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### **Dietary Intake of Sodium by Children: Why it matters – CPS Statement**

Developed by Dr. Claire Wallace and Dr. Manjula Gowrishankar for PedsCases.com.  
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#### **Introduction**

Hi, my name is Claire Wallace and I am a first-year Pediatrics resident at Memorial University of Newfoundland. This podcast provides guidelines for appropriate dietary sodium consumption in the pediatric population, as well as effective strategies for limiting excess sodium intake and promoting healthier eating in children. This podcast was created in collaboration with Dr. Manjula Gowrishankar, a Pediatric Nephrologist at the University of Alberta.

#### **Objectives**

By the end of the podcast, listeners will be able to:

1. Discuss the importance of dietary sodium.
2. Outline the ideal dietary sodium intake for children of all ages.
3. Review the short term and long term consequences of excess sodium intake.
4. List the barriers Canadians face in consuming foods low in sodium.
5. Describe an approach to help children limit their dietary sodium intake.

#### **Case**

Let's start with a case.

Nate is a 10-year-old boy who comes to your office for a "check-up" with his mom. He is generally well and has no medical conditions. On assessment, you notice that Nate appears overweight and that his blood pressure is at the upper limit of normal for his age and height. You decide to ask him more about his lifestyle. Nate tells you that he likes riding his bike and swimming, and he participates in gym class 2-3 times a week. His mother tells you he is a picky eater and eats mostly processed foods including pizza, frozen or prepackaged meals, and deli

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meat sandwiches. You suspect he is consuming too much sodium. How do you determine Nate's dietary sodium requirements, and how would you proceed in counseling him about reducing his sodium intake? We will return to these questions at the end of the podcast. First, let's learn more about dietary sodium.

### **What is sodium and why do we need it?**

Sodium is an electrolyte in our body that plays an important role in maintaining our intracellular and extracellular fluid balance, via osmosis. Our extracellular fluid balance controls the volume of blood that circulates our body, as well as our blood pressure. The amount of dietary sodium required to maintain an appropriate extracellular fluid volume varies with age. As we grow, our extracellular fluid requirements increase, and so our sodium requirements increase as well.

### **Where does sodium come from in our diet?**

Surprisingly, only 11% of dietary sodium comes from added table salt. The remainder comes from salt that is already added to the foods we buy. Almost 80% of sodium consumed by the average Canadian comes from processed and prepackaged foods<sup>(1)</sup>. Some common foods high in sodium include bakery products, mixed dishes such as pizza and frozen entrees, processed meats, cheeses and soup<sup>(1)</sup>. There can also be significant differences in the sodium content in the same food, depending on how it's been prepared. For example, a 100g serving of raw, steamed salmon contains 47mg of sodium compared to a 100g serving of smoked salmon which contains 1880mg of sodium<sup>(2)</sup>.

### **How much sodium do children need?**

The amount of sodium that a child requires depends on their age. Guidelines for the "adequate" amount of dietary sodium intake in children have been developed by the National Academies of Sciences, Engineering and Medicine (NASEM) and the World Health Organization. For infants age 0-6 months, the recommended sodium intake (110 mg/day) reflects amounts typically found in breastmilk. For infants age 6-12 months, the recommended sodium intake (370 mg/day) reflects amounts typically found in breastmilk as well as solid foods consumed by this age group. For children aged 1-18 years, the recommended sodium intake is determined based on the energy requirements of each age group, compared to the adult sodium requirement of 1500

mg/day. These end up being 800mg/day for ages 1-3, 1000mg/day for ages 4-8, 1200 mg/day for ages 9-13, and 1500 mg/day for children aged 14 and up<sup>(2-4)</sup>.

### **How much is too much sodium?**

NASEM provides target amounts of daily dietary sodium that all children should stay below, suggesting that reducing daily intake to below this amount will reduce the risk of chronic disease in healthy individuals. This is termed the "chronic disease risk reduction" level. For children 1-3 years of age, this target is 1200 mg/day or less, for children 4-8 years, the target is 1500 mg/day or less, for children 9-13 years, the target is 1800 mg/day or less, and for adolescents and adults aged 14-70 years, the target is 2300 mg/day or less. Guidelines have not yet been developed for children aged less than 1 year<sup>(5)</sup>.

### **What are the consequences of excess sodium consumption?**

It has been well established that excess dietary sodium is linked to hypertension, heart disease and other chronic medical conditions in the adult population<sup>(5-7)</sup>. Research on the pediatric population is limited, and yields varied results. To date, there is no unequivocal evidence to suggest that reducing dietary sodium reduces blood pressure in pediatric patients. That being said, emphasizing the importance of a healthy diet low in sodium teaches children to make informed food choices, a skill that they will carry on into adulthood, where the health benefits are clear and numerous. There is also an established link between diets high in sodium and childhood obesity<sup>(8-10)</sup>, and it is thought that children who are overweight or obese may be more susceptible to developing high blood pressure when consuming an excess of sodium, compared to their non-overweight counterparts<sup>(11-13)</sup>. This may be explained by a poorer overall diet consumed by overweight and obese children, containing foods that are not only higher in sodium, but also higher in calories, sugar, and fat<sup>(14-17)</sup>. Certain individuals may also be at higher risk of negative health outcomes related to a diet high in sodium. These individuals are considered "sodium sensitive" and are more likely to develop high blood pressure from excess sodium intake. Amongst this at-risk group are individuals with a pre-existing diagnosis of high blood pressure or metabolic syndrome, as well as women, people of African American heritage, and possibly children born at low birth weights<sup>(18,19)</sup>.

### **Are Canadian children consuming too much sodium?**

In short, yes. According to a 2015 Canadian Community Health Survey, 49% of 1-3 year olds and 72% of 4-8 year olds in Canada consume more than the NASEM recommended amounts of dietary sodium each day<sup>(4)</sup>. The same is true of older children, with 79% of males and 63% of females aged 9-13 exceeding the recommended amounts of sodium daily<sup>(4)</sup>. For teenagers aged 14-18 years, the rates are 92% in males and 50% in females<sup>(4)</sup>. On average, Canadian boys consume more sodium than girls, likely due to their higher daily caloric requirements<sup>(4)</sup>.

### **Why are Canadians consuming too much sodium?**

Canadians choose foods high in sodium for their convenience and taste. Prepackaged meals and canned ingredients typically contain large amounts of sodium when compared to their fresh equivalents. When looking for quick, convenient meal choices, many Canadians end up choosing foods high in sodium, sometimes without realizing it. We also develop a taste for salty foods the more we are exposed to them<sup>(20)</sup>. As a result, children who are raised eating salty foods are likely to choose similar foods as adults. Some other foods high in sodium don't taste salty, and so consumers are unaware of their high sodium content. As an example, a serving of O-shaped cereal contains more sodium than the same serving of dry roasted salted peanuts<sup>(21,22)</sup>.

### **What can we do to reduce dietary sodium intake in our patients?**

Although we know diets low in sodium such as the "Dietary Approach to Stop Hypertension" are beneficial<sup>(23)</sup>, diet adherence is a significant barrier, particularly in the adolescent population. Educating patients and their parents about reading food labels, choosing foods low in sodium, and reducing consumption of processed and prepackaged foods is an important first step, but adherence would improve if reading food labels was simpler, and if access to foods high in sodium was limited. Luckily, we expect to see some of these changes made in the upcoming years. By 2022, Health Canada will require that all nutrition labels include a "percent daily value" for sodium, and foods containing greater than 15% of the recommended daily value will be clearly labeled as "high in sodium"<sup>(24,25)</sup>. Unfortunately, to date, there are no limitations to the maximum amount of sodium that most food products can contain<sup>(24)</sup>. Physicians and other health care professionals can help change this by advocating for further government initiatives to increase awareness to the harms of a high sodium diet, encouraging major brands to offer more low-sodium options for popular products, setting limits to the amount of sodium that

children's products can contain, and placing limitations on the marketing of foods high in sodium to children.

### **Is it harmful to reduce dietary sodium?**

Luckily, no. Concerns have been raised in the past that reducing dietary sodium may have negative health consequences in adults, such as increasing the risk of cardiovascular disease, and insulin resistance. However, research to date has not supported this claim<sup>(2,7,26)</sup>.

### **Back to our case...**

After taking a detailed dietary history and consulting with a community dietician, you determine that Nate is consuming about 2300 mg of dietary sodium each day. You consult your reference guidelines and confirm your suspicion that this is above the NASEM "chronic disease risk reduction" amount for his age group. This means Nate is consuming levels of sodium well beyond what is required, and that reducing his sodium intake to 1800 mg/day or lower will likely reduce his risk of chronic disease in the future. Reducing his sodium intake may also reduce his blood pressure.

You explain to Nate and his mother that a diet high sodium is associated with higher rates of chronic medical conditions in adulthood and that learning healthy food choices in childhood will prepare Nate to make healthy choices throughout his life. You also mention that high sodium intake is linked to childhood obesity and that foods high in sodium are often also high in calories, sugars, and fat, and lower in nutritious ingredients that are important to growth and development. You arrange an appointment for Nate to see the dietician, who can suggest some healthy, low sodium foods for Nate and his family to try, and you plan to see him back in your clinic in three months' time. In the meantime, you use this reminder to send a letter to your local Minister of Health, advocating for more strict regulations on the maximum sodium content allowed in foods, clarity of sodium content on food labels, and placing limitations on marketing high sodium foods targeted to children.

Three months later, Nate and his mother return to your clinic. You are delighted to hear that Nate and the rest of his family have made significant changes to their diet. He has learned to read food labels for sodium content and tries to choose options lower in sodium, including fresh foods instead of processed. Nate admits he still enjoys occasional fast food meals, and you tell

him that this is OK in moderation. Nate appears slimmer, and both his body mass index and blood pressure have decreased since his last visit. You congratulate him on his hard work and encourage him to keep it up. Nate has learned important skills in making healthy, informed dietary decisions that will benefit his health throughout his lifetime. Well done!

### **Review of key learning points**

1. Sodium is an important component of our diet, but most Canadians consume far more than the recommended daily amount. The “adequate” amount of daily sodium intake, and the target amount to stay below to prevent adverse health events, varies by age group and can be found in reference tables provided by the National Academies of Sciences, Engineering and Medicine.
2. More than half of Canadian children consume sodium in excess. This is because foods high in sodium are both convenient and palatable. Foods highest in sodium tend to be frozen, processed and prepackaged.
3. A diet high in sodium is linked to hypertension, heart disease and other chronic medical conditions in adults, and may be related to high blood pressure and obesity in children. Some individuals are at higher risk of negative health outcomes after consuming sodium in excess.
4. We can support patients in making low-sodium choices by advocating for increased awareness of the harms of a high sodium diet, encouraging the production of more low-sodium items, setting limits to the amount of sodium that children's products can contain, and placing limitations on the marketing of foods high in sodium to children.

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