

ported >30,000 cases of measles, including 27 cases of measles encephalitis, a complication that often results in permanent neurologic sequelae, and eight measles-related deaths in 2011. Five countries (France, Italy, Romania, Spain, and Germany) accounted for more than 90% of cases reported to the European Centers for Disease Prevention and Control.<sup>4</sup> Although measles has been eliminated in the Region of the Americas since 2002 and considerable progress has been achieved in global measles control, measles is still common in many countries. Importations of measles virus into the United States will likely continue and cause outbreaks in communities that have clusters of unvaccinated persons. Maintenance of high MMR vaccination coverage is essential to prevent measles outbreaks and sustain measles elimination in the United States. Despite the relatively small number of reported cases in the United States, the public and the health-care providers must remain vigilant. A drop in MMR vaccination coverage in a community can increase the risk for large, sustained measles outbreaks, as experienced recently in Canada and France,<sup>4,5</sup> or re-establishment of endemic transmission, as experienced in the United Kingdom.<sup>6</sup>

Occasionally, measles cases are reported without apparent links to importations, but virologic evidence suggests recent importation of an undetected case or chain of cases. Given travel patterns, the highly infectious nature of measles virus, and limitations of surveillance systems, not every importation of measles virus into the United States is detected. Therefore, collection of samples for virus detection is extremely important. Genetic characterization of viruses can help to confirm or suggest the likely source of imported viruses because measles genotypes are distributed heterogeneously in regions that have not yet eliminated measles.<sup>7,8</sup>

Health-care providers play an important role in maintaining elimination of measles in the United States. Patients with measles frequently seek

medical care; therefore, health-care providers should maintain a high awareness of measles and suspect measles in persons who have a febrile rash illness and clinically compatible symptoms (e.g., cough, coryza, or conjunctivitis) and who recently have traveled abroad or have had contact with travelers. Providers should implement isolation precautions immediately and promptly report suspected measles cases to their local health department to limit spread to other susceptible persons, including those who cannot be vaccinated because of medical contraindications or those too young for vaccination. In several outbreaks during 2011, despite seeking medical care, the source case was not identified until after the first or second generation of cases was reported. Misdiagnosis and delayed reporting resulted in missed opportunities to prevent additional cases because of delayed implementation of control measures. Nevertheless, for most cases, early reporting by providers and rapid control efforts by state and local public health agencies have prevented measles transmission and limited the size of outbreaks.

Health-care providers should encourage vaccination of all eligible patients, including children and adults. MMR vaccine is recommended routinely for all children at age 12-15 months, with a second dose at age 4-6 years. Two doses of MMR vaccine also are recommended for unvaccinated health-care personnel, international travelers, and students attending post—high school educational institutions. Other adults without evidence of measles immunity should receive 1 dose of MMR vaccine.<sup>3</sup> In addition, providers should remind their patients who plan to travel internationally of the increased risk for measles and potential exposures during bus, train, or air travel and at large international events or gatherings (e.g., Euro 2012 and the 2012 Summer Olympics), and of the importance of vaccination. All persons aged  $\geq 6$  months who will be traveling outside the United

States and are eligible to receive MMR vaccine should be vaccinated before travel. Children aged  $\geq 12$  months should receive 2 doses of MMR vaccine separated by at least 28 days, before travel.<sup>3</sup>

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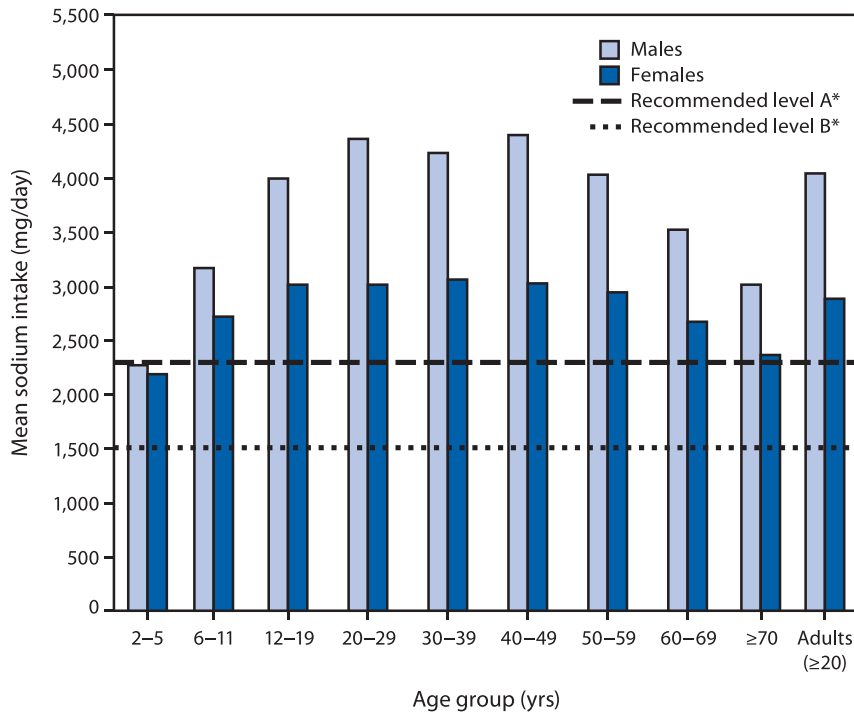
## CDC Grand Rounds: Dietary Sodium Reduction— Time for Choice

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EXCESS DIETARY SODIUM IS A MAJOR contributor to hypertension (high blood pressure) and a critical public health issue in the United States.<sup>1</sup> Nearly one in three U.S. adults, or 68 million persons, has hypertension, and half of those do not have their condition under control.<sup>2</sup> Hypertension is a major contributor to cardiovascular diseases, which are a leading cause of death, disability, and health-care costs in the United States.<sup>3</sup> The average sodium intake among persons in the United States aged  $\geq 2$  years is 3,266 mg/day (excluding table salt).<sup>4</sup> Current dietary guidelines recommend that reducing consumption of sodium to <2,300 mg/day, and that blacks, persons aged  $\geq 51$  years, and persons of any age with hypertension, diabetes, or chronic kidney disease (about half of the U.S. population and the majority of adults) further reduce intake to 1,500 mg/day.<sup>5</sup> Regardless of age or sex, sodium intake by most U.S. residents considerably exceeds recommended levels (FIGURE). Reducing sodium intake to 2,300 mg/day potentially could prevent 11 million cases of hypertension and save billions of dollars in health-care expenditures; reducing sodium intake further would yield additional benefits.<sup>6</sup> To achieve those reductions and help consumers make healthful choices,

**FIGURE. Mean sodium intake (excluding table salt), by age and sex, and recommended levels\* — National Health and Nutrition Examination Survey, United States, 2007–2008**



Sources: CDC. National Health and Nutrition Examination Survey data. Available at [http://www.cdc.gov/nchs/nhanes/nhanes2007-2008/nhanes07\\_08.htm](http://www.cdc.gov/nchs/nhanes/nhanes2007-2008/nhanes07_08.htm).

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\* Current dietary guidelines recommend reducing consumption of sodium to <2,300 mg/day, and that blacks, persons aged ≥51 years, and persons of any age with hypertension, diabetes, or chronic kidney disease further reduce intake to 1,500 mg/day.

expanded educational efforts and monitoring of the sodium content of the food supply are needed. Increased availability of lower sodium products and reductions in the amount of sodium in foods served or sold in the marketplace also are needed.

The causal link between sodium intake and high blood pressure levels is well-established.<sup>7</sup> Numerous scientific bodies and professional health organizations, including the American Heart Association,<sup>\*</sup> the American Medical Association,<sup>†</sup> and the American Public Health Association,<sup>‡</sup> support dietary sodium reduc-

tion to prevent and control high blood pressure. Decreasing systolic blood pressure by an average of 5 mm Hg within a population can lead to an estimated 14% reduction in stroke deaths and 9% reduction in coronary heart disease deaths.<sup>8</sup> For persons with prehypertension (i.e., blood pressure that is elevated above normal but not high enough for medical intervention), reduction of sodium intake might be particularly beneficial because lower blood pressure typically translates to lower risk for heart disease and stroke.<sup>9</sup> Nearly 30% of U.S. adults are prehypertensive.<sup>10</sup>

**Sodium in Foods**

A major challenge to sodium intake reduction efforts is the widespread use of sodium in the U.S. food supply, leaving little to no opportunity for average consumers to adjust their intake. The majority of sodium intake (>75%) is from consuming packaged and restaurant foods.<sup>1,11</sup> Only an estimated 12% of sodium consumption occurs from natural sources, and 11% results from adding salt while cooking or eating a meal.<sup>11</sup> Salt and other sodium-containing ingredients are added to food by manufacturers for many reasons; salt in particular can play multiple roles in flavoring, food processing, and safety at relatively low cost.<sup>1</sup> Sodium can change the properties of food in ways that are useful for food manufacturers, such as extending shelf life or altering texture. In many cases, however, sodium content exceeds the concentrations needed for food safety or essential food processing.<sup>1</sup>

The U.S. Department of Agriculture (USDA) conducts food composition analyses to measure the sodium values of foods that constitute significant sources of dietary intake. Mean sodium values for the same portion of different brands of the same foods can vary substantially; for example, the sodium content of 4-ounce slices of cheese pizza (regular crust) purchased from major pizza restaurant chains can vary from 510 mg to 760 mg.<sup>12</sup> This variation suggests that achieving substantial decreases in sodium levels of commonly consumed foods is feasible.<sup>1</sup> Current labeling regulations are designed to ensure that measured samples of a product do not exceed labeled sodium values by more than 20%.<sup>§</sup> However, laboratory analyses serve as a critical adjunct to closely monitor changes in the sodium content of the food supply and complement food label data.

**Consumer and Health-Care Provider Readiness for Sodium Reduction**

Data from the Behavioral Risk Factor Surveillance System in 21 states indicate that U.S. adults already are taking

steps to reduce their sodium intake. In 2007, >70% of U.S. adults with self-reported hypertension had been advised to reduce their salt intake, and >80% of those adults reported that they were already reducing their intake.<sup>13</sup> Data collected by a national market panel mail survey weighted to the U.S. population indicate that the majority of adult consumers understand the relationship between sodium intake and health, and 68% of consumers aged >50 years are either thinking about lowering their intake, have taken steps to lower their intake, or already have lowered their intake.<sup>14</sup>

Despite the good intentions of U.S. adults, the ubiquity of sodium in processed and prepared foods makes it difficult for them to control their own sodium intake.<sup>1</sup> Thus, interventions that involve food industry participation hold promise as a critical pathway to address this public health problem.

### Current Strategies to Reduce Sodium Intake

In 2010, the Institute of Medicine (IOM) issued a report, “Strategies to Reduce Sodium Intake in the United States,” which concluded that labeling and education efforts to bring about behavior change alone did not succeed in reducing sodium intake in the United States.<sup>1</sup> The primary strategy recommended in the IOM report is to pursue broad, gradual reductions in the sodium content of packaged and prepared foods in the United States through mandatory national standards. In advance of implementing national standards, IOM supports voluntary initiatives involving collaboration between industry, government, and others as a strategy to support sodium reduction. The National Salt Reduction Initiative (NSRI)<sup>||</sup> currently uses this partnership strategy as a framework to achieve its goal to reduce dietary sodium by 20% in 5 years by decreasing sodium content in packaged and restaurant foods by 25% over the same period.

The NSRI is a partnership of more than 85 organizations and local and state health authorities, aiming to re-

duce U.S. dietary sodium through voluntary sodium-content reductions by the food industry. Coordinated by the New York City Health Department, the NSRI strategy is to set feasible sodium reduction targets for 62 packaged food categories and 25 restaurant food categories based on industry feedback and analysis of the NSRI nutrition databases, and then to measure industry progress over time. Targets are set for 2012 and 2014. Twenty-eight companies, including packaged food companies, supermarkets, and restaurant chains, have signed on to meet at least one target. In addition, New York City developed an evaluation process to assess changes in population sodium intake in a representative sample of adult New York City residents.<sup>¶</sup> The baseline evaluation included a 24-hour urine collection and analysis, with additional diagnostic and self-reported measures. A follow-up study will be conducted to monitor changes over time.

On the local level, New York City has introduced several innovative, policy-based strategies to reduce sodium intake. A Mayoral Executive Order in 2008 made New York City the first major U.S. city to set nutrition standards for all food purchased and served by city agencies.<sup>#</sup> The city also has initiated a citywide media campaign that included subway posters and newspaper advertisements to increase public awareness about the sodium content of processed foods. Other projects include an educational initiative about sodium for the city’s independent restaurants and development of retail food standards for hospitals.

### Summary

Sodium reduction is an urgent public health priority that should be addressed by coordinated attention by multiple levels of government, the food industry, and other diverse stakeholders. Average daily sodium intake for U.S. adults is more than double the recommended dietary limit for the majority of this population, leading to adverse health outcomes and economic impacts. The

majority of U.S. adults recognize the health consequences of a high-sodium diet and are interested in reducing their sodium intake. However, packaged and restaurant foods often contain excessive amounts of sodium, which limits the choices of U.S. consumers about how much sodium they consume in those foods. USDA and the Food and Drug Administration recently collected public comments and research to help inform future sodium reduction-related activities.<sup>\*\*</sup> In the interim, the NSRI is a promising voluntary process to encourage public commitments by industry to sodium reduction. Reducing sodium in the food supply will increase consumer choice, has been shown to be feasible for the food industry, and will save thousands of lives and billions of health-care dollars each year.

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\*Additional information is available at [http://www.heart.org/heartorg/gettinghealthy/nutritioncenter/healthydietgoals/sodium-salt-or-sodium-chloride\\_ucm\\_303290\\_article.jsp](http://www.heart.org/heartorg/gettinghealthy/nutritioncenter/healthydietgoals/sodium-salt-or-sodium-chloride_ucm_303290_article.jsp).

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