

# «The role of diet in Hypertension for the prevention and treatment of CKD»

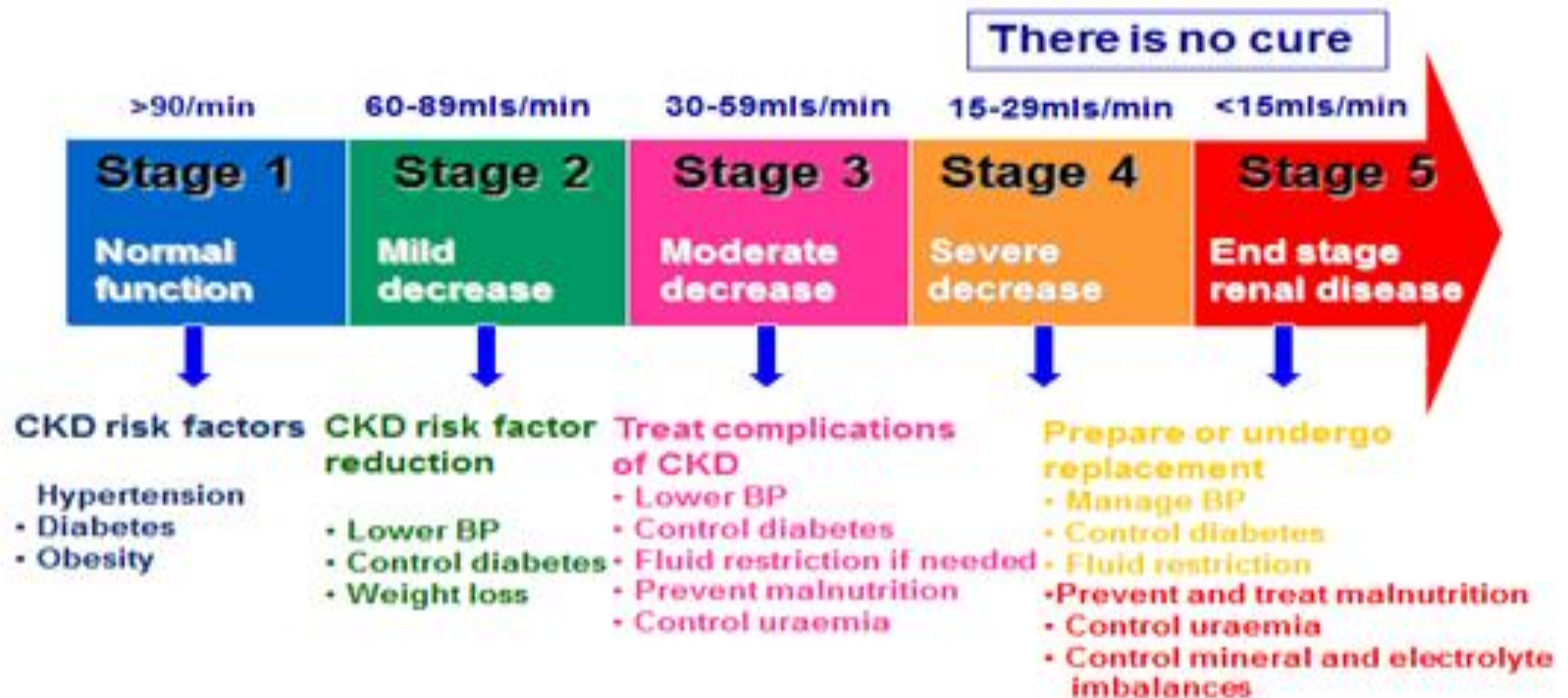
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# About CKD

- ∞ The kidneys regulate the composition and volume of blood, remove metabolic wastes in the urine, and help control the acid/base balance in the body. They activate vitamin D needed for calcium absorption and produce erythropoietin needed for red-blood-cell synthesis.
- ∞ CKD is typically a progressive disease.
- ∞ It is defined as: Reduction of kidney function—defined as an estimated glomerular filtration rate (eGFR)  $< 60$  mL/min/1.73 m<sup>2</sup> **and/or**
- ∞ Evidence of kidney damage, including persistent albuminuria—defined as  $> 30$  mg of urine albumin per gram of urine creatinine

# CKD STAGES



# CKD RISK FACTORS

Diabetes  
Hypertension  
Family history of kidney failure  
Cardiovascular disease  
Recurrent urinary tract infections  
HIV infection  
Immunological diseases

No symptoms!  
Silent Killer!

- ✓ HTN may be the earliest sign of kidney dysfunction and appropriate HTN management reduces both cardiovascular and kidney outcomes.

CKD Is Common Among Adults in the United States

**Fast Stat: 30 million people**  
or 15% of US adults  
are estimated to have CKD.



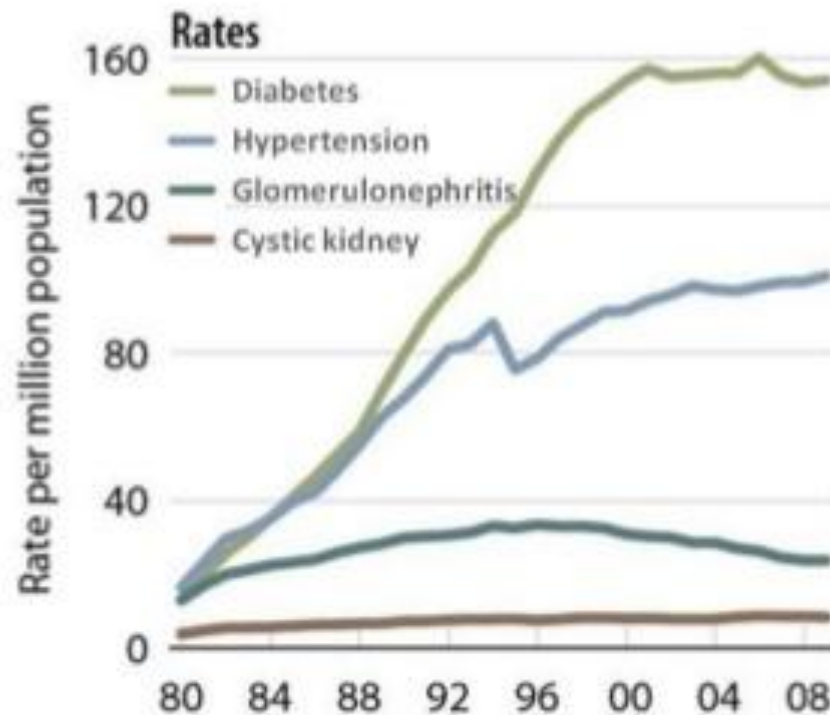
More than  
1 in 7

## FACTS

- More than half of the people with CKD have high blood pressure.
- Hypertension increases the chance that kidney disease will get worse.
- High blood pressure (BP) makes more likely heart disease to develop
- Following treatment plan carefully and keeping BP under control can help prevent these complications.
- Treatment for high BP and CKD includes following a healthy diet, exercising and taking medications.
- BP should be controlled to less than 130/80 CKD

# Diabetes is the leading cause of ESRD, followed by hypertension

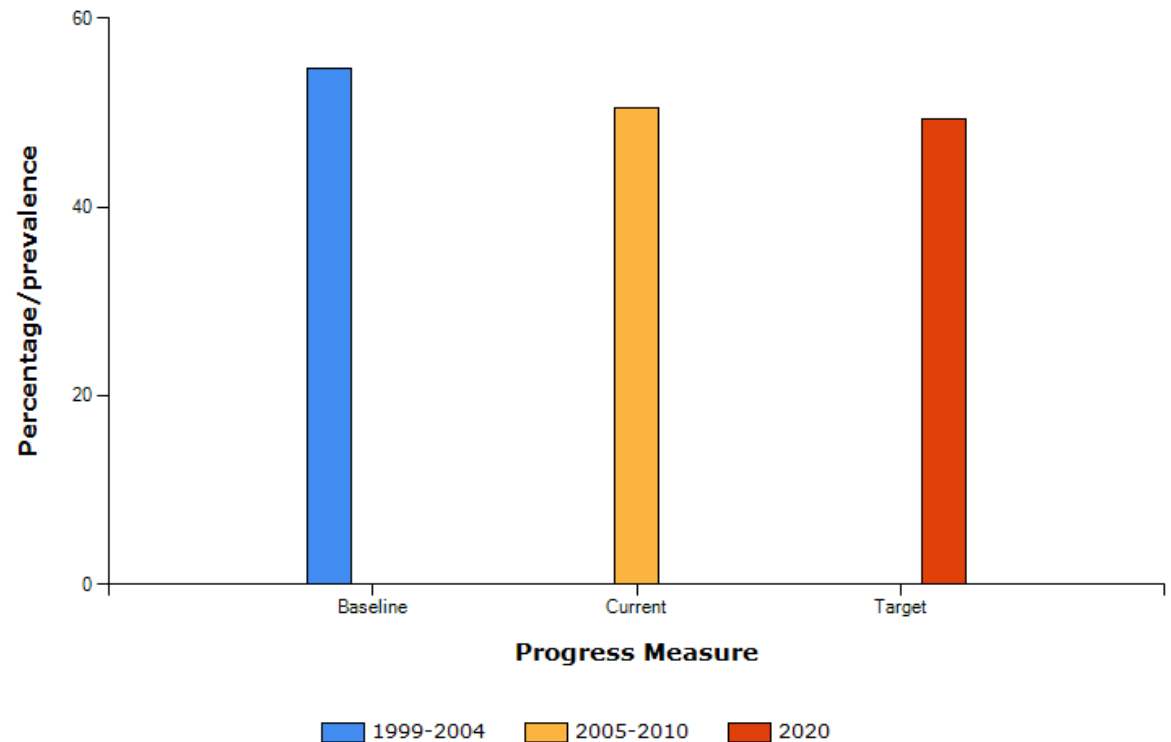
Adjusted incidence rates of ESRD by primary diagnosis



# PREVALENCE

## Prevalence of Elevated Blood Pressure in CKD People 1999-2004 vs. 2005-2010 vs. 2020 Target by Progress Measure and Year

National Health and Nutrition Examination Survey

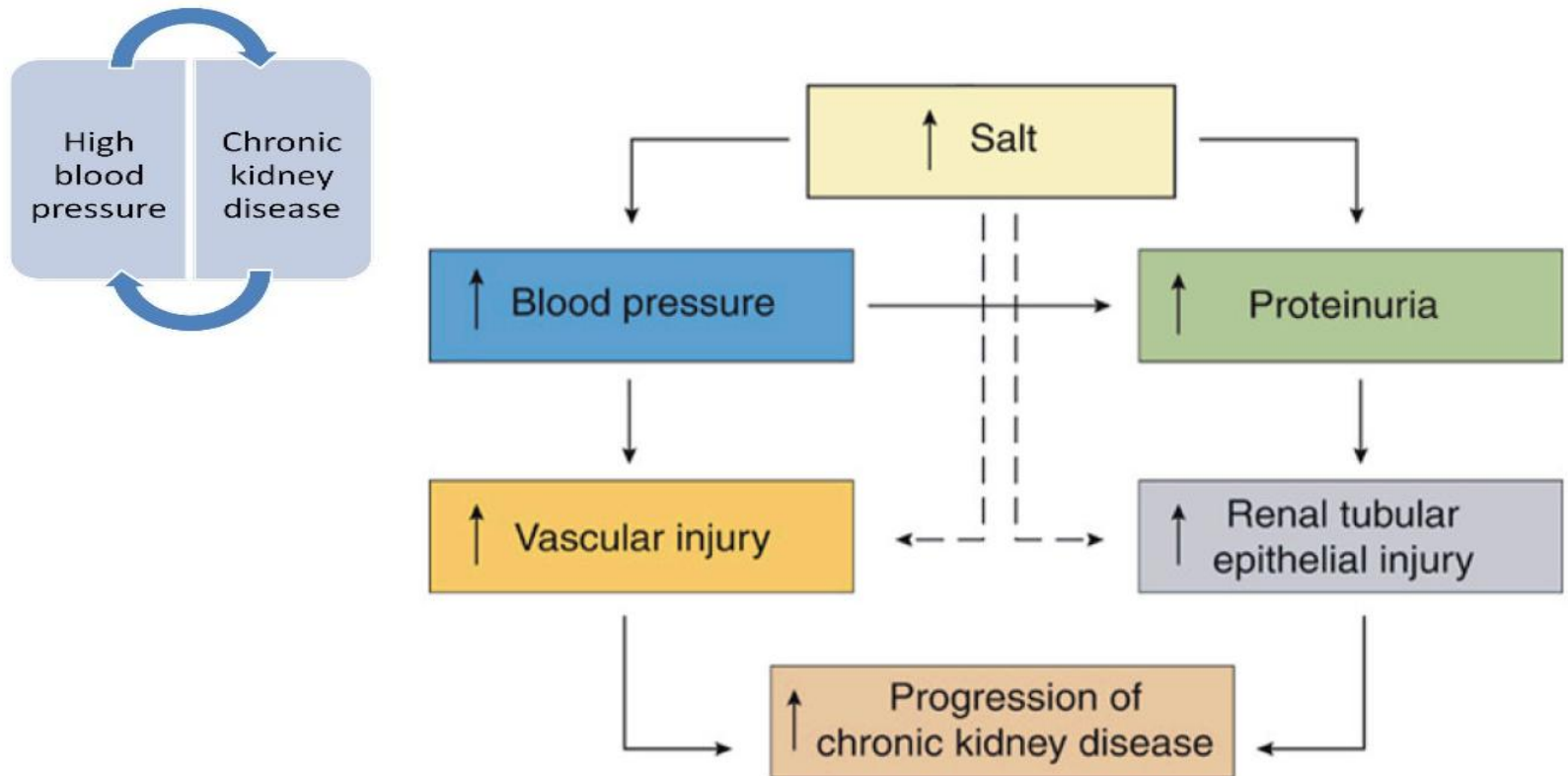


Centers for Disease Control and Prevention. Chronic Kidney Disease Surveillance System—United States. website. <http://nccd.cdc.gov/CKD>.

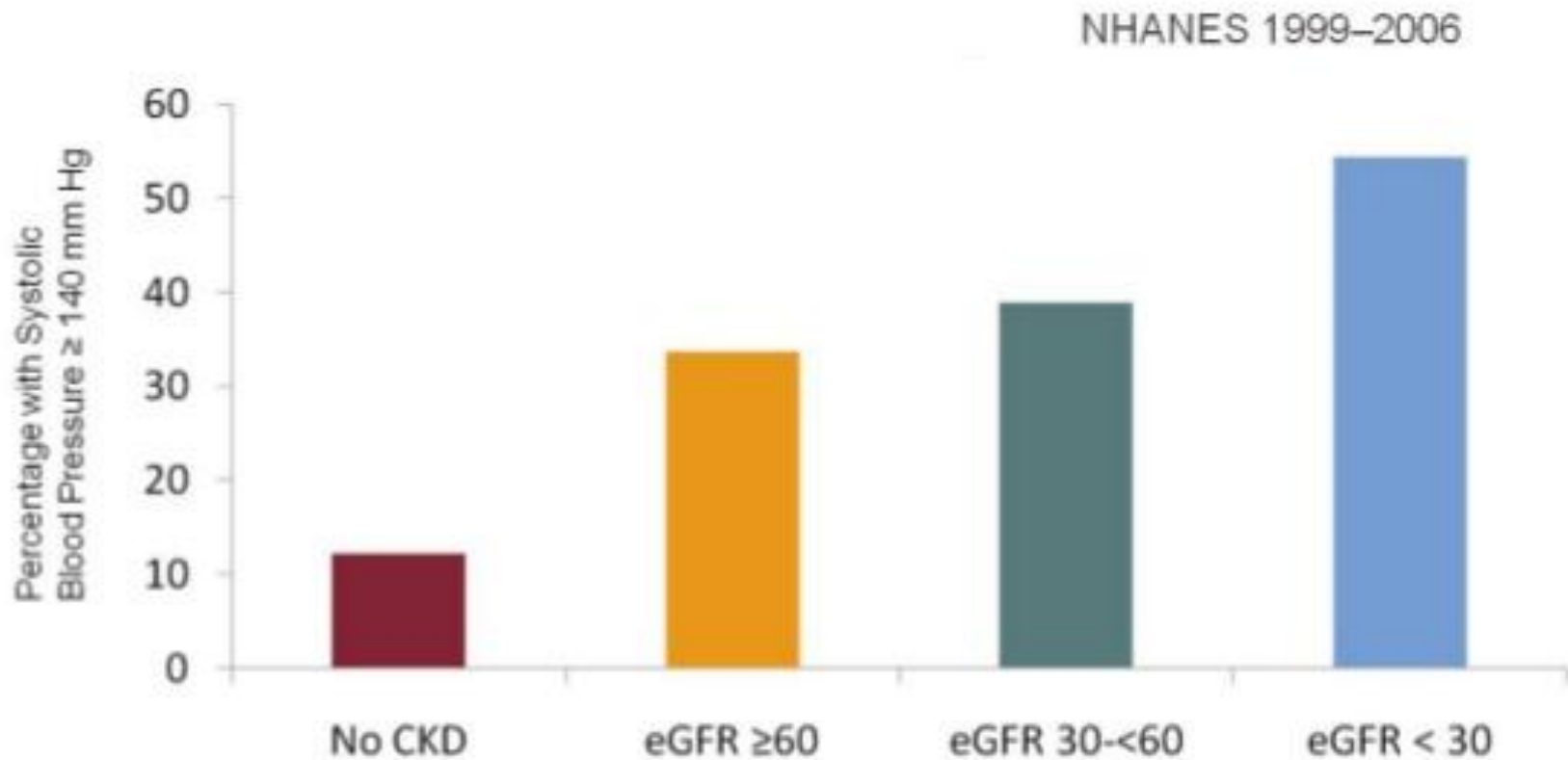
To improve cardiovascular care in people with CKD, **Healthy People 2020** objective (6a) aims to reduce the proportion of persons with CKD who have elevated blood pressure by 10%. The overall proportion of people with CKD and hypertension declined from 54.7% to 50.5% over the past decade, which is near the **HP 2020 target of 49.3% or less**.

# Interplay between dietary salt, blood pressure, proteinuria and kidney disease progression

**Hypertension may cause CKD, and CKD may cause worsening hypertension**

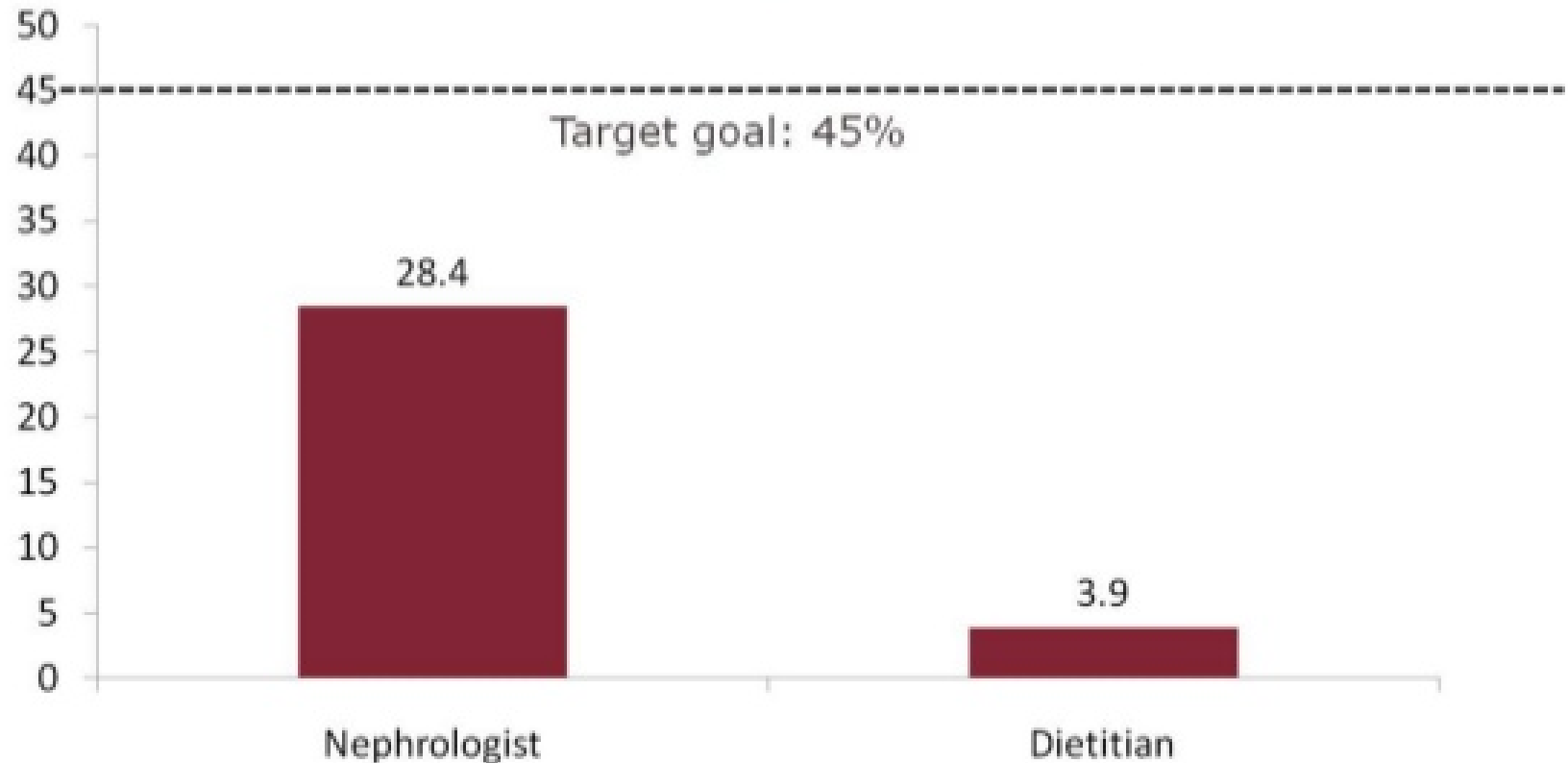


# Blood pressure is poorly controlled in people with CKD



# Too few people receive counseling prior to dialysis

Pre-ESRD counseling and care for greater than 12 months (2008)



# Complications

- ∞ As eGFR declines, **complications** occur more commonly and are more severe. These may include:
- ∞ Malnutrition
- ∞ Metabolic acidosis due to reduced acid (hydrogen ion) excretion
- ∞ Hyperkalemia
- ∞ Mineral imbalance and bone disorder (calcium, phosphorus, and vitamin D)
- ∞ Anemia due to impaired erythropoiesis and low iron stores
- ∞ Cardiovascular disease (CVD) (dyslipidemia)

# Slow Progression CKD

Therapeutic Goal and Its Relevance	Ranges/Goals	Dietary Intervention
<p><b>Control Blood Pressure</b></p> <p>Blood pressure control slows progression of CKD and lowers CVD risk.</p> <p>Sodium plays a large role in blood pressure control in CKD as a result of alterations in sodium excretion by the kidneys.</p>	<p>Less than 140/90 mmHg</p>	<ul style="list-style-type: none"> <li>• Limit sodium intake to 2,300 mg a day or less (IOM, 2013).</li> <li>• Weight reduction may be beneficial.</li> <li>• Monitor serum potassium in patients on renin angiotensin aldosterone system (RAAS) antagonists; limit dietary potassium intake when serum potassium &gt; 5 mEq/L.</li> </ul> <p><b>Additional Information</b></p> <p>For patients with hypertension, reduction of dietary sodium has been associated with improved blood pressure control in clinical trials and epidemiological studies.</p> <p>Multiple medications may be required to control blood pressure. RAAS antagonists, such as angiotensin-converting enzyme inhibitors (ACEi) or angiotensin receptor blockers (ARBs), are often used to control blood pressure, delay progression, reduce albuminuria, and protect against heart disease. These medications increase the risk of hyperkalemia.</p> <p>Diuretics are prescribed to treat fluid overload and high blood pressure, and may help control serum potassium levels.</p>
<p><b>Reduce Albuminuria</b></p> <p>Decreased albuminuria is associated with slower progression of CKD, particularly in diabetics. Limiting dietary protein may reduce albuminuria and improve blood glucose control, hyperlipidemia, blood pressure, renal bone disease, and metabolic acidosis. (de Zeeuw et al, 2004).</p>	<p>Reduce or stabilize the amount of albumin lost in the urine (see UACR on page 2).</p>	<p>Limit excessive dietary protein as follows:</p> <ul style="list-style-type: none"> <li>• Nondiabetic: 0.8 g protein/kg/day.</li> <li>• Diabetic: 0.8-1.0 g protein/kg/day.</li> </ul> <p>Evidence suggests that further lowering to 0.6 g protein/kg/day in nondiabetic patients may be beneficial, but adherence is difficult. Some patients may be able to achieve this level with intensive counseling.</p> <p><b>Additional Information</b></p> <p>Limiting excessive protein may activate adaptive responses that decrease albuminuria and increase serum albumin, without increasing risk for protein malnutrition. Reducing excessive protein also decreases nitrogen, phosphorus, and potassium intake.</p>

# GUIDELINES

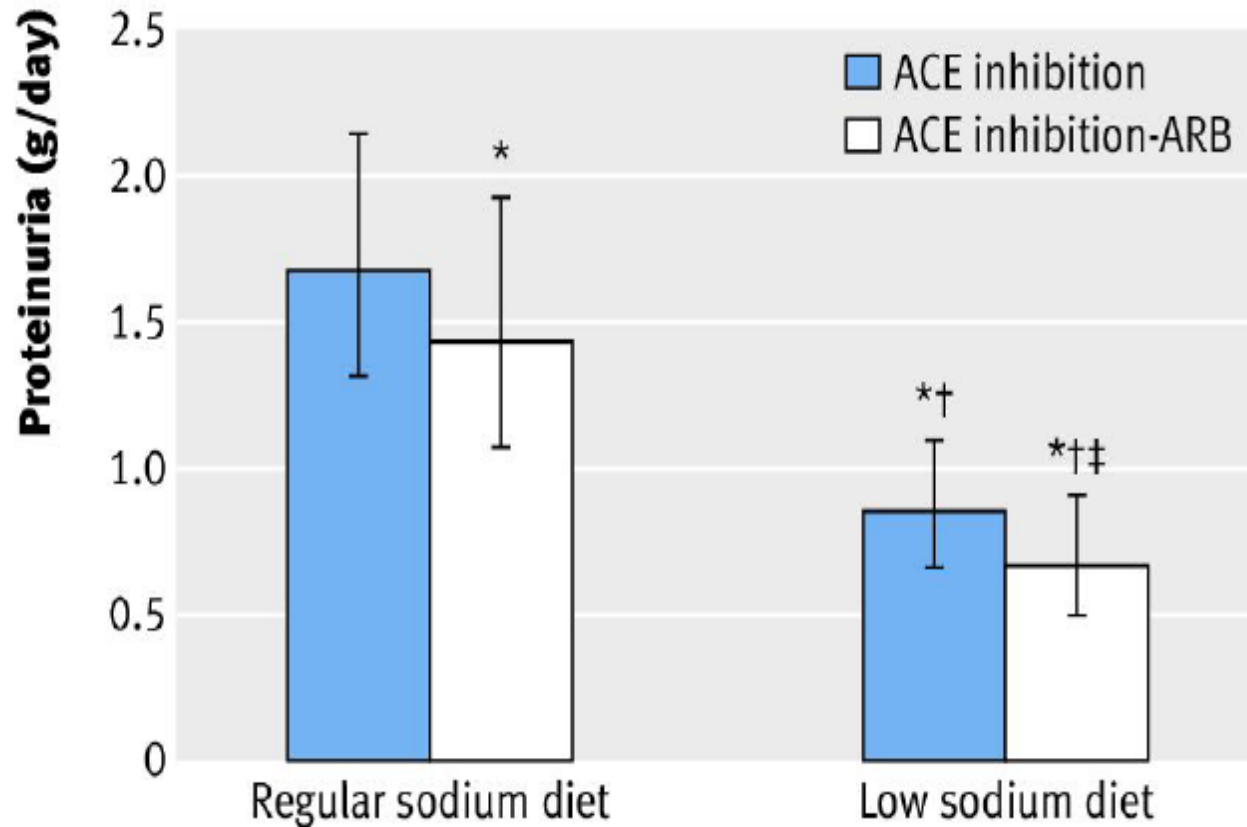
	<b>Recommended Limit for Healthy Adults</b>	<b>Additional Considerations</b>	<b>Food examples that could account for the <i>entire daily limit</i></b>
<b>World Health Organization</b>	2.0 g/day	Lower if specified by national targets	1 large taco + 1 cup of refried beans
<b>United States Department of Agriculture</b>	2.3 g/day	1.5 g/day in those who may benefit (hypertensive, Black race, middle older age adults)	1 teaspoon of table salt (NaCl)
<b>Institute of Medicine</b>	1.5 g/day Adequate Intake (AI) 2.3 g/day Upper Limit (UL)	AI to ensure nutrient adequacy, not to prevent chronic disease. AI not applicable to certain populations (e.g. highly active with large sweat losses)	6–8 fast food batter fried shrimp One 6" tuna salad sub sandwich + 1 cup chicken noodle soup
<b>American Heart Association</b>	2.3 g/day	Recommended as an achievable target	5 fast food chicken select strips + 1 large fry + 1 chocolate shake
<i>Kidney Disease Not Specifically Noted Above</i>			
<b>NKF K/DOQI Guidelines</b>	2.4 g/day	2.0 g/day Hemodialysis Reductions in Peritoneal Dialysis	1 cup beans & franks + 1 cup potato salad

# CKD RESEARCH

- ⌘ Limiting salt consumption in CKD patients, who receive angiotensin inhibitors 2, appears to decrease beyond blood pressure, albumin, and also total urinary albumin.
- ⌘ Unfortunately, there aren't large randomized studies on the benefits of low sodium intakes, in CKD patients, and therefore the recommendations are based on the benefits for the general population.

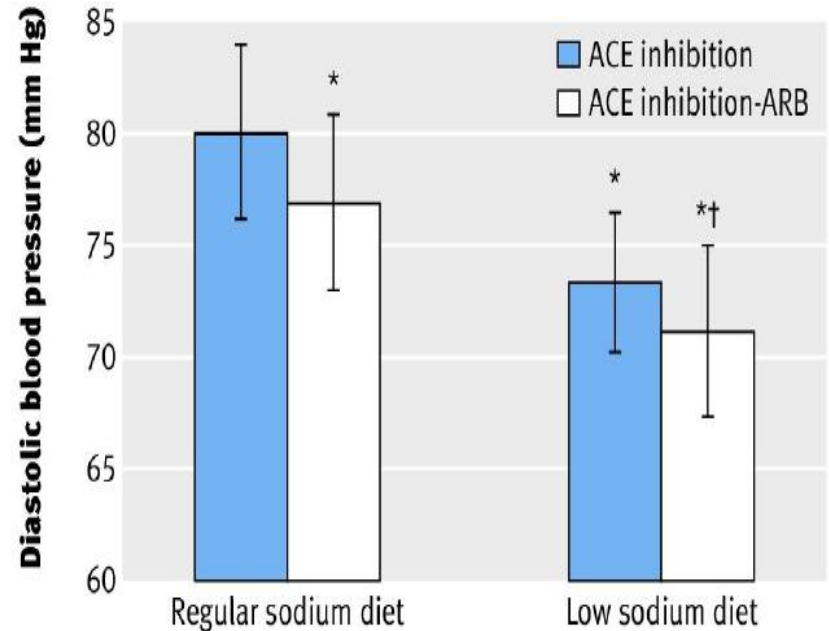
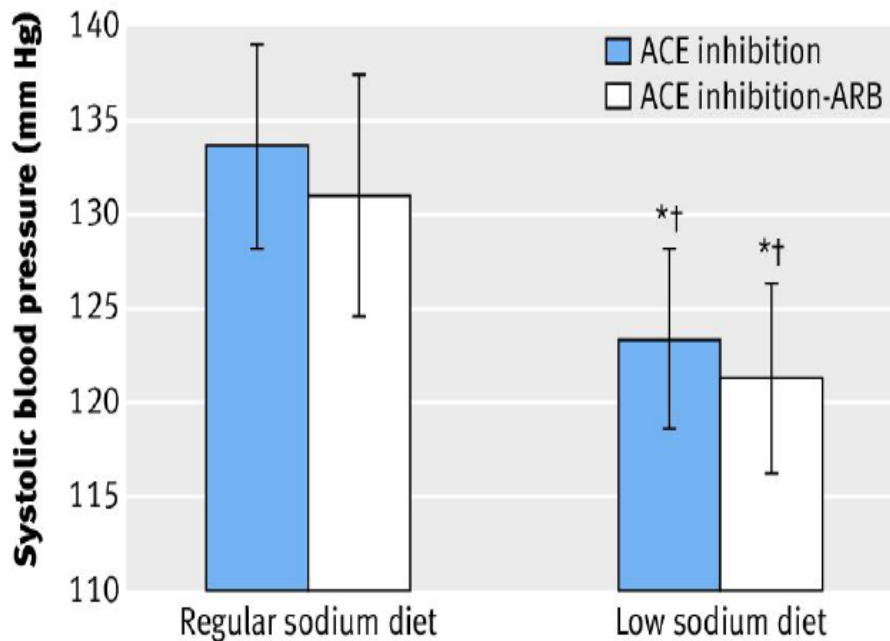
**Clinical Practice Guideline for the Management of Blood Pressure  
in Chronic Kidney Disease, KDIGO 2012**

# LOWERING PROTEINURIA IN CKD



Slagman MC et al. Moderate dietary sodium restriction added to angiotensin converting enzyme inhibition compared with dual blockade in lowering proteinuria and blood pressure: randomised controlled trial. *BMJ*. 2011 Jul 26;343:d4366

# Hypertension and CKD



Slagman MC et al. Moderate dietary sodium restriction added to angiotensin converting enzyme inhibition compared with dual blockade in lowering proteinuria and blood pressure: randomised controlled trial. *BMJ*. 2011 Jul 26;343:d4366

# DIABETIC CKD

Since non-diabetic CKD patients have equivalent or greater risk for the development of CVD as diabetic patients without CKD, cardiovascular protective measures in addition to antihypertensive therapy must always be considered. Since a given individual's BP response to high sodium intake (salt sensitivity) is not predictable, sodium restriction should generally be enforced in all CKD patients, *ie*, <1500 mg sodium (65 mEq Na) per day.

# Dietary and other Therapeutic lifestyle

- ∞ The Registered Dietitian (RD) should recommend/prescribe a sodium intake of less than 2.4g (Stages One to Five), with adjustments based on the following:
  - ∞ Blood pressure
  - ∞ Medications
  - ∞ Kidney function
  - ∞ Hydration status
  - ∞ Acidosis
  - ∞ Glycemic control
  - ∞ Catabolism
  - ∞ Gastrointestinal issues, including vomiting, diarrhea and constipation.
- ∞ Dietary and other therapeutic lifestyle modifications are recommended as part of a comprehensive strategy to reduce cardiovascular disease risk in adults with CKD.

# From KDOQI Clinical Practice Guidelines on Hypertension and Antihypertensive Agents in Chronic Kidney Disease (2004)

- ∞ Dietary and other therapeutic lifestyle modifications are recommended as part of a comprehensive strategy to lower blood pressure and reduce CVD risk in CKD.
  - Dietary sodium intake of less than 2.4g per day (less than 100mmol per day) should be recommended in most adults with CKD and hypertension (A)
  - Other dietary recommendations for adults should be modified according to the stage of CKD (B)
  - Lifestyle modifications recommended for CVD risk reduction should be recommended as part of the treatment regimen (B)
  - Referral to an RD should be considered to help patients achieve dietary recommendations (C).

# LIFESTYLE MODIFICATION, NKF

- ☞ Encourage lifestyle modification in patients with CKD to lower BP and improve long-term cardiovascular and other outcomes
- ☞ We recommend achieving or maintaining a healthy weight (BMI 20 to 25).
- ☞ We recommend lowering salt intake to  $<90$  mmol ( $<2$  g) per day of sodium (corresponding to 5 g of sodium chloride), unless contraindicated.
- ☞ We recommend undertaking an exercise program compatible with cardiovascular health and tolerance, aiming for at least 30 minutes 5 times per week.
- ☞ We suggest limiting alcohol intake to no more than two standard drinks per day for men and no more than one standard drink per day for women.

# Limited Knowledge in Patients and Providers

- ∞ There is some evidence showing limited patient knowledge about sodium content in food.
- ∞ Although there is little known about the sodium knowledge of patients with kidney disease, less knowledge may be a contributing factor in this population
- ∞ Providers may also be unclear regarding the amount of sodium in foods.
- ∞ One study of providers showed their knowledge of the sodium content of common food items was no different than the knowledge of the general population
- ∞ Patients commonly indicate that their health care provider (i.e. physician) counsels them to adhere to a low sodium diet, but usually does not offer the detailed advice needed to execute this important recommendation.
- ∞ At a minimum, **patients should be instructed to reduce intake of processed, canned, and “fast” foods.** The natural sodium content of food is estimated at 10%, while more than 75% is added during the manufacturing of processed foods.

# Findings From the Chronic Renal Insufficiency Cohort (CRIC) Study

- ✎ The CRIC Study is an ongoing multicenter, prospective, observational study of risk factors for progression of CKD and cardiovascular disease (CVD)
- ✎ 3939 men and women aged 21–74 years with estimated glomerular filtration rate (eGFR) 20–70 ml/min/1.73m<sup>2</sup> were recruited from June 2003 through December 2008 at seven US clinical centers.
- ✎ Physical activity was measured
- ✎ Diet was assessed using the Diet History Questionnaire
- ✎ BMI was calculated
- ✎ GFR was estimated annually

# CRIC Study

- In this cohort of persons with mild-to-moderate CKD, adherence to components of a healthy lifestyle (regular physical activity, BMI 20–<25 kg/m<sup>2</sup>, nonsmoking, and “healthy diet”) was associated **with reduced risk for adverse outcomes**, including progression of CKD, atherosclerotic events and all-cause mortality.

	Physical Activity <sup>#</sup>			BMI			
	Inactive (n=849)	<Ideal (n=565)	Ideal (n=1592)	<20 kg/m <sup>2</sup> (n=70)	20–<25 kg/m <sup>2</sup> (n=430)	25–<30 kg/m <sup>2</sup> (n=844)	≥30 kg/m <sup>2</sup> (n=1662)
Hypertension	763 (89.9%)	481 (85.1%)	1314 (82.5%)*	49 (70%)	326 (75.8%)	698 (82.7%)	1485 (89.4%)*



# HHS Public Access

Author manuscript

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## Management of Hypertension in CKD: Beyond the Guidelines

- ∞ Many conditions associated with CKD can impair salt excretion, including:
  - ∞ reduced renal mass,
  - ∞ sympathetic nervous system activation,
  - ∞ reninangiotensin-aldosterone imbalance,
  - ∞ altered sodium chloride handling in the distal nephron,
  - ∞ endothelial dysfunction,
  - ∞ or some combination of the earlier mentioned conditions.

# Management of Hypertension in CKD: Beyond the Guidelines

## ∞ Salt restriction

- evidence supports a large component of salt sensitivity to HTN in patients with CKD
- educating patients with CKD on a low salt diet is critical to achieving BP control
- can enhance the effects of antihypertensive medications like angiotensin-converting enzyme inhibitors or angiotensin receptor blockers
- augments the antiproteinuric effect of diuretics and renin-angiotensin-aldosterone blocking drugs

## ∞ Bedtime dosing of at least one antihypertensive medication improves BP control in patients with CKD

# Sodium: Tips for People with Chronic Kidney Disease

## ☞ What Is Sodium?

☞ Sodium is a part of salt. Sodium is found in many canned, packaged, and "fast" foods. It is also found in many condiments, seasonings, and meats.

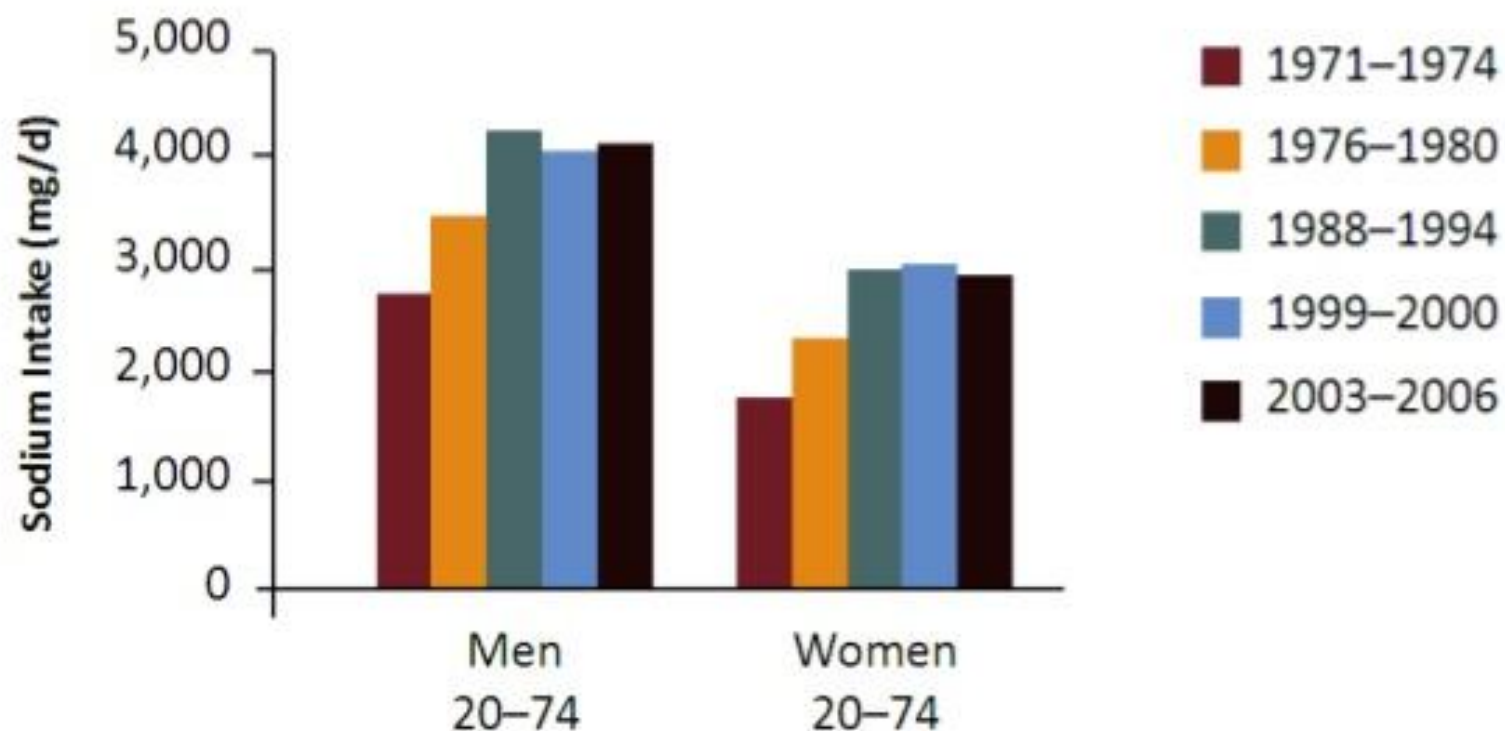
## ☞ Why Is Sodium Important for People with CKD?

☞ One of the kidneys' important jobs is to filter sodium out of the body and into the urine. Damaged kidneys cannot filter as well as healthy kidneys can. This can cause sodium to stay in your body and make your blood pressure go up.

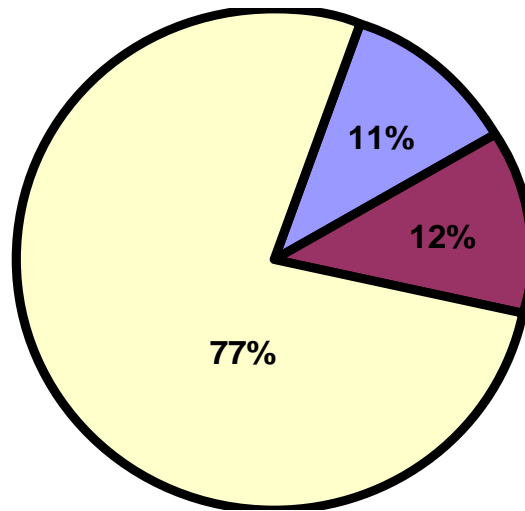
## ☞ How Much Sodium Should I Eat Every Day?

☞ Most people need to eat less sodium than they are eating. Aim for less than 2,300 milligrams of sodium each day. Much of the sodium you eat does not come from a salt shaker. Sodium is added to the prepared foods you buy at the supermarket or at restaurants.

## Sodium intake is higher than recommended



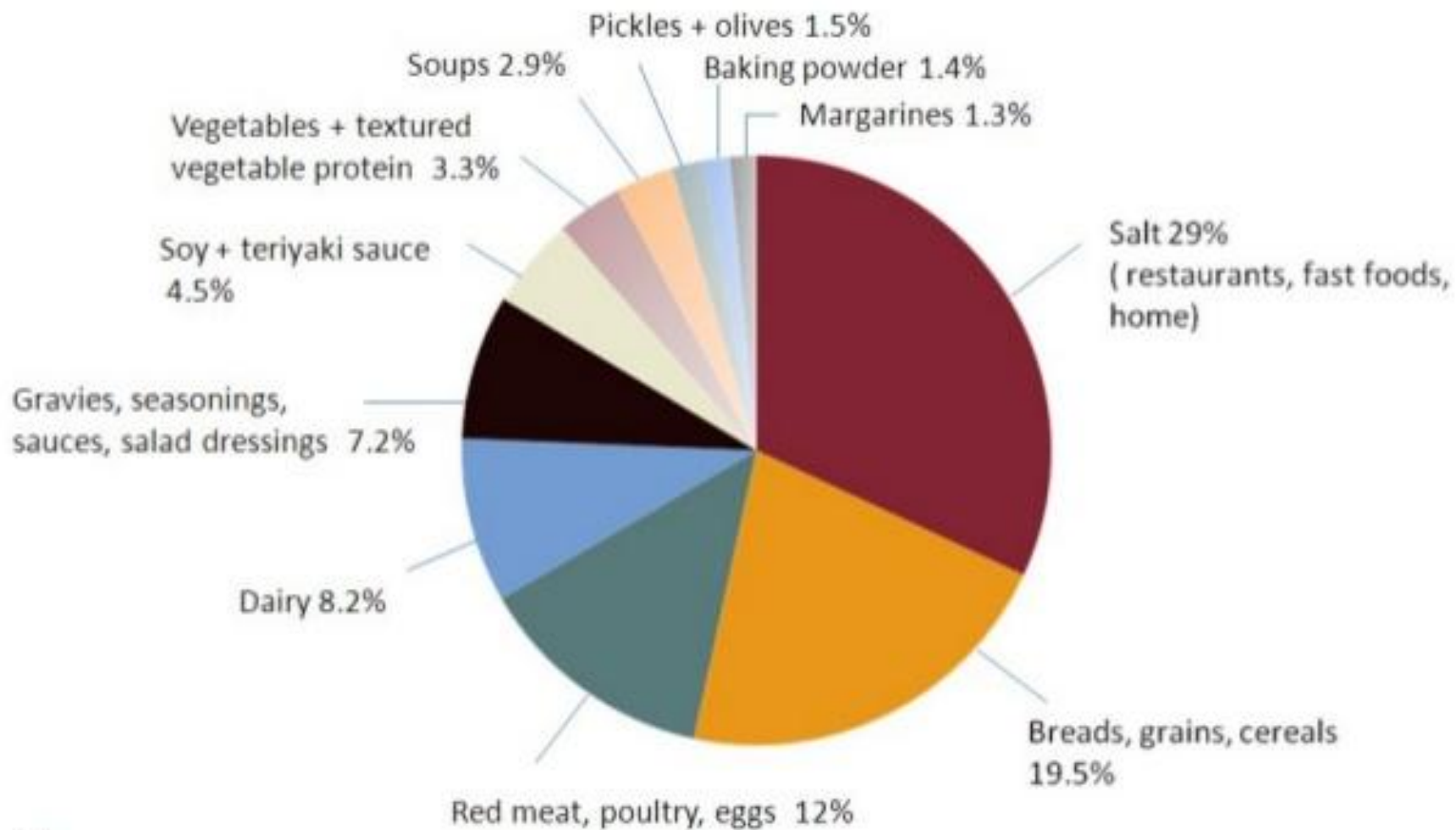
# Sodium Sources



- Occurs Naturally in Foods
- Added at the Table or in Cooking
- Restaurant/Processed Food

1. 11% natural content of foods
2. "Hidden" sodium: 77% from processing of food -manufacturing and restaurants
3. "Conscious" sodium: 12% added at the table (5%) and in cooking (6%)

# INTERMAP: Salt is the leading source of sodium in middle-aged Americans



# Processing foods...adds sodium!

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Food	Sodium (mg)	Food	Sodium (mg)
Plain pasta	5	Pasta & sauce	800
Cucumber	2	Dill Pickle	385
Fresh salmon	56	Canned salmon	272
Cheddar cheese	176	Processed cheese	407
Coffee – cream & sugar	15	Cappuccino – from mix	250

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# Sodium content in fast food meals

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Menu Item	Sodium (mg)
Breakfast Egg Sandwich	840
Chicken Caesar Salad	570
12" Pepperoni Pizza	5960
Deluxe Cheeseburger & Medium Fries	1910
Fried Chicken Dinner	2280

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# Foods Lower in Sodium

- ∞ Fresh or frozen fruits and vegetables
- ∞ Rice, noodles
- ∞ Cooked cereal without added salt
- ∞ Fresh meat, poultry, seafood
- ∞ Low-fat, low-sodium cheese
- ∞ Unsalted nuts
- ∞ Low- and reduced-sodium frozen dinners, peanut butter, homemade salad dressings



# Foods Higher in Sodium

- ☞ Bacon, corned beef, ham, hot dogs, luncheon meat, sausage
- ☞ Bouillon, canned, and instant soups
- ☞ Boxed mixes, like hamburger meals and pancake mix
- ☞ Canned beans, chicken, fish and meat
- ☞ Canned tomato products, including juice
- ☞ Canned and pickled vegetables, vegetable juice
- ☞ Cottage cheese
- ☞ Frozen meals
- ☞ Frozen vegetables with sauce
- ☞ Olives, pickles, relish
- ☞ Pretzels, chips, crackers, salted nuts
- ☞ Salt and salt seasonings, like garlic salt
- ☞ Seasoning mix and sauce packets
- ☞ Soy sauce
- ☞ Salad dressings, bottled sauces, marinades
- ☞ Some ready-to-eat cereals, baked goods, breads
- ☞ Ready-to-eat boxed meals and side dishes

## COMPARE LABELS

Food labels can help you choose items lower in sodium, as well as calories, saturated fat, total fat, and cholesterol. The label tells you:

FROZEN PEAS	
<b>Nutrition Facts</b>	
Serving Size: 1/2 cup	
Servings Per Container: about 3	
<b>Amount Per Serving</b>	
Calories: 60	Calories from Fat: 0
<small>% Daily Value*</small>	
Total Fat 0g	0%
Saturated Fat 0g	0%
Cholesterol 0mg	0%
Sodium 125mg	5%
Total Carbohydrate 11g	4%
Dietary Fiber 6g	22%
Sugars 5g	
Protein 5g	
<hr/>	
Vitamin A 15%	Vitamin C 30%
Calcium 0%	Iron 6%
*Percent Daily Values are based on a 2,000 calorie diet.	

### Amount per serving

Nutrient amounts are provided for one serving. If you eat more or less than a serving, add or subtract amounts. For example, if you eat 1 cup of peas, you need to double the nutrient amounts on the label.

### Number of servings

There may be more than one serving in the package, so be sure to check serving size.

### Nutrients

You'll find the milligrams of sodium in one serving.

### Percent daily value

Percent daily value helps you compare products and tells you if the food is high or low in sodium. Choose products with the lowest percent daily value for sodium.

CANNED PEAS	
<b>Nutrition Facts</b>	
Serving Size: 1/2 cup	
Servings Per Container: about 3	
<b>Amount Per Serving</b>	
Calories: 60	Calories from Fat: 0
<small>% Daily Value*</small>	
Total Fat 0g	0%
Saturated Fat 0g	0%
Cholesterol 0mg	0%
Sodium 380mg	16%
Total Carbohydrate 12g	4%
Dietary Fiber 3g	14%
Sugars 4g	
Protein 4g	
<hr/>	
Vitamin A 6%	Vitamin C 10%
Calcium 2%	Iron 8%
*Percent Daily Values are based on a 2,000 calorie diet.	

? Which product is lower in sodium?

Answer: The frozen peas. The canned peas have three times more sodium than the frozen peas.

## SODIUM ADDS UP QUICKLY

Not all foods are high in sodium. But when you combine foods with varying levels as part of your daily diet, sodium can add up quickly.

### BREAKFAST

250 mg sodium



Bowl of cereal  
with skim milk

+

### LUNCH

2,200 mg sodium



Cup of soup and a  
turkey sandwich

+

### DINNER

710 mg sodium



Slice of pizza and salad  
with light dressing

=

### TOTAL SODIUM

3,160 mg  
sodium



## Spice It Up and Use Less Sodium

Most Americans should consume no more than 2.4 grams (2,400 milligrams) of sodium a day. That equals 6 grams (about 1 teaspoon) of table salt a day. For someone with high blood pressure, the doctor may advise less. The 6 grams includes *all* salt and sodium consumed, including that used in cooking and at the table.

### TIPS TO REDUCE SALT AND SODIUM

- Buy fresh, plain frozen, or canned “with no salt added” vegetables.
- Use fresh poultry, fish, and lean meat, rather than canned or processed types.
- Use herbs, spices, and salt-free seasoning blends in cooking and at the table.
- Cook rice, pasta, and hot cereal without salt. Cut back on instant or flavored rice, pasta, and cereal mixes, which usually have added salt.
- Choose “convenience” foods that are low in sodium. Cut back on frozen dinners, pizza, packaged mixes, canned soups or broths, and salad dressings—these often have a lot of sodium.
- Rinse canned foods, such as tuna, to remove some sodium.
- When available, buy low- or reduced-sodium or no-salt-added versions of foods—see box 11 for guidance on how to use food labels.
- Choose ready-to-eat breakfast cereals that are low in sodium.



# THE DASH EATING PLAN

## TIPS FOR USING HERBS AND SPICES

HERBS AND SPICES	USE IN
Basil	Soups and salads, vegetables, fish, and meats
Cinnamon	Salads, vegetables, breads, and snacks
Chili Powder	Soups, salads, vegetables, and fish
Cloves	Soups, salads, and vegetables
Dill Weed and Dill Seed	Fish, soups, salads, and vegetables
Ginger	Soups, salads, vegetables, and meats
Marjoram	Soups, salads, vegetables, beef, fish, and chicken
Nutmeg	Vegetables, meats, and snacks
Oregano	Soups, salads, vegetables, meats, and snacks
Parsley	Salads, vegetables, fish, and meats
Rosemary	Salads, vegetables, fish, and meats
Sage	Soups, salads, vegetables, meats, and chicken
Thyme	Salads, vegetables, fish, and chicken



# Check the Ingredient Label for Added Sodium

- ✎ Salt (sodium chloride)
- ✎ Monosodium glutamate or MSG
- ✎ Baking soda (sodium bicarbonate)
- ✎ Baking powder
- ✎ Sodium nitrate
- ✎ Sodium sulfite
- ✎ Sodium phosphate
- ✎ Sodium alginate
- ✎ Sodium benzoate
- ✎ Sodium hydroxide
- ✎ Sodium propionate



# Lower Your Blood Pressure by Being Active

## EXAMPLES OF MODERATE-LEVEL PHYSICAL ACTIVITIES

### COMMON CHORES

- Washing and waxing a car for 45–60 minutes
- Washing windows or floors for 45–60 minutes
- Gardening for 30–45 minutes
- Wheeling self in wheelchair for 30–40 minutes
- Pushing a stroller 1 1/2 miles in 30 minutes
- Raking leaves for 30 minutes
- Shoveling snow for 15 minutes
- Stair walking for 15 minutes

### SPORTING ACTIVITIES

- Playing volleyball for 45–60 minutes
- Playing touch football for 45 minutes
- Walking 2 miles in 30 minutes (1 mile in 15 minutes)
- Shooting baskets for 30 minutes
- Bicycling 5 miles in 30 minutes
- Dancing fast (social) for 30 minutes
- Performing water aerobics for 30 minutes
- Swimming laps for 20 minutes
- Playing basketball for 15–20 minutes
- Jumping rope for 15 minutes
- Running 1 1/2 miles in 15 minutes (1 mile in 10 minutes)

## Lifestyle modifications help lower blood pressure in the general population

<b>Modification</b>	<b>Recommendation</b>	<b>Lowers Systolic Blood Pressure by (Range)</b>
<b>Weight reduction</b>	<ul style="list-style-type: none"><li>•Maintain normal body weight</li><li>•Body mass index (BMI) 18.5–24.9 kg/m<sup>2</sup></li></ul>	5–20 mm Hg / ↓ 10 kg ~ 4 mm Hg / ↓ 5 kg
<b>DASH</b>	<ul style="list-style-type: none"><li>•Increase potassium (fruits and vegetables) and calcium (dairy)</li><li>•DASH may be too high in protein, potassium and phosphorus for CKD</li></ul>	8–14 mm Hg
<b>Physical activity</b>	<ul style="list-style-type: none"><li>•At least 30 minutes most days</li></ul>	4–9 mm Hg
<b>Moderate alcohol consumption</b>	<ul style="list-style-type: none"><li>•Women: ≤ 1 drink per day</li><li>•Men: ≤ 2 drinks per day</li></ul>	2–4 mm Hg
<b>Sodium restriction</b>	<ul style="list-style-type: none"><li>•2,300 mg per day</li><li>•1,500 mg per day for hypertension, diabetes, and CKD</li></ul>	2–8 mm Hg

## DASH diet pattern for 2,000 calories

<b>Food Group</b>	<b>Servings/day</b>
Grains (mostly whole)	6–8
Vegetables	4–5
Fruits	4–5
Fat-free, low-fat milk, and milk products	2–3
Meats, poultry, and fish	≤6 ounces (oz.)
Nuts, seeds, and legumes	4–5 per week
Fats and oils	2–3
Sweets and added sugars	≤ 5 tablespoons (Tbsp.) per week

# DASH diet pattern and potential nutrients of concern in CKD

## Food Group

Grains

Vegetables

Fruits

Fat-free, low-fat milk , and milk products

Meats, poultry, and fish

Nuts, seeds, and legumes

Fats and oils

Sweets and added sugars

## Nutrients of Concern for CKD

Whole grains: phosphorus, potassium

Potassium

Potassium

Protein, sodium, phosphorus, potassium

Protein, phosphorus, potassium, sodium (“enhanced” and processed)

Protein, phosphorus, potassium, sodium (if salted)

May have sodium

May have added phosphorus

# DASH Diet

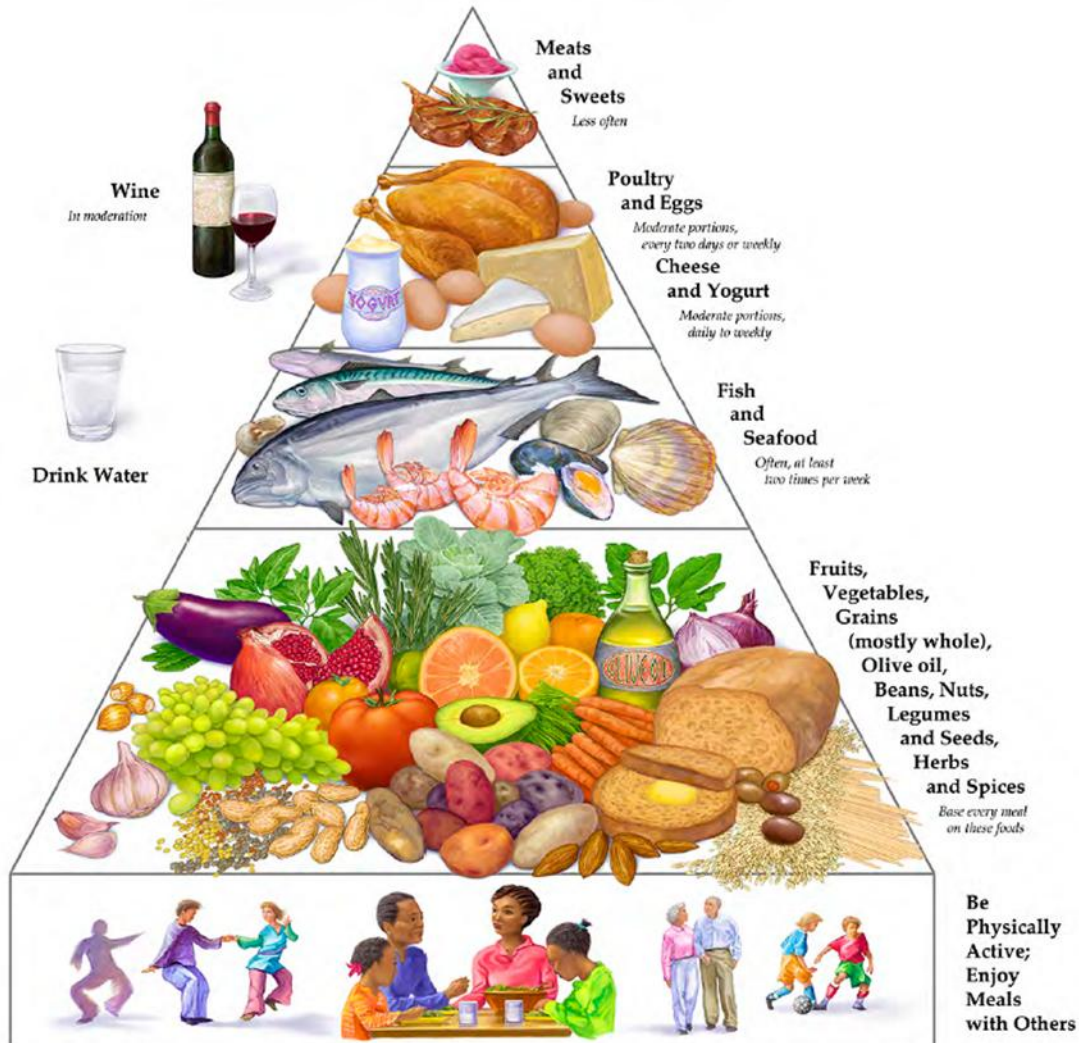
- Dietary Approaches to Stop Hypertension (DASH) diet is a dietary pattern commonly recommended, along with a sodium restriction, for nutritional treatment of hypertension in people with diabetes because of its potent reductions in both blood pressure and its effect on insulin resistance
- Principles of the DASH diet include the use of whole grains, fruits and vegetables, and low-fat dairy products. As a result, the diet is designed to be high in potassium and phosphorus and may be best suited **only** to individuals with stage 1 to 2 CKD

## Summary: The DASH diet may help prevent CKD, but it is not generally used with CKD

- DASH and DASH-Sodium patterns lower blood pressure.
- The lowest sodium level is the most effective, even with the usual (control) diet.
- The DASH pattern *may* be too high in protein, potassium, and phosphorus for CKD.

# Mediterranean Diet Pyramid

*A contemporary approach to delicious, healthy eating*



- ∞ The shortest way to reach nutritional goals is to adopt Mediterranean food choices...
  - Maillot, Am J Clin Nutr 2011
- ∞ Med-diet, a high quality diet. Predimed trial, showed that a 14-item Med-diet score, was positively related to overall micronutrient adequacy in elderly participants.
- ∞ Med-diet is associated with BP reductions (PREDIMED)
  - Sanchez-Tainta, Eur J Nutr 2016
- ∞ Still controversial results in patients with established CKD
  - RCT's needed

**THANK YOU**