Chapter 8

Sodium Restricted Diets and Blood Pressure

Some facts about:

- Blood Pressure and
- How to keep it normal !

Stages of Hypertension (HTN)

Category	Systolic Blood Pressure mm Hg	Diastolic Blood Pressure mm Hg
Normal	< 120	<80
Pre-hypertension	120-139	80-89
Hypertension – Stage 1	140-159	90-99
Hypertension – Stage 2	≥160	≥100

Isolated Systolic Hypertension— ISH

- High systolic blood pressure is very dangerous--- even when the diastolic pressure is low

- An ISH of 140 mm Hg Systolic imparts 2x's the risk of CVD than120 mm Hg Systolic pressure.

- An ISH of 150 mm Hg imparts 3 x's the risk of CVD than 120 mm Hg systolic pressure.

Risk Factors of High Blood Pressure

- Age
- Race: ↑rates for hypertension,
  - Blacks ↑ than Whites & Hispanics
- Family history
- Excess weight (>25 BMI)
- Inactivity
- Tobacco use
- ↑ Sodium intake
- ↓ potassium, calcium, magnesium intake
- Alcohol- even moderate intake for some!
- Stress → temporary increase in blood pressure

Risk Factors of High Blood Pressure Cont'd.

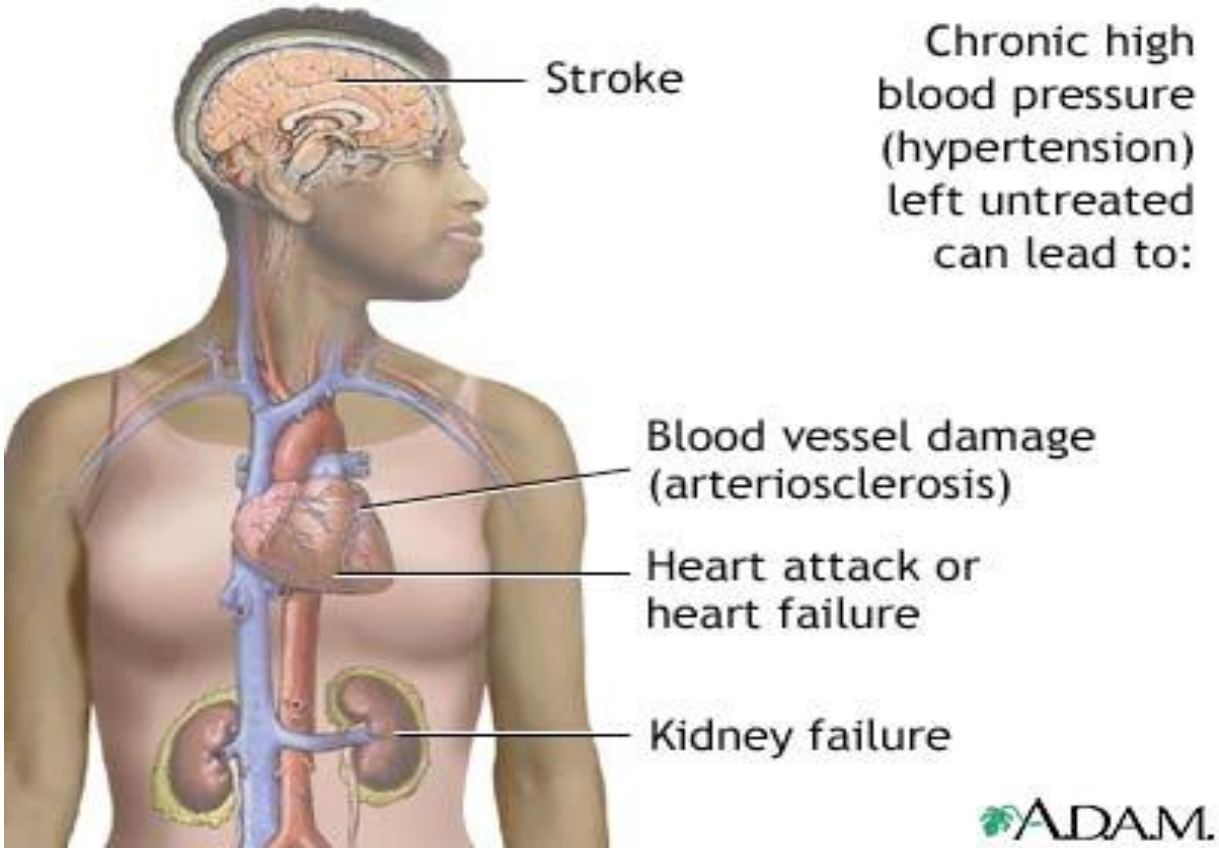
- Other chronic conditions such as:

  1. High cholesterol *
  2. Diabetes *
  3. Kidney disease *
  4. Insufficient sleep and sleep apnea
  5. Overwork

*Should be careful with potassium intake.

Complications of Hypertension

- Damage to the arteries (arteriosclerosis),
- Heart failure,
- Blocked or ruptured blood vessel in the brain resulting in stroke,
- Damage to blood vessels in the kidneys and eyes.



- Untreated hypertension can result in:
  - Arteriosclerosis --Kidney damage
  - Heart Attack --Stroke
  - Enlarged heart --Blindness

Major Sources of Sodium

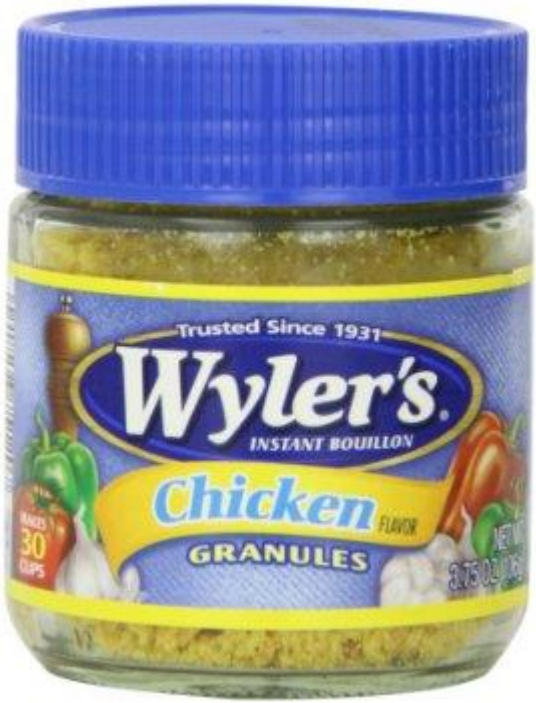
- Processed foods:
  - ✓ Canned.
  - ✓ Cured: addition of combinations of salt, nitrates, nitrites, or sugar, with the aim of drawing moisture out of the food by the process of osmosis.
  - ✓ Pickled.
  - ✓ Boxed.
- Make up ≈ 75% of dietary Na^+ intake.

Boxed Food

Examples of Sodium Rich Foods

- Canned foods such as vegetable unless labeled no added salt
- Processed meats such as ham, sausages, and frankfurters
- Commercially prepared soups or stews
- Sardines
- Smoked meat, poultry or fish
- Bouillon

Examples of
Sodium Rich Foods



Examples of Sodium Rich Foods

- Potato chips
- Pretzels
- Salted crackers
- Fast foods
- Soy sauce
- Catsup (ketchup)
- Sauerkraut
- Olives
- Pickles
- Dried fruits with sodium sulfite.
- Salted nuts

Examples of Sodium Rich Foods

- Pastries or cakes made with self-rising flour mixes
  - Pancakes, Pastries, Biscuits, Cakes etc.
- Cheeses
- Buttermilk

NACL = SALT

- 1 tsp salt = weighs 6 grams and contains about 2400 mg of sodium (and 3600 mg. of chloride)
- NACL is 40 % Sodium.
- A flatware teaspoon is 2-3 x's larger than a measuring teaspoon!

Flatware Teaspoon

Recommendations for Na^+ daily intake

- Recommendation: everyone reduce daily sodium intake to 2400 mg.
- Those with high blood pressure get only a modest decrease from 2400 mg down to 2300mg
- For significant results, decrease sodium intake to ≤ 1500 mg / day.

*Not very well accepted, not easy to achieve.

Potassium Intake is Critical

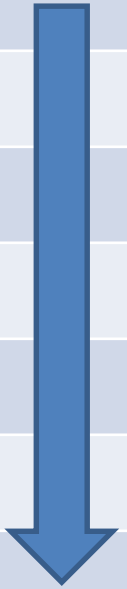
- A good balance between potassium & sodium is 3:1
- 1500 mg sodium, aim for 4500 mg potassium.

Potassium Intake is Critical Cont'd.

- AI: 4.7 grams/day (4,700 mg/day)
- AI = 9 - 10 servings of fruits and vegetables
  - found to lower <u>blood pressure</u>
- Moderate Potassium Deficiency →
  - HTN
  - Bone loss
  - Kidney Stone Risk

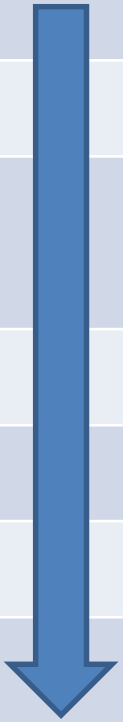
Potassium Content of Some Foods

Food	Standard Portion	K^+ Content in standard portion (mg)
Potato baked with skin	1 potato	1081
Tomato paste	¼ cup	664
Yogurt, plain, skim milk	8 oz.	579
Tomato puree	½ cup	549
Beans	½ cup	477-305
Banana, raw	1	422
Milk, skim	1 cup	382



Potassium Content of Some Foods

Food	Standard Portion	K^+ Content in standard portion (mg)
Prune juice	½ cup	354
Tuna, cooked	2 oz.	323
Potatoes, mashed, home- made, whole milk added,	½ cup	311
Spinach, frozen, cooked	½ cup	287
Tomato juice, canned	½ cup	278
Beets, cooked	½ cup	260
Orange juice, frozen concentrate, unsweetened, diluted	½ cup	237



DASH Diet
(Dietary Approaches to Stop Hypertension)

- Follows the heart healthy diet guidelines to limit saturated fat and cholesterol.

- Focuses on increasing the intake of foods rich in nutrients that are expected to lower blood pressure, mainly:
  - Minerals: such as potassium, calcium, and magnesium,
  - Protein,
  - Fiber.

DASH Diet
(Dietary Approaches to Stop Hypertension)

Is adopted by the:

- National Heart, Lung, and Blood Institute,
- American Heart Association,
- Dietary Guidelines for Americans,
- US guidelines for treatment of high blood pressure.

DASH Diet
Daily Nutrient Goals

Total Fat	27%	Sodium	2,300 mg
Saturated Fat	6%	Potassium	4,700 mg
Protein	18%	Calcium	1,250 mg
CHO	55%	Magnesium	500 mg
Cholesterol	150 mg	Fiber	30 g

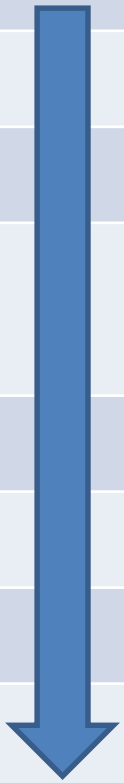
Calcium

- ✓ Recommendation is Higher than RDA 2010, RDA = 1000 mg/day
- ✓ Calcium and Vitamin D
  - ➢ From food → ↓ risk for HTN.

(Am Heart Assoc. - Hypertension journal. Feb 2008)

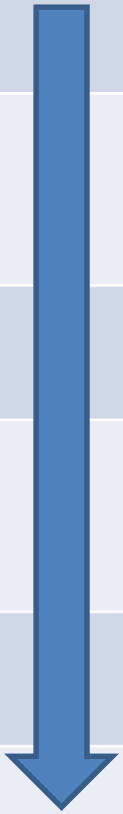
Calcium Content of Some Foods

Food	Standard Portion	Calcium in Standard Portion (mg)
Yogurt, plain, low-fat	8 oz.	415
Yogurt, fruit, low-fat	8-oz.	345
Cheese, ricotta, part skim milk	½ cup	335
Cheese, mozzarella, part skim milk	1½ oz.	311
Cheese, cheddar	1½ oz.	306
Milk, non-fat	1 cup	299
Milk, whole	1 cup	276
Cheese, cottage, low-fat, 2% milk fat	1 cup	206



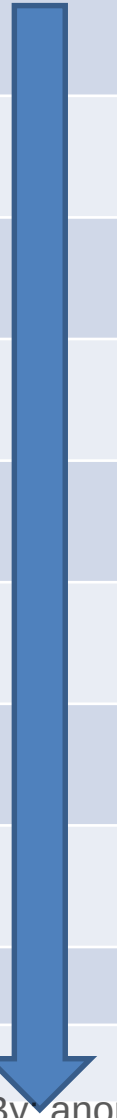
Calcium Content of Some Foods

Food	Standard Portion	Calcium in Standard Portion (mg)
Fortified ready to eat cereals (various)	1 cup	250-1,000
Tofu, firm, prepared with calcium sulfate and magnesium chloride	½ cup	253
Orange juice, calcium fortified.	½ cup	250
Fish, salmon, pink, canned, solids with bone and liquid	3 oz.	181
Collards, frozen, cooked ?	1/2 cup	179
Spinach, frozen, cooked ?	1/2 cup	145



Magnesium Content of Some Foods
RDA = M 420 mg; F 320 mg

Food	Standard Portion	Content/Standard Portion (mg)
Seeds, pumpkin, roasted	1 oz.	156
Muffin, oat bran	1	89
Spinach, frozen, cooked	½ cup	78
Nuts, almonds, (24 nuts)	1 oz.	76
Soybeans, mature, cooked	½ cup	74
Beans, (various)	½ cup	67-43
Soymilk, unfortified	1 cup	61
Potato, baked in skin	1	57
Yogurt, plain, skim milk	8 oz.	43
Rice, brown, long grain, cooked	½ cup	42



Fiber Content of Some Foods

Food	Standard Portion	Average Content/ Standard Food Portion (g)
Beans , split peas, & lentils	½ c	≈ 6.3-9.6
Starchy vegetables	½ c	≈ 3
Nuts	1/4c	≈ 2-3
Cereals and grains	½ c	≈ 2
Bread, white, whole wheat	1 slice	≈ 1-2
Non Starchy vegetables	1 c raw or 1/2c cooked	≈ 1-4
Fruits, especially raw with skin	1/2c	≈ 2
Juices, from fruits or vegetable		Minimal

Increased Risks with the DASH Diet which is High in K^+

- Increases the risk of hyperkalemia for people suffering from one or more of the following conditions:

  - Diabetes
  - Chronic renal failure
  - End stage renal diseases
  - Severe heart failure
  - Adrenal insufficiency

Increased Risks with the DASH Diet is High in K^+ Cont'd.

May increase the risk of hyperkalemia when used with medications that impair K^+ excretion from the body such as:

- K^+ sparing diuretics:
  - Diuretic drugs that do not promote the secretion of potassium into the urine
- β adrenergic blockers (β-blockers):
  - Prescribed to protect the heart from a second heart attack by decreasing stress on the heart:
    - Reduce the heart rate
    - Decrease the force of heart muscle contractions
    - Reduce contraction of blood vessel in the heart, brain, and throughout the body.
- Oral K^+ supplements used to treat high blood pressure, hypokalemia, to prevent stroke, etc.

Increased Risks with the DASH Diet is High in K^+ Cont'd.

May increase the risk of hyperkalemia when used with medications that impair K^+ excretion from the body such as:

- Non-steroidal anti-inflammatory drugs (NSAIDs):
  - Provide analgesic (pain killer) and antipyretic (fever-reducing) effects,
  - Anti-inflammatory when taken in high doses
- Angiotensin-converting enzyme (ACE) inhibitors:
  - Are used primarily to treat high blood pressure and congestive heart failure.
  - Cause blood vessels to relax and blood to flow freely.

DASH Diet is High in K^+ and Phosphorus

- Not recommended for people with:

  ✓ Stage 3 or 4 *chronic renal disease.*

Tips to Reduce Salt and Sodium

- Use fresh as much as possible.
- Start by cutting salt intake in half.
- Use spices instead of salt in cooking and at the table.
- Flavor foods with herbs, spices, lemon, lime, vinegar, salt free seasoning blends.
- On nutrition facts labels aim for foods that contain < 5% of the daily value for sodium.
- Foods with ≥ 20% or more of the daily value are considered high.

READ LABELS

Label 1

Nutrition Facts

Serving Size 1/2 cup (54g)
(About 1 cup cooked)
Servings Per Container: about 7

Amount Per Serving	
Calories 190	Calories from Fat 15
	% Daily Value*
Total Fat 1.5g	**2%**
Saturated Fat 0g	**0%**
Cholesterol 0mg	**0%**
Sodium 20mg	**1%**
Total Carbohydrate 42g	**14%**
Dietary Fiber 2g	**8%**
Sugars 0g	
Protein 4g	
Vitamin A	0%
Vitamin C	0%
Calcium	0%
Iron	2%

*Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Label 2

Nutrition Facts

Serving Size 1 cup (49g)
Servings Per Container: about 9

Amount Per Serving	
Calories 190	Calories from Fat 30
	% Daily Value*
Total Fat 3.5g	**6%**
Saturated Fat 0.5g	**3%**
Cholesterol 0mg	**0%**
Sodium 220mg	**9%**
Total Carbohydrate 38g	**13%**
Dietary Fiber 3g	**14%**
Sugars 13g	
Protein 4g	
Vitamin A	10%
Vitamin C	2%
Calcium	10%
Iron	35%

*Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Label 3

Nutrition Facts

Serving Size 1/2 cup (120ml)
Servings Per Container: about 2.5

Amount Per Serving	
Calories 60	Calories from Fat 20
	% Daily Value*
Total Fat 2g	**3%**
Saturated Fat 0.5g	**3%**
Cholesterol 10mg	**3%**
Sodium 890mg	**37%**
Total Carbohydrate 8g	**3%**
Dietary Fiber less than 1g	**3%**
Sugars 1g	
Protein 3g	
Vitamin A	4%
Vitamin C	0%
Calcium	0%
Iron	2%

*Percent Daily Values are based on a 2,000 calorie diet. Your Daily Values may be higher or lower depending on your calorie needs.

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Example of Food Servings Dash Diet

Type of food	# of exchange units on a 2000 Calorie diet
Grains & Products (at least 3 whole)	6-8/day
Fruits	4-5/ day
Vegetables	4-5/ day
Low fat/fat free dairy	2-3/ day
Lean meats/poultry/fish	≤ 6/ day
Fat & oils	2-3/ day
Nuts, seeds, legumes	4-5 / week
Sweets & added sugars (should be low in fat)	≤ 5/ week

Sodium Restricted Diets

1) No Added Salt Diet (NAS diet)

[contains 3000 - 4000 mg Na+]

- Also known as [Low Salt Diet]
- Appropriate for the *elderly who have higher risk for weight loss*
- Used for Preventing and/or Controlling Edema and/or Hypertension
- *Adequate* in nutrients

1) No Added Salt Diet Cont'd. General Recommendations

- No table salt
- Limit foods processed with salt.
- Limit foods with visible salt such as pretzels and chips etc.
- May limit foods which are naturally high in sodium
- When planning a no added salt diet, take into account:
  - ✓ Medications that are high in sodium [such as antacids and indigestion medications].

❖ Salt substitutes like potassium chloride should only be used if permitted by physician or dietitian.

2) Low Sodium Diet

[contains 2000 mg Na^+ /day]

- Used to:
  - ➢ Manage edema and/ or hypertension,
  - ➢ Manage Fluid Restricted Diets [for renal and liver disease].

❖ Adequate in nutrients.

2) Low Na^+ Diet
General Recommendations

- No added salt in cooking,
- No table salt,
- Low sodium foods that contain **≤ 5 %** of the daily value for sodium.

2) Low Sodium Diet Principles

- Limit the amount of:
  - Milk,
  - Meat,
  - Ready to eat cereals,
  - Breads and desserts made with BP and BS

- When planning a low sodium diet: take into account**:**

  - Medications that are high in sodium such as those used for indigestion or excess acid.

  - Local water supplies and chemically softened water may be high in sodium.

Low Na^+ Diet: foods to restrict

- Canned vegetables all canned with added salt, pickles.
- Dried fruits with sodium sulfite.
- Breads, rolls, or crackers with salted toppings, high salt snacks, instant hot cereals.
- Buttermilk, cottage cheese, aged cheeses, processed cheese, cheese spreads or sauces
- Processed meats, canned meats and fish
- Salted gravies, salted nuts, regular salad dressings
  - (limit to 1 Tbsp/day)
- Commercially canned soups, bouillon cubes and granules, dry soup mixes
- Seasoning blends with salt, sauces such as soy sauce, teriyaki sauce, barbeque sauce, ketchup and mustard.