



# CARDI•OH

Ohio Cardiovascular and Diabetes Health Collaborative



In partnership with:



## Overview of Salt Restriction

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# Objectives



- Explain the role of salt intake in controlling blood pressure (BP).
- Describe the epidemiology of excessive salt intake across the American population.
- Describe a strategy to promote reduced salt consumption among patients with hypertension.



# Factors Associated with Increased Salt Sensitivity

## Fixed Factors

- Middle and older ages
- African Americans
- Genetic factors
- Individuals with:
  - Hypertension
  - Diabetes
  - Chronic renal insufficiency

## Modifiable Factors

- Low potassium intake
- Poor diet quality



# DASH-Sodium Trial



- Design: Randomized feeding trial
- Participants: 412 adults, ages 20+, systolic BP 120-159 mmHg and diastolic BP 80-95 mmHg, not on medication
- Randomized Groups:
  - Two diets (DASH and Control diets)
  - Three sodium levels (142, 105, 67)
- Outcome: blood pressure at the end of one month

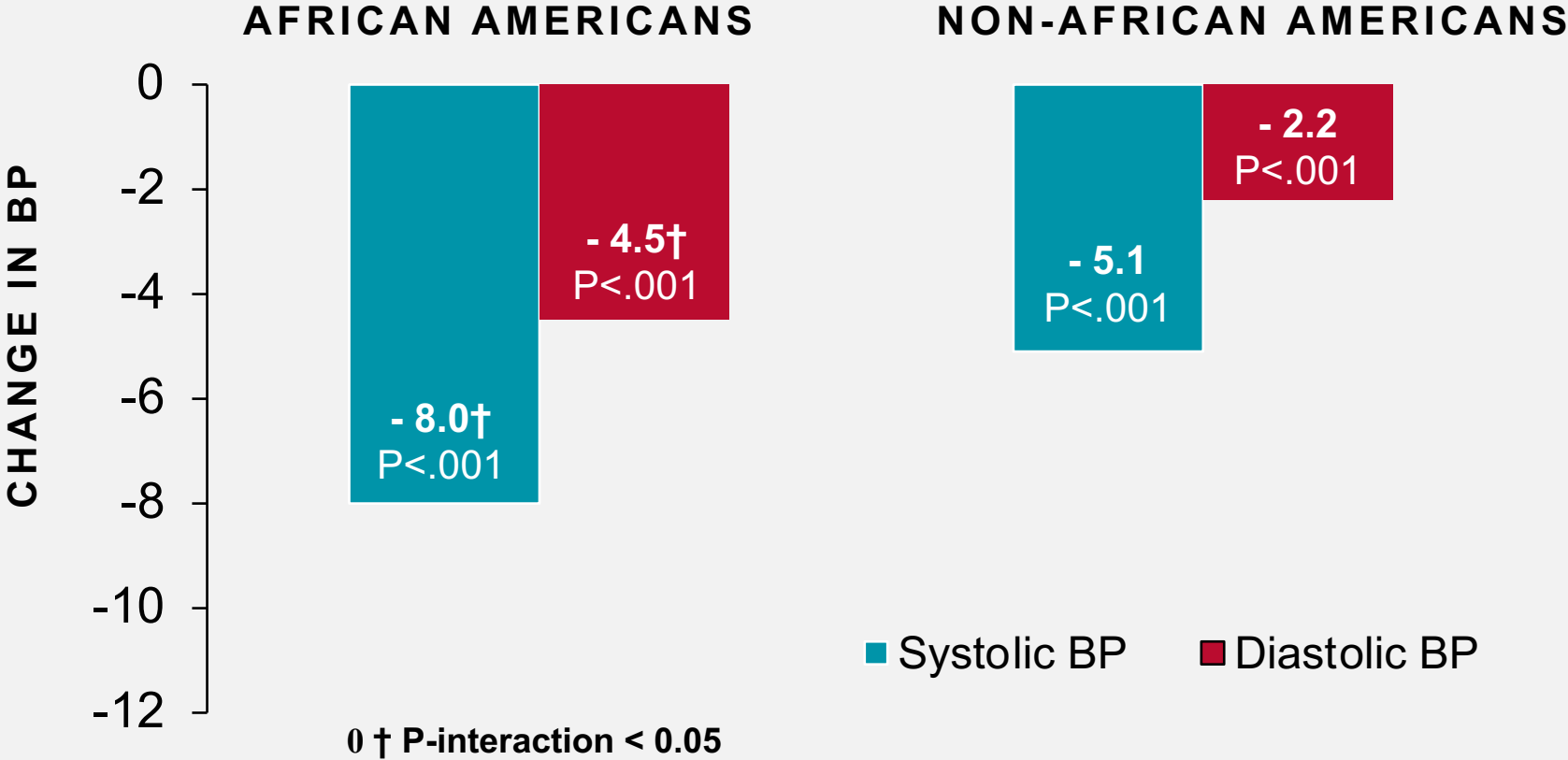


# Achieved Sodium Levels

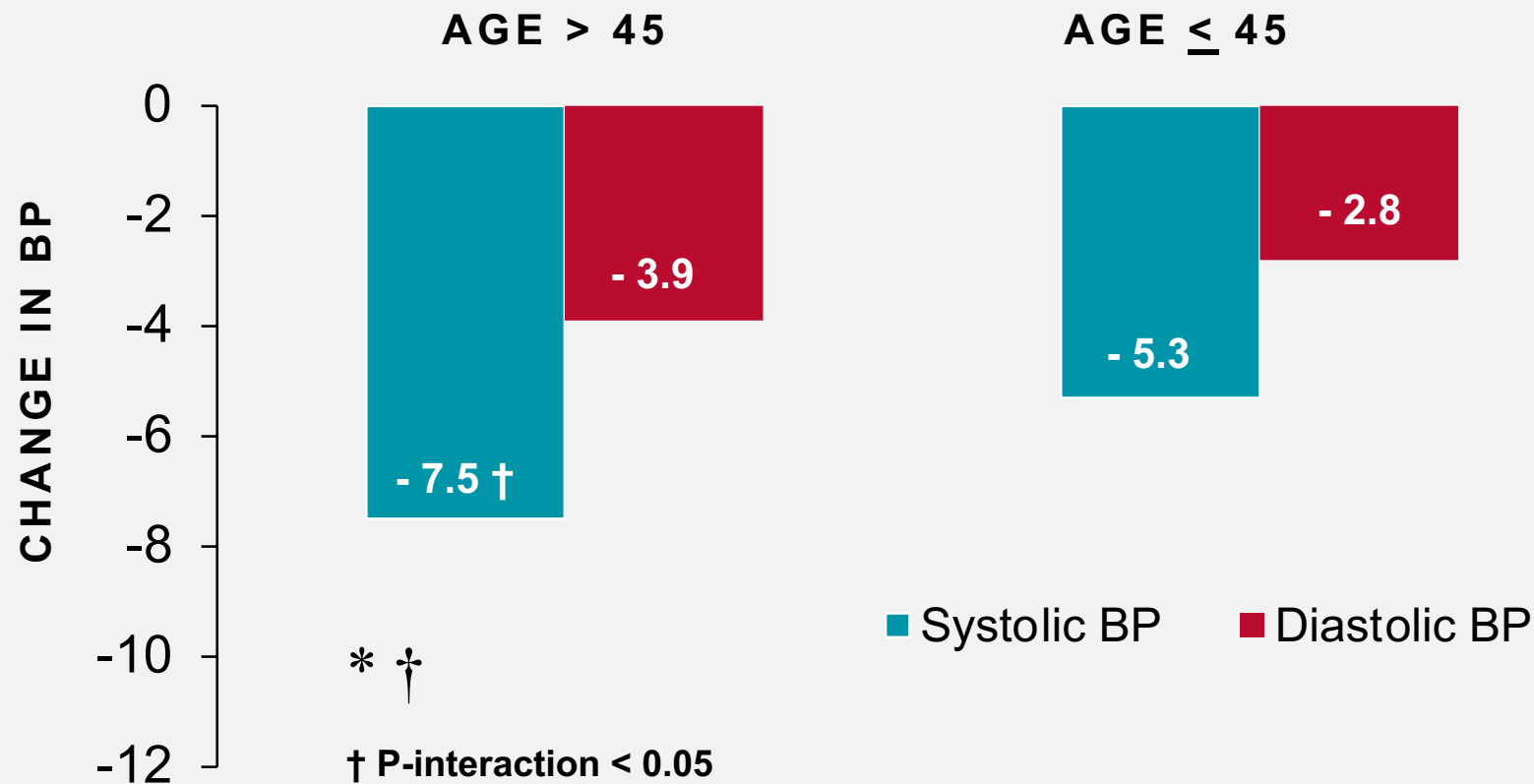


- “Higher”: 143 mmol/d (3.3 g)
  - Similar to average U.S. intake
- “Intermediate”: 106 mmol/d (2.4 g)
  - Upper limit of traditional guidelines for hypertension prevention and treatment
- “Lower”: 65 mmol/d (1.5 g)
  - Possible optimal level

# Effect of Salt Reduction on the Control Diet by Race



# Effect of Sodium Reduction on the Control Diet by Age Group



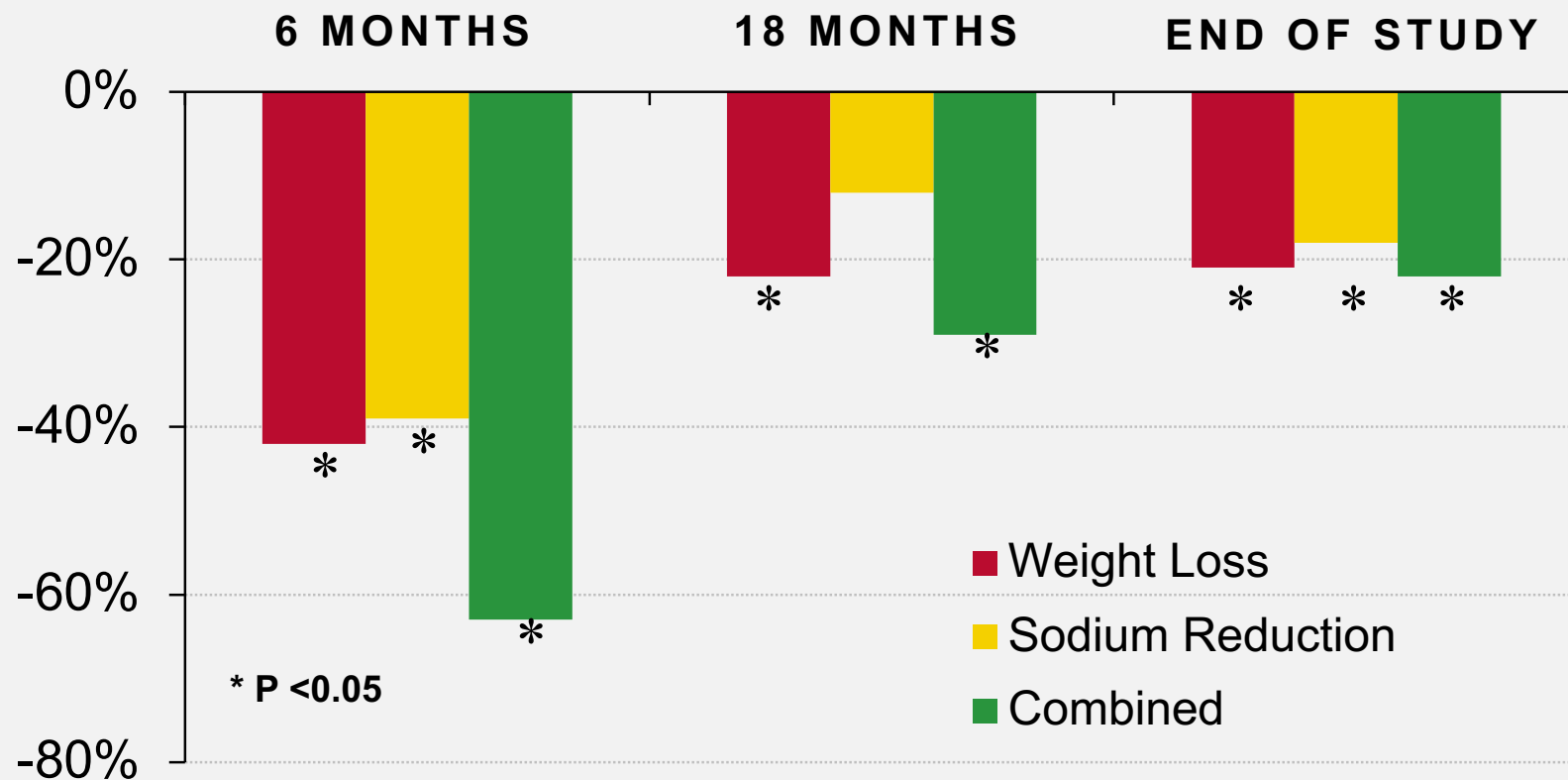


# Phase 2 of the Trials of Hypertension Prevention (TOHP2)



Can sodium reduction and/or weight loss prevent hypertension in overweight pre-hypertensive adults?

# Percent Reduction in Incident Hypertension over 36-48 Months from Weight Loss and Sodium Reduction Interventions in TOHP<sub>2</sub>

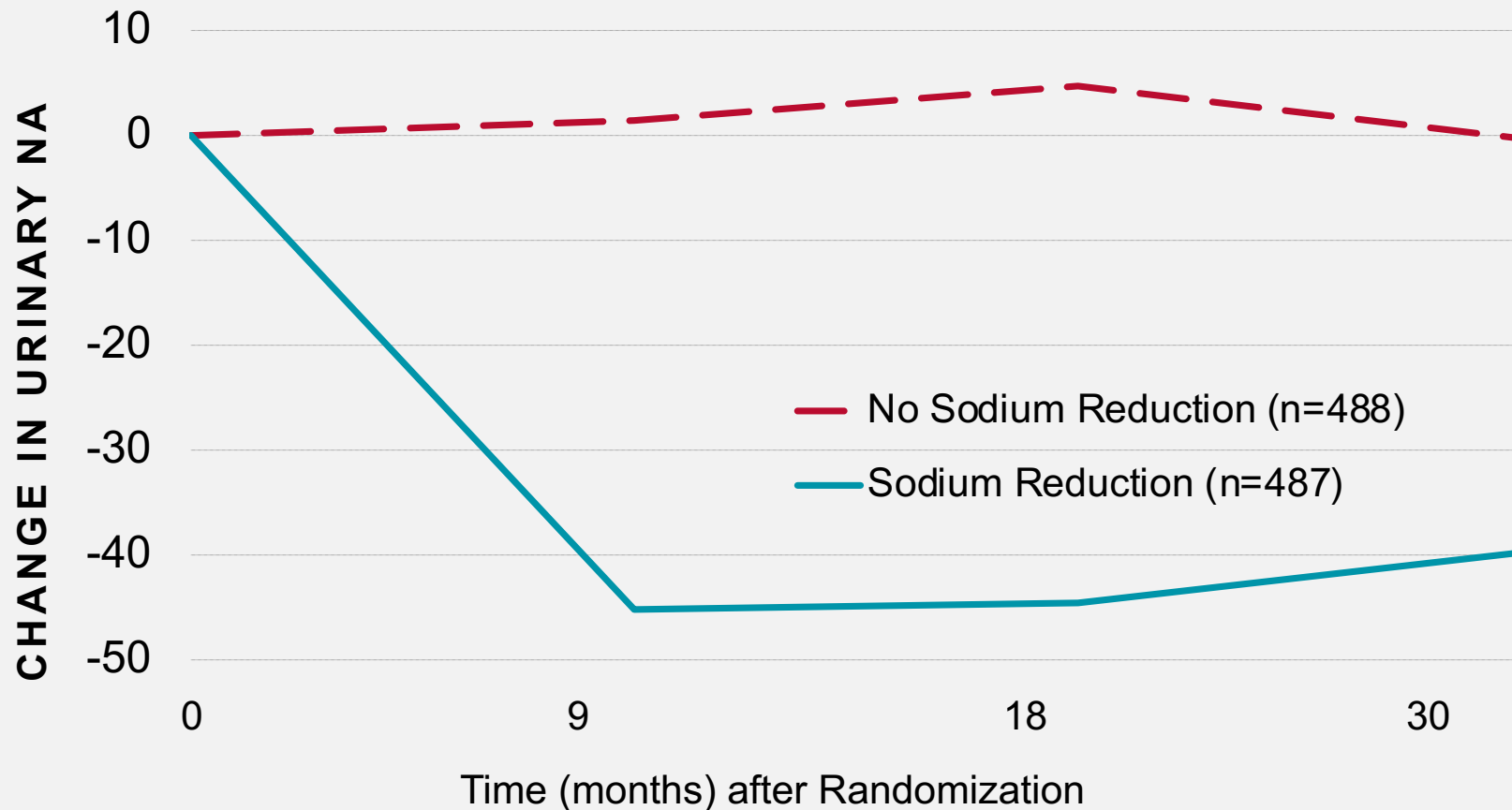


# Trial of Non-Pharmacologic Interventions in the Elderly (TONE)



Can older-aged (60-80 year-old) medication treated hypertensive adults make and sustain lifestyle changes (sodium reduction and weight loss) that control blood pressure?

# Mean Change in Urinary Sodium Excretion (mmol/24hr) in Older-Aged Persons (TONE)



Can sodium reduction prevent cardiovascular disease (CVD) events?

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



	INTERVENTION	OUTCOME	FOLLOW-UP
<b>TONE (2001)</b> (Population = 639 Elderly)	↓ Na	21% ↓ CVD events	2.3 years
<b>Taiwan Veterans (2006)</b> (Population = 1,981 Elderly)	↓ Na / ↑ K Salt	41%* ↓ CVD Mortality	2.6 years
<b>TOHP Follow-up (2007)</b> (Population = 3,126 Prehypertensives)	↓ Na	30%* ↓ CVD events	10-15 years

\*p<0.05

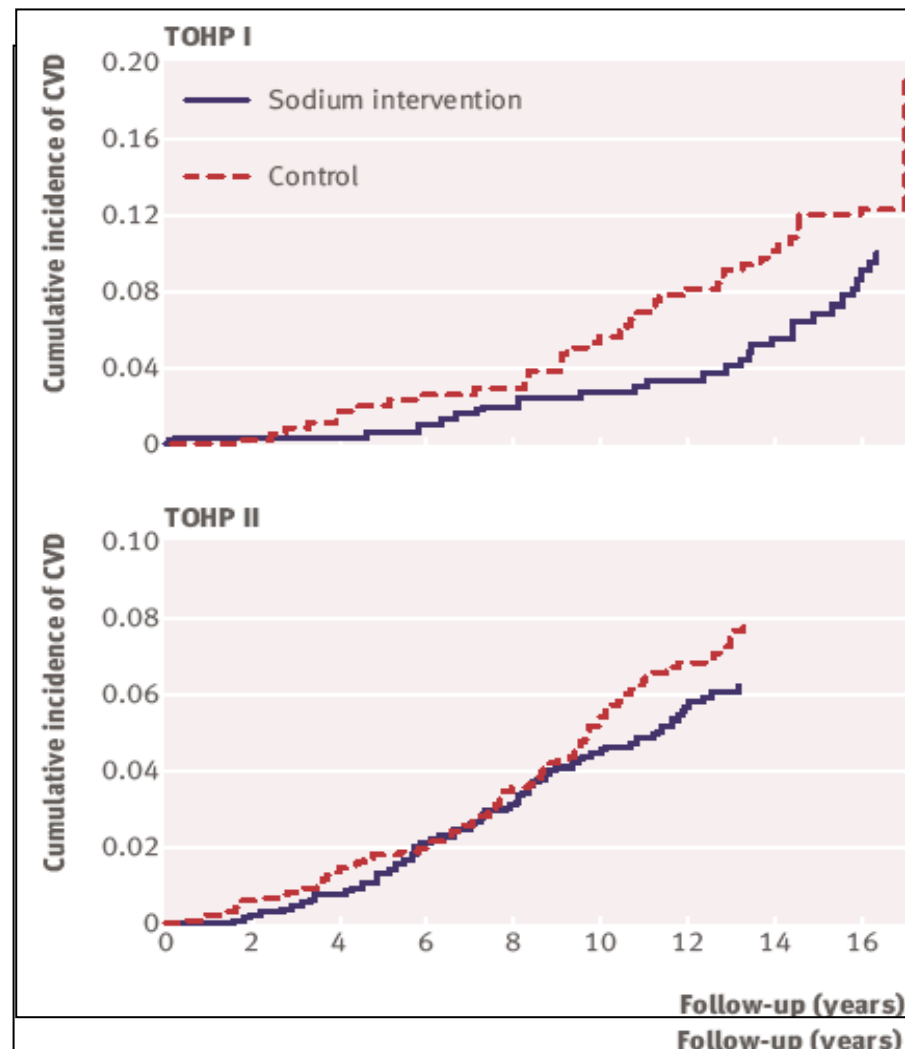
Na = Salt

K Salt = Potassium-Enriched Salt

# Effects of Reduced Sodium Intake on CVD: Long Term Results from the Trials of Hypertension Prevention



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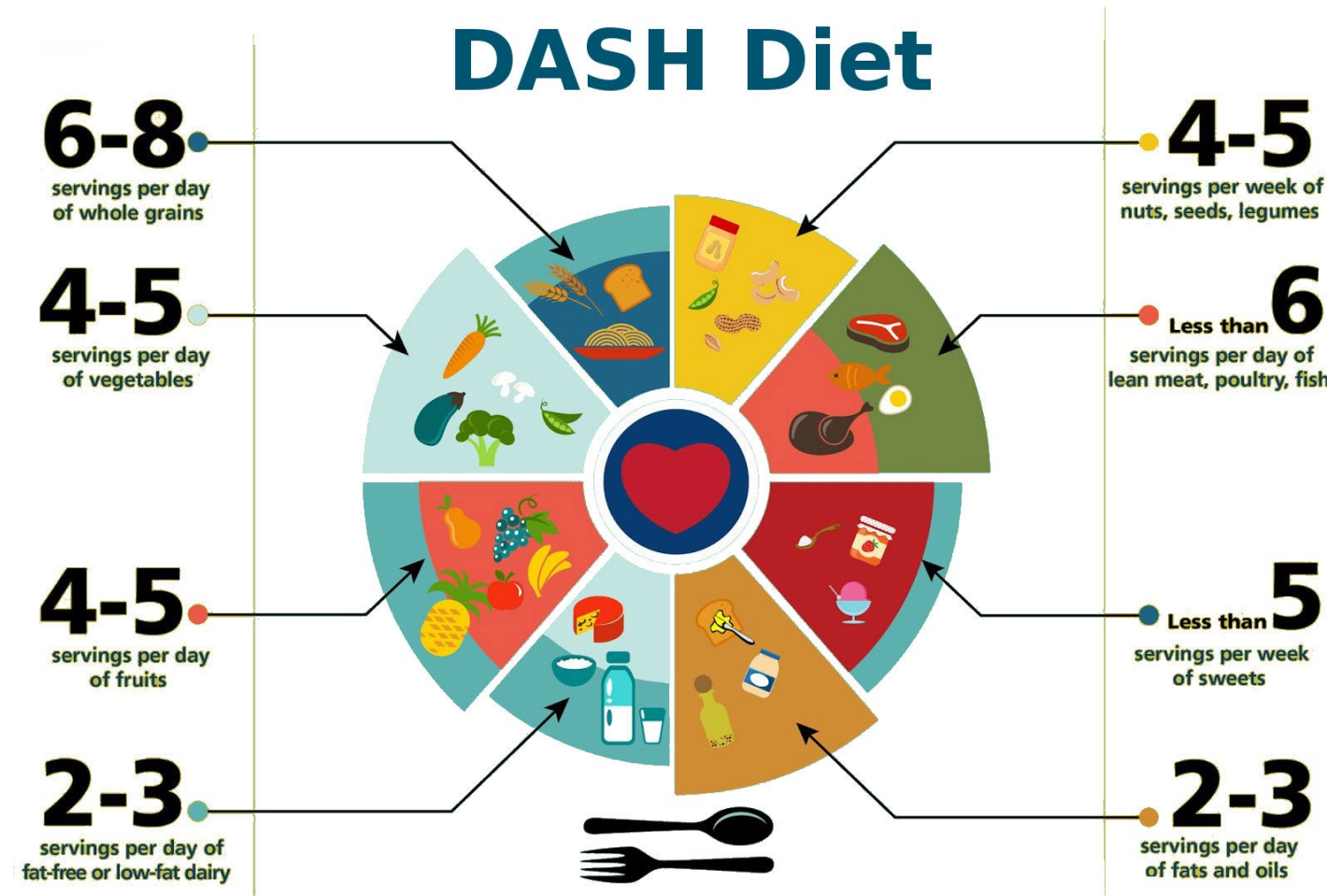
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# Dietary Strategies to Address Hypertension (DASH)



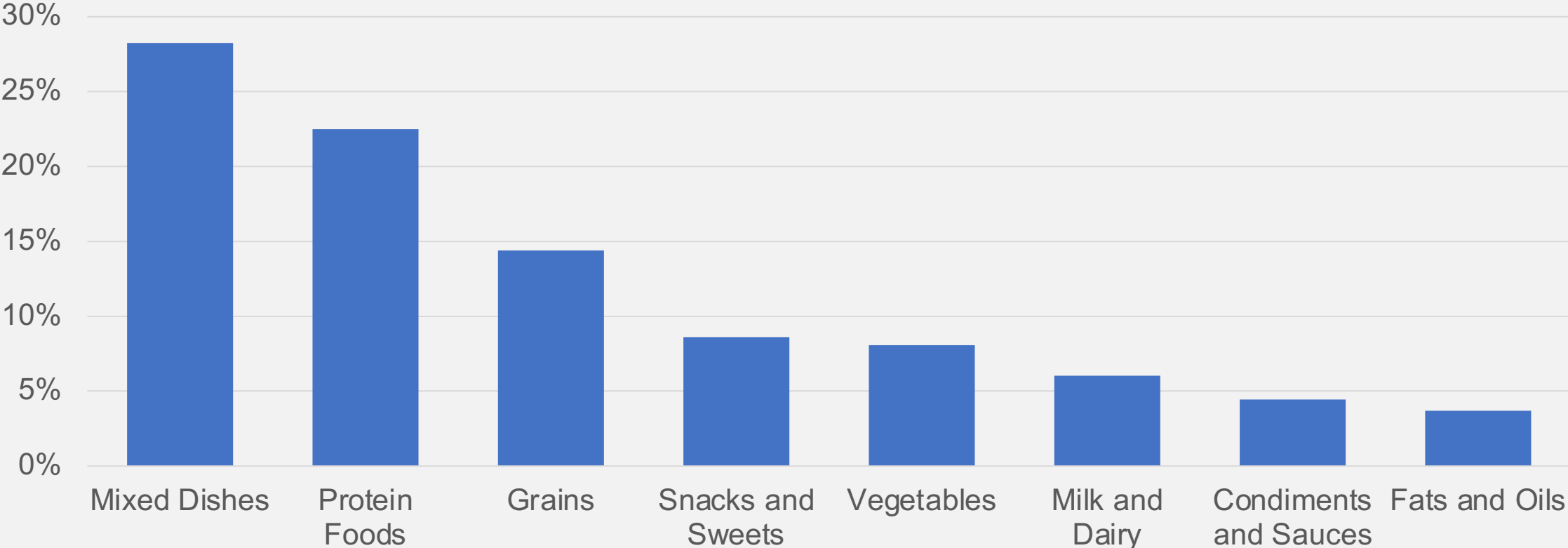
# Components of DASH



# Where is Sodium in the Diet?

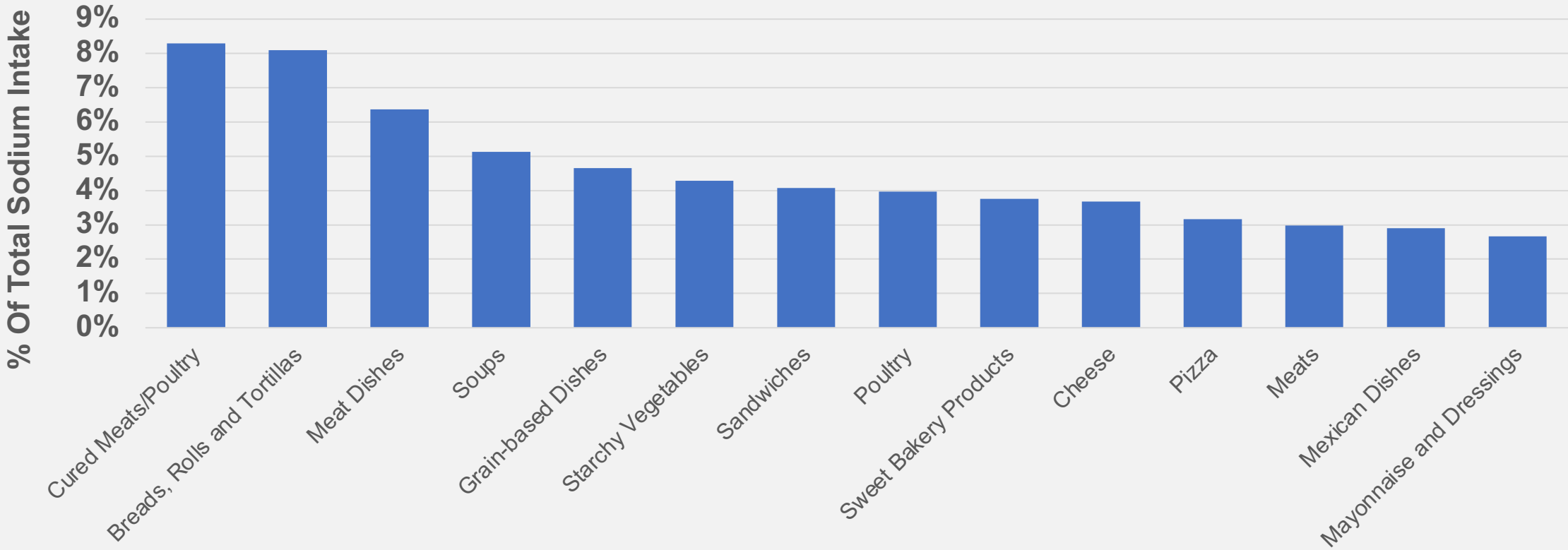


Percent of Total Sodium Intake

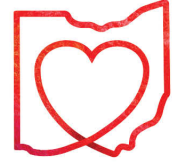


National Health and Nutrition Examination Survey (NHANES) 2005-2016, ≥50 years

# Where is Sodium in the Diet?



# Understand What a Label Is and Isn't



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<b>Nutrition Facts</b>		Amount/serving	%DV*	Amount/serving	%DV*
Serv. Size 1/2 cup (120mL) condensed soup Servings about 2.5		<b>Total Fat</b> 1g	<b>2%</b>	<b>Sodium</b> 410mg	<b>17%</b>
<b>Calories</b> 90 Fat Cal. 10		Sat. Fat 0g	<b>0%</b>	<b>Potassium</b> 700mg	<b>20%</b>
		Trans Fat 0g		<b>Total Carb.</b> 19g	<b>6%</b>
		Polyunsat. Fat 0.5g		Fiber 3g	<b>12%</b>
		Monounsat. Fat 0g		Sugars 5g	
		<b>Cholest.</b> 0mg	<b>0%</b>	<b>Protein</b> 2g	
*Percent Daily Values (DV) are based on a 2,000 calorie diet.		Vitamin A 35% • Vitamin C 0% • Calcium 2% • Iron 4%			

$$410 \text{ mg} \times 2.5 \text{ servings} = 1,025 \text{ mg}$$

# Strategies to Reduce Sodium Intake

- Limit high sodium foods
  - Highly processed foods and soups
- Identify sneaky sources
  - Common foods consumed repeatedly with modest sodium
  - ‘Mixed’ dishes
- Manage flavor profiles and sensory thresholds
- Understand the implications of fad diets (keto, low carb, gluten-free)

# Additional Resources

## THE DASH EATING PLAN

The DASH eating plan shown below is based on **2,000 calories a day**. The number of daily servings in a food group may vary from those listed, depending upon your caloric needs.

FOOD GROUP	DAILY SERVINGS (EXCEPT AS NOTED)	SERVING SIZES
Grains and grain products	7-8	1 slice bread 1 cup ready-to-eat cereal* 1/2 cup cooked rice, pasta, or cereal
Vegetables	4-5	1 cup raw leafy vegetable 1/2 cup cooked vegetable 6 ounces vegetable juice
Fruits	4-5	1 medium fruit 1/4 cup dried fruit 1/2 cup fresh, frozen, or canned fruit 6 ounces fruit juice
Lowfat or fat free dairy foods	2-3	8 ounces milk 1 cup yogurt 1 1/2 ounces cheese
Lean meats, poultry, and fish	2 or fewer	3 ounces cooked lean meat, skinless poultry, or fish
Nuts, seeds, and dry beans	4-5 per week	1/3 cup or 1 1/2 ounces nuts 1 tablespoon or 1/2 ounce seeds 1/2 cup cooked dry beans
Fats and oils†	2-3	1 teaspoon soft margarine 1 tablespoon lowfat mayonnaise 2 tablespoons light salad dressing 1 teaspoon vegetable oil
Sweets	5 per week	1 tablespoon sugar 1 tablespoon jelly or jam 1/2 ounce jelly beans 8 ounces lemonade

\* Serving sizes vary between 1/2 cup and 1 1/4 cups. Check the product's nutrition label.

† Fat content changes serving counts for fats and oils: For example, 1 tablespoon of regular salad dressing equals 1 serving, 1 tablespoon of lowfat salad dressing equals 1/2 serving, and 1 tablespoon of fat free salad dressing equals 0 servings.



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## Find an RD tool

[https://www.nhlbi.nih.gov/files/docs/public/heart/dash\\_brief.pdf](https://www.nhlbi.nih.gov/files/docs/public/heart/dash_brief.pdf)  
[https://www.nhlbi.nih.gov/files/docs/public/heart/new\\_dash.pdf](https://www.nhlbi.nih.gov/files/docs/public/heart/new_dash.pdf)  
<https://findanrd.eatright.org/>

IN BRIEF:

## Your Guide To Lowering Your Blood Pressure With DASH



What you eat affects your chances of developing high blood pressure (hypertension). Research shows that high blood pressure can be prevented—and lowered—by following the Dietary Approaches to Stop Hypertension (DASH) eating plan, which includes eating less sodium.

High blood pressure is blood pressure higher than 140/90 mmHg\*, and prehypertension is blood pressure between 120/80 and 139/89 mmHg. High blood pressure is dangerous because it makes your heart work too hard, hardens the walls of your arteries, and can cause the brain to hemorrhage or the kidneys to function poorly or not at all. If not controlled, high blood pressure can lead to heart and kidney disease, stroke, and blindness.

But high blood pressure can be prevented—and lowered—if you take these steps:

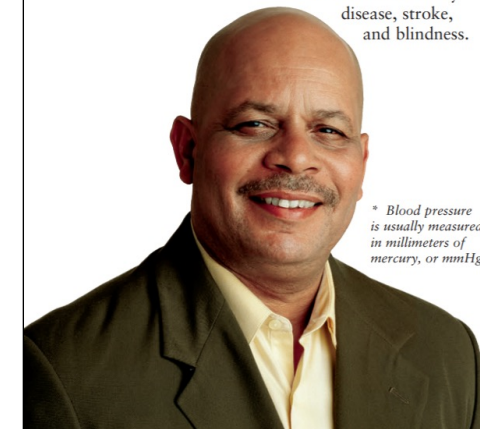
- Follow a healthy eating plan, such as DASH, that includes foods lower in sodium.
- Maintain a healthy weight.
- Be moderately physically active for at least 2 hours and 30 minutes per week.
- If you drink alcoholic beverages, do so in moderation.

If you already have high blood pressure and your doctor has prescribed medicine, take your medicine, as directed, and follow these steps.

### The DASH Eating Plan

The DASH eating plan is rich in fruits, vegetables, fat-free or low-fat milk and milk products, whole grains, fish, poultry, beans, seeds, and nuts. It also contains less sodium; sweets, added sugars, and beverages containing sugar; fats; and red meats than the typical American diet. This heart-healthy way of eating is also lower in saturated fat, *trans* fat, and cholesterol and rich in nutrients that are associated with lowering blood pressure—mainly potassium, magnesium, calcium, protein, and fiber.

\* Blood pressure is usually measured in millimeters of mercury, or mmHg.



**NIH** National Heart, Lung, and Blood Institute