



## DIETARY SODIUM, HEART DISEASE AND STROKE

### FACTS

- Humans require a small amount of sodium in order to maintain health.<sup>1</sup> However, in some people too much sodium causes blood pressure to rise. High blood pressure increases your risk for heart disease and stroke.
- About six million, or roughly 20% of adult Canadians have high blood pressure (hypertension), the leading risk for death in the world,<sup>2</sup> the number one risk factor for stroke, and a major risk factor for heart disease. A further 20% of Canadian adults have pre-hypertension, when blood pressure is elevated above normal but not to the level considered to be classified as high.<sup>1</sup>
- Aboriginal peoples, Canadians of South Asian or black ancestry, the elderly, less-educated and lower income populations have a higher prevalence of high blood pressure when compared with the general population.
- On average, adult Canadians consume about 3,400 mg (roughly 1 ½ teaspoons) of sodium per day.<sup>3</sup> This is significantly above the level recommended as the upper tolerable limit for health, which is 2,300 mg per day (approximately 1 teaspoon).<sup>4</sup>
- Table salt, also known as sodium chloride, consists of both sodium and chloride. One teaspoon of salt contains roughly 2,300 mg of sodium, and 3,800 mg of chloride.<sup>5</sup> It is the sodium component of salt that increases the risk for high blood pressure, heart disease and stroke.<sup>6</sup>
- Reduced sodium intake results in reduced blood pressure levels.
- Most of the sodium Canadians consume (77%) comes from processed foods sold in grocery stores and food service outlets. Only about 11% is added during preparation or at the table, with the remainder occurring naturally in foods.<sup>7</sup>
- Sodium is primarily added to foods to act as a preservative and to enhance taste.
- The majority of national and international organizations recommend reducing sodium intake to at least 2,300 mg per day to reduce cardiovascular risk.





### RECOMMENDATIONS

The Heart and Stroke Foundation of Canada recommends that:

#### CANADIANS

1. Eat less salt by:

- Eating mostly fresh foods prepared at home and eating fewer ready-made packaged foods.
- Developing and sharing food preparation and cooking skills.
- Limiting eating at restaurants and fast food outlets, asking for nutrition information and asking for meals to be prepared with no salt when dining out.
- Ordering a smaller portion or sharing your meal with someone when eating out.
- Reducing the amount of salt used in cooking by not adding the full amount a recipe calls for.
- Washing away some of the salt in canned goods such as beans, lentils and vegetables by rinsing them before eating.
- Cutting down on the amount of seasoning used when making packaged pastas or taco kits.
- Removing the salt shaker from the table and avoiding adding salt to your food.
- Tasting food before adding salt. Add salt-free herbs and spices or lemon to foods for extra flavour instead of salt.
- Reading the Nutrition Facts table on packaged foods carefully. Look for the serving size and use the % Daily Value (%DV) to compare products. Choose products that are lowest in sodium. A %DV of 5% or less per serving is considered a little and a %DV of 15% or more per serving is considered a lot.
- Looking for 'sodium-free', 'low sodium', 'reduced sodium' or 'no added salt' on the package if choosing packaged foods.

2. Work with organizations like the Heart and Stroke Foundation to influence the government and the food industry to reduce sodium in the food supply. Visit [heartandstroke.ca](http://heartandstroke.ca) to learn more and get involved.

3. Reduce your risk of high blood pressure in other ways such as accumulating at least 150 minutes of moderate-to vigorous-intensity aerobic physical activity per week in bouts of 10 minutes or more, eating a healthy diet, achieving and maintaining a healthy weight, limiting alcohol consumption, setting aside some time every day to relax, and living smoke-free.
4. Have your blood pressure measured at least once a year by a healthcare professional, know and understand what your blood pressure is and learn to take your own blood pressure correctly.
5. Visit the Heart and Stroke Foundation's online Blood Pressure Action Plan at [heartandstroke.ca/bp](http://heartandstroke.ca/bp) or download the <30 Days App at <https://itunes.apple.com/ca/app/30-days/id556586803?ls=1&mt=8>.
6. Consult your doctor or healthcare professional to better understand how salt affects your health and find out what you can do to reduce your risk of high blood pressure, heart disease and stroke.
7. Promote and encourage adoption of food policies that create healthier environments in places we live, work and gather such as schools, workplaces, sports clubs, faith centres and community organizations.

#### FEDERAL GOVERNMENT

1. Work in collaboration with civil society and the food industry to:
  - Conduct public awareness and education campaigns for Canadians about the importance of reducing sodium consumption.
  - Establish a monitoring system to track and report on progress made by the food industry in achieving the sodium reduction targets established by Health Canada.<sup>17</sup>
2. Mandate standardized serving sizes on the Nutrition Facts table of packaged food products.
3. Support food literacy among Canadians by implementing programs to improve knowledge and skills required to make informed eating decisions and to prepare nutritious meals.
4. Provide funding to support research that addresses knowledge gaps, and supports innovation and technologies that will help the food industry reduce sodium in the food supply.



5. Restrict the marketing of all foods and beverages to children.
  6. Continue to support and improve the Nutrition North Canada program to ensure affordable pricing of nutritious foods in remote northern locations.
  7. Provide financial, research and policy support to foster growth of local food procurement initiatives and the improvement of food distribution networks that increase access to healthy food (particularly traditional food) for First Nations, Inuit, and Métis populations, as well as others living in northern, remote and rural communities.
3. Develop, implement and monitor school food policies that increase access to affordable healthy food and beverages while decreasing access to unhealthy choices. For example:
    - Implement and enforce nutrition standards for food and beverages provided at school venues including cafeterias and vending machines.
    - Offer guidance to parents and students on healthy bag lunch and snack options.
    - Make healthy food (particularly vegetables and fruit) readily available. This can be accomplished, for example, through supporting and participating in programs that help bring healthy food to schools (e.g., Farm to Cafeteria Canada's Farm to Schools program, FoodShare, and Breakfast for Learning) and the establishment of school community gardens.
    - Use healthy foods and beverages or non-food alternatives for school fundraising efforts.

### PROVINCIAL TERRITORIAL GOVERNMENTS

1. Implement healthy, low sodium, food procurement policies for public institutions that address:
  - Meals sold or served by the institution to staff, students, patients, and/or residents of the institution.
  - Items sold in vending machines, concession stands, cafeterias, restaurants, etc.
2. Conduct public awareness and education campaigns for Canadians about the importance of reducing sodium consumption.
3. Mandate the inclusion of nutritional information, including sodium content, on all restaurant and food service overhead and table menus.
4. Restrict the marketing of all foods and beverages to children.

### MUNICIPAL GOVERNMENTS, REGIONAL HEALTH AUTHORITIES, WORKPLACES AND SCHOOL BOARDS

1. Establish policies and zoning by-laws designed to promote the establishment of grocery stores and other venues (e.g., farmers' markets, community gardens, community kitchens, convenience stores, etc.) that provide affordable access to healthy food, particularly in areas of low availability and restrict accessibility of fast food outlets and convenience stores near schools.
2. Support community programs and initiatives that can potentially improve access to healthy food including community gardens, community kitchens, local food distribution networks, community supported agriculture, school meal programs, etc.

### HEALTH-RELATED EDUCATIONAL INSTITUTIONS

Educate health professionals about the health risks of excess dietary sodium, how to reduce sodium intake within the context of a healthy diet and how to counsel their patients/clients to reduce sodium intake.

### FOOD INDUSTRY

1. As with trans fat reduction, take a leadership role to continue to reduce sodium during processing and preparation of all foods sold in Canada. Comply with the Guiding Benchmark Sodium Reduction Levels<sup>8</sup> for processed food categories developed and released by Health Canada in June 2012.
2. Support efforts to educate Canadians about the health benefits of consuming foods which are low in sodium.
3. Provide nutritional information, including sodium content, of all foods and beverages on overhead menu boards and table menus in food service outlets.
4. Stop the practice of marketing of foods and beverages to children.

### RESEARCHERS

1. Identify the health and economic impacts of sodium reduction including public policy measures to reduce the intake of sodium and unhealthy foods.
2. Conduct randomized clinical trials designed to assess the impact of sodium reduction on health including heart disease and stroke and identify population target levels.
3. Design studies to identify the genetic, ethno-racial and dietary factors that affect salt sensitivity.
4. Develop practical tools to measure sodium intake and to assess total body levels of sodium.
5. Identify the influence of sodium intake during infancy and childhood on blood pressure later in life.

### BACKGROUND INFORMATION

#### HYPERTENSION IMPACT ON HEART DISEASE AND STROKE

One fifth of the adult Canadian population has hypertension, or high blood pressure, and more than 90 per cent of Canadians will develop hypertension if they live the average lifespan.<sup>9</sup> Efforts over the last 20 years have greatly improved diagnosis and treatment of high blood pressure, however, 17 per cent of Canadians with high blood pressure do not realize that they have it, and one third of those with high blood pressure do not have their levels under control.<sup>10</sup>

Over time high blood pressure can damage blood vessel walls causing scarring that promotes the build-up of fatty plaque, which can narrow and eventually block arteries. It also strains the heart and eventually weakens it. Very high blood pressure can cause blood vessels in the brain to burst, resulting in a stroke.<sup>11</sup>

Hypertension is the number one preventable risk factor for stroke, and significantly increases the risk for all cardiovascular disease outcomes including coronary artery disease and congestive heart failure.<sup>12</sup>

#### REDUCING SODIUM INTAKE TO COMBAT HYPERTENSION

Canada's Food Guide recommends adults eat a healthy and balanced diet. According to the Food Guide, a healthy diet is

defined as one that includes a variety of foods from each of the four food groups – Vegetables and Fruit, Grain Products, Milk and Alternatives, and Meat and Alternatives and limits foods and beverages high in calories, fat, sugar or salt. Health Canada further suggests that individuals divide their dinner plate and fill half the plate with vegetables, a quarter with grain products and a quarter with meat or alternatives.

In addition to eating a healthy and balanced diet, several scientific and public health organizations have specifically recommended reducing dietary sodium in the population through changes to food processing as a means of reducing the prevalence of hypertension. A study published in 2011 identified salt reduction initiatives in 32 countries. Most had maximum population salt intake targets ranging from 5 to 8 g/person per day (approximately 2,000 to 3,200 mg of sodium per day). Twenty-six of the 32 strategies were led by government, five by non-government organizations and one by industry. Strategies that demonstrated impact were multifaceted and included food reformulation, consumer awareness initiatives and food labelling actions.<sup>13</sup>

A group known as Consensus Action on Salt and Health (CASH) in the United Kingdom, has been very successful in influencing the UK Department of Health and the Food Standards Agency in policy change. The group has been able to gain public support to pressure the food industry to reduce sodium levels in foods. Major food manufacturers in the UK have been gradually reducing salt in their products at a rate of about 10 to 20 per cent per year without rejection from consumers or public outcry.<sup>14</sup>

#### CANADIAN SODIUM CONSUMPTION LEVELS

According to the Canadian Community Health Survey, the average sodium consumption of Canadians is estimated at 3,400 mg (roughly 1 ½ tsp) when salt added during cooking and at the table is included.<sup>3</sup> The survey found that intake levels were far beyond the recommended upper limit for all ages. Among people aged 19 to 70, over 85 per cent of men and 60 per cent of women had sodium intakes exceeding the recommended upper limit.

Most of the sodium Canadians consume (77 per cent) comes from processed food sold in grocery stores and in food service outlets. Only about 11 per cent is added during preparation or at the table, with the remainder occurring

naturally in foods.<sup>7</sup> A study of sodium levels in Canadian fast-food and sit-down restaurants found that on average, sit-down restaurant menu items contained 1,455 mg of sodium per serving. More than 22 per cent of sit down restaurant stir fry entrees, sandwiches/wraps, ribs and pasta entrees with meat/seafood exceeded 2,300 mg of sodium.<sup>15</sup> Since the majority of dietary sodium intake is in the form of salt added to foods during processing, changes to food processing are needed to reduce dietary sodium intake and high blood pressure among the Canadian population.

### REDUCING SODIUM CONSUMPTION IN CANADA

In 2007, the Minister of Health announced that the federal government would establish an expert Sodium Working Group to explore options for reducing sodium consumption among Canadians. The national group included representatives from government, the scientific and health professional communities, the food industry and non-government organizations, including the Heart and Stroke Foundation.

In July 2010, the Sodium Working Group released its recommendations to reduce sodium intake among Canadians.<sup>16</sup> Broadly, the Working Group recommendations addressed the following aspects of sodium reduction:

- Voluntary reduction of sodium levels in processed food products and foods sold in restaurants and other food services;
- Development, monitoring and evaluation of sodium reduction targets for various food categories;
- Education and awareness aimed at consumers, industry, health professionals and stakeholders; and
- Research related to sodium reduction.

In June 2012, the provincial and territorial (PT) governments adopted the interim goal of reducing the average sodium intake of Canadians to a population average of 2,300 mg per day by 2016.<sup>8</sup> Also in June 2012, the federal government released sodium reduction benchmarks to provide guidance to the food industry for lowering sodium in processed foods.<sup>17</sup> This guidance is based on a gradual and phased reduction approach and supports the recommendations of the Sodium Working Group.

Sodium content can be reduced in the food environment through a variety of approaches. Reformulating food products to reduce sodium, free sugars and fat content (healthier products) and bringing to market new products which support the goal of improving the healthfulness of foods and beverages are important strategies for the food industry. Companies can diversify to develop healthier products that are lower in sodium, unhealthy fats, and free sugars.

Children are particularly vulnerable to advertising and marketing messages. Marketing of foods and beverages is associated with higher levels of junk food consumption and obesity.<sup>18-21</sup> In addition, product placement of foods and beverages influences children and consumer's choices. Restrictions on marketing to children have been cited as the most cost effective approach to reduce childhood obesity.<sup>22,23</sup> Energy dense, nutrient poor products should not be placed at children's eye level or at check-out locations. Instead, healthy products should be placed in highly visible areas. Recognizing the connection between product placement and unhealthy eating habits in children, Tesco, a major European grocery chain has adopted a policy that removes unhealthy foods and beverages from placement at children's eye level. Indigo Books, a Canadian retail chain with over 300 bookstores across Canada, has also removed all processed food items from the cash register or 'impulse section' of stores.

Local food procurement initiatives and the improvement of food distribution networks can increase access to healthy food (particularly traditional food) for First Nations, Inuit, and Métis populations, as well as others living in northern, remote and rural communities. Nutrition North Canada is a food subsidy program in isolated northern locations that is funded by the federal government. The program seeks to improve access to perishable healthy foods, including fresh, frozen, and refrigerated foods with a shelf-life of less than one year. A higher subsidy applies to the most nutritious options such as fresh fruit, frozen vegetables, bread, meat, milk and eggs. A lower subsidy applies to other eligible foods such as flour, crackers, ice cream and combination foods (e.g., pizza and lasagna).

Adequate food preparation skills, in particular those related to vegetables and fruit, are needed to prepare healthy meals. Individuals who lack basic food selection and preparation skills may be more likely to rely on convenience and fast foods. Preparation of foods at home allows



individuals to control the amount of sodium in their meals. In addition, research shows that initiatives aimed to increase food literacy can be successful in improving healthy eating and cooking habits.<sup>24</sup> Schools can help improve food literacy and offer guidance to parents and students regarding healthy bag lunches and snacks.

School food policies that increase access to affordable healthy food and beverages while decreasing access to unhealthy choices can help foster healthy habits early in life. Policies including the development of nutrition standards for food and beverages provided at school venues, in school cafeterias and vending machines are important contributors to healthy eating. Schools can make healthy food (particularly vegetables and fruit) readily available through supporting and participating in programs that help bring healthy food to schools (e.g., Farm to Cafeteria Canada's Farm to Schools program, FoodShare, and Breakfast for Learning). The establishment of school community gardens can educate students on the importance of healthy eating, improve nutritional quality of the diet and help foster life skills.<sup>25-27</sup> Using healthy foods and beverages or non-food alternatives for school fundraising efforts are additional ways to limit availability of unhealthy foods.

Development of agricultural policies and subsidies that provide incentives for the production and distribution of healthy foods (particularly vegetables and fruit) will help to improve accessibility and affordability. Access to healthy unprocessed foods can also be improved through the establishment of Food Policy Councils and Food Charters that promote and develop local policies, programs and strategies. Community venues and programs such as community gardens, community kitchens, local food distribution networks, community supported agriculture, and school meal programs can help improve access to healthy foods. Policies and zoning by-laws designed to promote the establishment of grocery stores and other venues (e.g., farmers' markets, community gardens, healthy convenience stores, community kitchens, etc.) can provide affordable access to healthy food, particularly in areas of low availability.

## SODIUM INTAKE, BLOOD PRESSURE AND CARDIOVASCULAR DISEASE

Between 2011 and 2014, several studies were published questioning the established links between sodium intake,

blood pressure, and cardiovascular disease (CVD).<sup>28-35</sup> A study following over 30,000 people for four years concluded that sodium reduction below 2,300 mg/day was associated with increased risk of cardiovascular disease death and risk of hospitalization for heart failure.<sup>28</sup> This study included patients with chronic conditions like diabetes and hypertension (i.e. 'non-healthy patients'), who might already be on a sodium-restricted diet because of their pre-existing conditions and receiving a range of CVD treatments.

The Prospective Urban Rural Epidemiological (PURE) sodium study investigated the association between sodium intake and overall blood pressure in over 100,000 individuals from 17 countries. The study results suggest that dietary sodium reduction likely reduces blood pressure to a greater extent among those with high sodium consumption, high blood pressure and the elderly. Less reduction was seen among those with moderate or low level sodium consumption.<sup>29</sup> One potential drawback of this study is that it relied on one-time spot urine testing to assess sodium levels, a method that is not as reliable as the gold standard measure of 24 hour urine collection.<sup>30</sup> Additionally, the early results from this study have been used to suggest that a population level approach to reducing sodium consumption for blood pressure reduction is not advised and that instead, efforts should be made to reduce sodium consumption among specific populations. However, most of the sodium Canadians consume (77 per cent) comes from salt added to foods during processing,<sup>7</sup> therefore a reasonable approach to reduce sodium consumption among those at risk would necessitate a population-wide approach. It would be neither feasible nor cost-effective to utilize an individual approach.

A meta-analysis of 25 studies which included data from over 200,000 patients concluded that sodium consumption above 4,600 mg/day and consumption less than 2,600 mg/day was associated with elevated risk of cardiovascular disease.<sup>31</sup> The study further concluded that consumption of sodium between 2,600 and 4,600 mg/day are not associated with any health risks (elevated risk of CVD). There were a number of limitations to the studies reviewed as part of this meta-analysis including: inclusion of patients with chronic conditions who might already be on a sodium-restricted diet and receiving a range of treatments because of their pre-existing conditions; use of a single measure of sodium urine instead of average of multiple measures; use of one day dietary recall which may



not reflect sodium intake patterns over a long period of time; lack of similarity in study design; and failure to account for key factors that influence sodium intake and heart disease.

A trial of over 2,000 individuals not on a sodium intervention and followed for 10 or 15 years found overall health benefits, specifically cardiovascular health benefits, of reducing sodium intake to at least 2,300 mg/day.<sup>32</sup> This study was specifically designed to overcome design issues and challenges of previous studies. Participants had sodium excretion measured multiple times, key factors influencing sodium were considered and the trial excluded participants who were on a sodium restricted diet. The findings of this study support reducing sodium intake to 2300 mg/day to reduce cardiovascular disease risk.

In May 2013, the Institutes of Medicine (IOM) released a major review of the evidence examining the relationship between sodium and health.<sup>36</sup> The report concluded that evidence confirms a relationship between high sodium consumption and cardiovascular disease; specifically that greater sodium consumption increases the risk of cardiovascular disease. It also concluded that there was insufficient evidence to support the notion that lowering sodium consumption below 2,300 mg/day would have cardiovascular benefits or pose cardiovascular risk.

The new evidence released between 2010 and 2014 led a number of organizations to re-examine their

recommendations for sodium consumption. In 2012, the World Health Organization (WHO) released recommendations for sodium intake calling for a reduction in sodium intake to reduce blood pressure and risk of cardiovascular disease, stroke and coronary heart disease in adults.<sup>37</sup> The WHO recommended a reduction to less than 2,000 mg/day of sodium in adults. In October 2013, after reviewing the latest research about the effects of sodium on blood pressure, Hypertension Canada recommended that to reduce blood pressure, adults should reduce sodium intake towards 2,000 mg (5 g of salt) per day.<sup>38</sup>

A body of evidence continues to support the notion that high sodium intake is associated with higher levels of blood pressure. Blood pressure treatment, management and control are vital to reducing the risk of heart disease and stroke among Canadians. Reducing blood pressure through physical activity and diet, including reduced sodium consumption, is recommended by various national and international bodies. Canadians consume on average 3,400 mg of sodium per day, the majority of which is from sodium added to foods during processing. The Heart and Stroke Foundation (HSF) is committed to helping Canadians reduce the amount of sodium in their diets and reach a population average intake of 2,300 mg of sodium per day by 2016. To achieve this sodium reduction, a population approach is warranted. HSF will continue to monitor the evidence on this topic.

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