the most frequent diagnosis for Canadian adults visiting a family physician.
- Antihypertensive therapy is one of the most expensive categories of medications.
- In Canada almost 46% of women and 38% of men aged 60 and over are taking antihypertensive medications.
- Hypertension is a multi-factorial condition associated with obesity, family history, physical inactivity, alcohol, smoking and dietary factors, including high sodium intake.
- Limited attention has been focused on the importance of reducing dietary sodium as a key measure in reducing the risk for and management of hypertension.
- The average Canadian diet contains about 3500 mg of sodium per day.
- The Tolerable Upper Intake Level for sodium intake for health is 2300 mg per day as recommended by the Institute of Medicine of the National Academies¹.
- It is estimated that one million Canadians have hypertension caused by excess dietary sodium and that this generates more than 430 million dollars per year in direct health care costs.
- Reducing dietary sodium intake within the context of a healthy diet can substantially reduce the incidence of hypertension among Canadians who have normal blood pressure. Therefore a population health approach to reducing dietary sodium is an appropriate strategy.

Policy Recommendations:

- To ensure an intake of sodium conducive to health, Blood Pressure Canada and the endorsing organizations recommend that the Canadian government:
 - 1) Achieve the goal of reducing adult Canadian's sodium intake to between 1200 and 2300 mg per day by January 1, 2020¹.
 - 2) Set graduated targets for sodium levels according to food categories.
 - 3) Monitor and report on progress toward achieving sodium food targets by 2012 and 2016.
 - 4) Establish effective and timely monitoring systems to track sodium levels in the diets of Canadians. Report on these levels in 2012, 2016, and 2020.
 - 5) Educate Canadians about the health risks of high dietary sodium and how to reduce their sodium intake within the context of a healthy diet.
 - 6) Work with other levels of government and stakeholders to create supportive environments, including incentives to the food industry, leading to the reduction of sodium in the Canadian diet.
 - 7) Establish a multi-sectoral task force to facilitate and accelerate the achievement of the sodium intake goal.

¹ See Table 2 for specific sodium values by age group

- To ensure health professionals understand the need to reduce dietary sodium to recommended levels, Blood Pressure Canada and the endorsing organizations recommend that health professional organizations educate their memberships about:
 - 1) the health risks of excess dietary sodium
 - 2) how to reduce sodium intake within the context of a healthy diet
 - 3) how to counsel their patients/clients to reduce sodium intake

Background:

The World Health Organization estimates hypertension to be the leading risk factor for death in the world (1). This is partly because hypertension is common, occurring in nearly one quarter of the world's adult population (1), and also partly because management of hypertension is sub-optimal. Significant proportions of hypertensive patients in Canada are unaware that their blood pressure is elevated, and many of those patients that are aware are either untreated, or under-treated (2). As such, only a small minority of hypertensive patients are treated to recommended targets (2).

In Canada and the United States, hypertension is the most frequent diagnosis for an adult visiting a family physician. Antihypertensive drug therapy represents one of the most expensive categories of drug therapy. The World Health Organization and national organizations have called for enhanced diagnosis, treatment, and control of hypertension as a cost-effective way to reduce morbidity and mortality (3). Improving the management of hypertension, however will require extensive resources and will have substantive costs which may be unaffordable in an aging population (4). Currently in Canada almost 46% of women and 38% of men aged 60 or over are taking antihypertensive drug therapy (5).

While hypertension is a multi-factorial condition associated with obesity, family history, physical inactivity, alcohol consumption, smoking and dietary factors, including high sodium intake (6-8), limited attention has been focused on the importance of reducing dietary sodium as a key measure in reducing the risk for hypertension. Most Canadians consume far more sodium than is necessary for health. Results from the 2004 Canadian Community Health Survey (CCHS)–Nutrition indicate that among people aged 19 to 70 over 85% of men and 60% of women had sodium intakes exceeding the recommended upper intake level. Males consumed more sodium than females, with intakes above 4000mg/day for males and above 2700 mg/day for females aged 19-30 years (9)

National guidelines have emphasized the importance of lifestyle modification counseling to patients for both prevention of hypertension and management of patients who have developed hypertension (8;10). However, even within rigorous clinical trials with extensive resources for individualized counseling, only modest improvements in the prevention of hypertension have been seen (11). Further, despite national and international recommendations to the public to improve diet, physical activity, and maintain a healthy body weight, there is an epidemic of obesity related to poor dietary habits and a lack of physical activity (12). While lifestyle modifications need to be the cornerstone of effective management and prevention of hypertension, there is growing awareness that effective public health interventions should be based on more comprehensive approaches. A comprehensive approach addresses multiple levels including intrapersonal factors (motivation, skills), interpersonal processes (social supports, social norms), organizational factors (workplace policies), community factors and public policy (voluntary and/or regulatory measures, tax Incentives) (13). A broad strategy with appropriate supporting policy and regulation that addresses the key determinants of health including: physical activity, other dietary factors and healthy weights is required (14). While steps are being taken to address some of these issues, the issue of dietary sodium is not addressed by any other strategy to date.

Many international and national organizations have called for reductions in dietary sodium as a means to manage and prevent hypertension. Examples of these recommendations include:

- One of the few recommendations made by the World Health Organization (WHO) to improve the health of populations was to reduce dietary sodium (3). The WHO has called on governments to introduce regulations on sodium additives to food (3). Recently, a WHO sponsored meeting recommended dietary sodium intake should be less than 2000 mg/day (15).
- International and national cardiovascular organizations have advised reductions in dietary sodium intake.
 - The American Heart Association (16) and the American Public Health Association have called for 50% reductions in sodium additives to food;
 - The American Medical Association has requested that the American government remove sodium from the 'generally recognized as safe' category (17).
 - Similarly, in the United Kingdom the Scientific Advisory Committee on Nutrition has recommended substantial reductions in dietary sodium (18).
- The Canadian and American governments have 'adopted' the Adequate Intakes of sodium and Tolerable Upper Intake Levels of dietary sodium intake as recommended by the Institute of Medicine (IOM) (19) as being compatible with health. Many other governments in developed countries (20) have made similar recommendations. To reduce the intake of dietary sodium by Canadians to within this range would require a significant reduction of sodium in the food supply.

Reduction in sodium intake is a mechanism by which the mean blood pressure of the Canadian population could be lowered. Meta-analyses have indicated that a 'modest' 1840 mg /day reduction in dietary sodium would reduce blood pressure by 5.1/2.7 mmHg, with more aggressive dietary sodium reduction resulting in even greater blood pressure lowering (21;22). As such, reduction in dietary sodium intake at a population level, by reducing the addition of sodium to foods, is a highly attractive method for reducing mean blood pressure within the population and could reduce the prevalence of hypertension by up to 30% (23;24) (table 1). A reduction of systolic blood pressure by 5 mmHg is estimated to prevent 1 in 7 stroke deaths, 1 in 11 coronary deaths, and overall 1 in 14 deaths from any cause (10). It is estimated that reducing dietary sodium by 1840 mg would result in more than one million Canadians with hypertension having normal blood pressure and save over 400 million dollars per year in health costs just as a result of a reduced need for physician visits for hypertension, laboratory tests and drug costs (23).

Table 1: The potential reduction in death and hypertension from a reduction in dietary sodium of 1840 mg/day in Canada

| Disease | Benefit |
|-----------------------------------|--|
| Death from Stroke | 1 in 7 deaths prevented |
| Death from Coronary Heart Disease | 1 in 11 deaths prevented |
| Death from any cause | 1 in 14 deaths prevented |
| Hypertension | 1 in 6 cases of hypertension prevented |

The average Canadian diet contains about 3500 mg of sodium /day (9).² According to a document produced by the Institute of Medicine of the National Academies (25) with input from Canadian and American scientists, 1500 mg sodium/day was specified as the Adequate Intake (AI) for people aged 9-50 years. Although it was recognized that sodium balance can be maintained on sodium intakes that are considerably lower (e.g. 500 mg of sodium/day), these very low intakes were not selected as recommended intakes for three reasons:

- With the current North American food supply it is not possible to meet recommended intakes for other nutrients when sodium intakes are that low;
- Some studies have detected adverse effects on blood lipid concentrations when sodium intake is extremely low; and
- An intake of 1500 mg/d allows for sodium loss in sweat for those who are moderately physically active. Recommendations for adequate sodium intake by age are in table 2. Some Canadians may require higher or lower sodium intakes for health.

² Estimated intake is 3119 mg/day plus sodium added at the table and in cooking or about 3500 mg/day

Table 2: Recommendations for adequate sodium intake by age

| Age | Sodium Intake per Day (mg) |
|---------------|----------------------------|
| 0 – 6 months | 120 |
| 7 – 12 months | 370 |
| 1 – 3 years | 1,000 |
| 4 – 8 years | 1,200 |
| 9 – 50 years | 1,500 |
| 50 – 70 years | 1,300 |
| > 70 years | 1,200 |

Additional health risks associated with high dietary sodium include increased severity and frequency of asthma, osteoporosis, stomach cancer, kidney stones and worsening of symptoms and signs of congestive heart failure. Reduction in dietary sodium is recommended for persons with symptomatic heart failure (26) and non-adherence to low sodium diets is a cause of heart failure exacerbations and hospitalization. Congestive heart failure is the leading cause for hospitalization in Canadians over age 65 therefore any positive effect of sodium reduction on the worsening of CHF symptoms could greatly reduce the stress on Canada's overburdened health system (27).

The high dietary sodium intake of Canadians is a significant health concern. A coalition of organizations (appendix 2) and individuals has formed to improve the health of Canadians by developing strategies and tactics to reduce dietary sodium intake in Canada to between the Adequate Intake and the Tolerable Upper Intake Level. In particular, significant government involvement to lead gradual reductions in dietary sodium is believed to be a critical factor in this effort to both improve the health of Canadians and reduce health costs. Voluntary reductions in sodium additives to food by the food sector will be important and initial meetings have occurred with food processors. Education of health care professionals; the general public; and patients with cardiovascular, cerebrovascular and kidney disease; is vital to ensure that Canadians understand and support this initiative. Wide dissemination, endorsement and advocacy of this policy paper are elements of this comprehensive strategy to impact the health of Canadians by reducing dietary sodium intake.

Several documents indicate sodium in mmol, mg or in mg of sodium chloride; conversions at common dietary levels are indicated in the attached appendix.

Appendix 1 – Different Measurements of Sodium and Salt*

| Sodium (mg) | Sodium (mmol) | Salt (g) |
|-------------|---------------|----------|
| 500 | 22 | 1.25 |
| 1,500 | 65 | 3.75 |
| 2,000 | 87 | 5.0 |
| 2,300 | 100 | 5.8 |
| 2,400 | 104 | 6.0 |
| 3,000 | 130 | 7.5 |
| 4,000 | 174 | 10 |

*a teaspoon of salt contains approximately 2300 mg or 100 mmol of sodium

Appendix 2 – Organizations Belonging to the Coalition on Sodium

Canadian Hypertension Society
 Canadian Cardiovascular Society
 Canadian Stroke Network
 Canadian Council of Cardiovascular Nurses
 Canadian Society of Nephrology
 Dietitians of Canada
 Heart and Stroke Foundation of Canada
 Blood Pressure Canada

Reference List

- (1) Lawes CMM, Vander Hoorn S, Law MR, Elliott P, MacMahon S, Rodgers A. Blood pressure and the global burden of disease 2000. Part II: Estimates of attributable burden. *J Hypertens*. 2006;24:423-30.
- (2) Joffres MR, Ghadirian P, Fodor JG, Petrasovits A, Chockalingam A, Hamet P. Awareness, Treatment, and Control of Hypertension in Canada. *Am J Hypertens*. 1997;10:1097-102.
- (3) World Health Organization. *The World Health Report 2002*. Geneva, Switzerland: World Health Organization; 2002.
- (4) Mohan S, Campbell N, Chockalingam A. Management of hypertension in low and middle income countries: Challenges and opportunities. *Prevention and Control*. 2005;1:275-84.
- (5) Onysko J, Maxwell C, Eliasziw M, Zhang J, Johansen H, Campbell N. Large Increases in Hypertension Diagnosis and Treatment in Canada Following a Health Care Professional Education Program. *Hypertension*. 2006;48:853-60.
- (6) Touyz RM, Campbell N, Logan A, Gledhill N, Petrella R, Padwal R et al. The 2004 Canadian recommendations for the management of hypertension: Part III - Lifestyle modifications to prevent and control hypertension. *Can J Cardiol*. 2004;20:55-59.
- (7) Hemmelgarn BR, McAlister FA, Grover S, Myers MG, McKay DW, Bolli P et al. The 2006 Canadian Hypertension Education Program recommendations for the management of hypertension: Part 1 - Blood pressure measurement, diagnosis and assessment of risk. *Can J Cardiol*. 2006;22:573-81.
- (8) Khan NA, McAlister FA, Rabkin SW, Padwal R, Feldman RD, Campbell NRC et al. The 2006 Canadian Hypertension Education Program recommendations for the management of hypertension: Part II - Therapy. *Can J Cardiol*. 2006;22:583-93.
- (9) Garriguet D. Sodium consumption at all ages. *Health Reports*. 2007;18:47-52.
- (10) Whelton PK, He J, Appel LJ, Cutler JA, Havas S, Kotchen TA et al. Primary Prevention of Hypertension. Clinical and Public Health Advisory From the National High Blood Pressure Education Program. *JAMA*. 2002;288:1882-88.
- (11) Hooper L, Bartlett C, Smith GD, Ebrahim S. Systematic review of long term effects of advice to reduce dietary salt in adults. *BMJ*. 2002;325:628-37.
- (12) Katzmarzyk PT, Mason C. Prevalence of class I, II and III obesity in Canada. *CMAJ*. 2006;174:156-57.
- (13) Raine, Kim D. Overweight and Obesity in Canada. A Population Health Perspective. pg 41. 2004. Ottawa, Canada, Canadian Institute for Health information.
- (14) Chockalingam A, Campbell N, Ruddy T, Taylor G, Stewart P. Canadian National High Blood Pressure Prevention and Control Strategy. *Can J Cardiol*. 2000;16:1087-93.
- (15) World Health Organization. *Reducing Salt Intake in Populations: Report of a WHO Forum and Technical Meeting 5-7 October, 2006 Paris, France*. 1-65. 2007. Geneva, Switzerland, World Health Organization.
- (16) Appel LJ, Brands MW, Daniels SR, Karanja N, Elmer PJ, Sacks FM. Dietary Approaches to Prevent and Treat Hypertension: A Scientific Statement From the American Heart Association. *Hypertension*. 2006;47:296-308.

- (17) Warner, Melanie. The War Over Salt. New York Times , C1. 9-13-2006.
- (18) Scientific Advisory Committee on Nutrition. Salt and Health. 1-134. 2003. Norwich, UK, The Stationery Office.
- (19) Health Canada. Dietary Reference Intakes: Reference Values for Elements. 2005. Ottawa, Health Canada.
- (20) World Health Organization Nutrition and Food Security Programme. Food Based Dietary Guidelines in the WHO European Region. 1-38. 2003. Copenhagen, Denmark, World Health Organization.
- (21) He FJ, MacGregor GA. Effect of longer-term modest salt reduction on blood pressure. Cochrane Database Syst Rev. 2004;1-64. **updated in 2006
- (22) He FJ, MacGregor GA. How Far Should Salt Intake Be Reduced? Hypertension. 2003;42:1093-99.
- (23) Joffres M, Campbell NRC, Manns B, Tu K. Estimate of the benefits of a population-based reduction in dietary sodium additives on hypertension and its related health care costs in Canada. Can J Cardiol. 2007; [In press].
- (24) Geleijnse JM, Grobbee DE, Kok FJ. Impact of dietary and lifestyle factors on the prevalence of hypertension in Western populations. J Hum Hypertens. 2005;19:S1-S4.
- (25) Panel on Dietary Reference Intakes for Electrolytes and Water and Standing Committee on the Scientific Evaluation of Dietary Reference Intakes. Dietary Reference Intakes for Water, Potassium, Sodium, Chloride and Sulfate. 1-640. 2004. Washington, D.C., National Academies Press.
- (26) Hunt, Sharon Ann, Abraham, William T., Chin, Marshall H., Feldman, Arthur M., Francis, Gary S., Ganiats, Theodore G., Jessup, Mariell, Konstam, Marvin A., Mancini, Donna M., Michl, Keith, Oates, John A., Rahko, Peter S., Silver, Marc A., Stevenson, Lynne Warner, and Yancy, Clyde W. ACC/AHA 2005 Guideline Update for the Diagnosis and Management of Chronic Heart Failure in the Adult. A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Update the 2001 Guidelines for the Evaluation and Management of Heart Failure). 2005 Guidelines, 1-82. 2005. Maryland, American College of Cardiology/American Heart Association.
- (27) The changing face of heart disease and stroke in Canada 2000. Wielgosz, A., Arango, M., Carew, M., Ferguson, A., Johansen, H., Nair, C., Phillips, S., Reeder, B., Taylor, G., Wilson, E., and Zelmer, J. 1999. Ottawa, Heart and Stroke Foundation of Canada.