Hypertension: Today’s clinical and public health challenge

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Outline

- The scope of the problem
- Clinical approaches to resistant hypertension
- Public health issues in hypertension control

Which Cardiovascular Risk Factor Is On The Decline In The Us Population?

A. Smoking
B. Total cholesterol
C. Diabetes
D. Hypertension
E. Obesity


Why is there more hypertension and more poorly controlled hypertension?

- Trends in other correlated risk factors (obesity)
- Diet
- Patterns of clinical practice in treatment of hypertension
  - Measurement
  - Diagnosis
  - Monitoring of treatment
  - Medications
    - Need for multiple medications
    - Clinical inertia

At What Systolic Blood Pressure Value Does Cardiovascular Risk Begin?

A. 140 mmHg
B. 130 mmHg
C. 120 mmHg
D. 110 mmHg

CHD mortality rate in each decade of age versus usual SBP at the start of that decade

33,867 deaths at ages 40 - 89

Cumulative prehypertension before age 35 stronger predictor than blood pressure elevation at time of CAC assessment


Awareness, treatment, and control of hypertension by age in US, 1999-2000


Particularly low rates of blood pressure control among blacks and Latinos


Summary

• Increasing prevalence of hypertension in US.
• More poorly controlled hypertension.
• Worsening trends in younger adults.
• Adverse health consequences among young adults, particularly in race/ethnic minorities.
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Resistant hypertension

• Blood pressure above goal on three or more medications.
• Controlled blood pressure requiring at least 4 medications.

Mainstays of hypertension treatment

• Thiazides
  – Chlorthalidone
    • Studied in clinical trials - CVD and mortality benefit
    • More potent
    • Less available in combinations
    – Add diuretic even if not first line

• ACE inhibitor/ARB
  – Compelling indication for many (renal, DM, CHF, CAD)

• Calcium channel blockers
  – Effective and less need for monitoring

Algorithm for Treatment of Hypertension

[Diagram showing steps and drug choices based on blood pressure levels and compelling indications]

Hypertension 2008;51;1403-1419
Beta blockers

• Compelling indication for some
  — Post MI
  — CHF (Carvedilol, Metoprolol XL)

• Less effective in blood pressure control
• Often poorly tolerated secondary to side effects
• Less benefit for stroke reduction

• Generally not a first line agent

Who has resistant hypertension?

• Older age
• High baseline blood pressure
• Obesity
• Excessive dietary salt ingestion
• Chronic kidney disease
• Diabetes
• Left ventricular hypertrophy
• Black race
• Female sex
• Residence in southeastern United States

Resistant Hypertension: Diagnostic and Treatment Recommendations

STEP ONE: Confirm Treatment Resistance

• Office blood pressure >140/90 or 130/80 mm Hg in patients with diabetes or chronic kidney disease
  and
• Patient prescribed 3 or more antihypertensive medications at optimal doses and the appropriate types
  or
• Office blood pressure at goal but patient requiring 4 or more antihypertensive medications

STEP TWO: Exclude “Pseudoresistance”

• Is patient adherent with prescribed regimen?
  • Obtain home, work, or ambulatory blood pressure readings to exclude white coat effect

STEP THREE: Identify and Reverse Contributing Lifestyle Factors

• Obesity
• Physical inactivity
• Excessive alcohol ingestion
• High salt, low-fiber diet
STEP FOUR: Discontinue or Minimize Interfering Substances

- Non-steroidal anti-inflammatory agents
- Sympathomimetics
  - Diet pills
  - Decongestants
- Stimulants
- Oral contraceptives
- Licorice
- Ephedra

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STEP FIVE: Screen for Secondary Causes of Hypertension

COMMON
- Obstructive sleep apnea (snoring, witnessed apnea, excessive daytime sleepiness)
- Primary aldosteronism (elevated aldosterone/renin ratio)
- Chronic kidney disease (creatinine clearance <30 mL/min)
- Renal artery stenosis (young female, known atherosclerotic disease, worsening renal function)

LESS COMMON
- Pheochromocytoma (episodic hypertension, palpitations, diaphoresis, headache)
- Cushing’s disease (moon facies, central obesity, abdominal striae, inter-scapular fat deposition)
- Aortic coarctation (differential in brachial or femoral pulses, systolic bruit)

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Change one medication to nighttime

Add an aldosterone antagonist


Consider additional combinations

- Consider combining meds with different mechanisms of action
  - dihydropyridine and non-dihydropyridine
  - ACE inhibitor and angiotensin receptor blocker

Summary

- Resistant hypertension requires a deliberate approach to diagnosis and treatment.
- Diuretic, ACE/ARB, calcium channel blockers are mainstays of most regimens
- Other approaches can prove beneficial:
  - Switching to nighttime dosing,
  - Addition of spironolactone,
  - Same class, different mechanism

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What is the Recommended Intake of Salt for Most Adults In The Us?

1. < 7.6 gm (3,000 mg)
2. < 5.8 gm (2,300 mg)
3. < 3.8 gm (1,500 mg)
4. < 2.0 gm (800 mg)

Salt intake in the United States

- Recommended daily salt intake:
  - < 5.8 gm/day (<2300 mg of sodium)
  - 1 gm salt = approx 400 mg sodium
  - < 3.8 gm/day (<1500 mg) FOR MOST ADULTS
    - (66% - those over 40, those with hypertension, and African Americans)
- Current daily intake in US:
  - 9.4 gm/day (3700 mg sodium)

Average daily salt intake in male and female Americans, as ascertained from 24-hour dietary recall, 2005-2006

80% in processed or pre-prepared foods


Where is the salt?

- Processed/restaurant foods 77%
- Naturally occurring 12%
- While eating 6%
- Home cooking 9%

Source: Mattes et al.
What Single Food Category Is Responsible For The Majority Of Salt In the US Diet?

A. Soup  
B. Snack foods (chips, etc)  
C. Bread  
D. Tomato sauce  
E. Pizza

Sources of salt in our grocery bags

37% - from cereal & cereal products  
– breads, cereals, pastries  

28% - from meat, poultry, fish products  

12% - from vegetable products  
– Including soups, tomato sauces, potatoes  

8% - from milk & milk products  
– milk, cheese

Why do food manufacturers use so much salt?

- Preservative
- Taste
  - Inexpensive way to add flavor  
  - Habituated to very salty food  
  - Can be unlearned (6 wk down regulation of salt receptors)  
- Weight of food
What is the evidence for the link between salt and cardiovascular disease?

Salt and blood pressure:
• Ecological studies
• Observational studies (InterSalt, Cochrane reviews)
• Controlled feeding studies
• Randomized controlled trials

THE DASH DIETARY PATTERN: Foods

- Includes: Whole Grains, Nuts, Poultry, Fish
- Reduced in: Fats, Red Meat, Sweets, and Sugar-containing Beverages

The DASH diet

[Image of a table with various food items]

The Effect on Systolic Blood Pressure (Panel A) and Diastolic Blood Pressure (Panel B) of Reduced Sodium Intake and the DASH Diet

The Effect on Systolic Blood Pressure of Dietary Sodium Intake during the Control Diet (Panel A) and the DASH Diet (Panel B), According to Subgroup


What to do about high salt in the US diet?

• Do nothing and wait for more evidence

• Individual approach to educating about salt reduction

• Public health approach

Percent change in incident CHD with 3 gm/day reduction in dietary salt


Percent change in total death events with 3 gm/day reduction in dietary salt by US subpopulations

Comparing salt reduction to other preventive measures (deaths 2010-2019)

Reducing salt → reducing costs

- WHO estimates $1 per person to reduce salt through regulatory means, public campaigns, monitoring.
  - More cost effective than treating all hypertensives
  - Actually cost savings even if only modest reductions in salt achieved.
    - Gradual reduction over the decade to 1 gm/day reduction -> 7 dollars saved in healthcare for 1 dollar spent.

Is population-wide salt reduction feasible?
  - UK experience
    - Food Standard’s Agency launched campaign to encourage food manufacturers to lower salt in their products in 2003
    - Goal: to reduce salt intake by 1/3 from 2005-2010
    - Raised awareness in general – ad campaigns
    - Set targets with food industry (75 products)
    - Labeling – Traffic Light
    - The results:
      - Sodium reduction on restaurant and processed foods
      - Increased dietary daily salt intake awareness from 3% to 34%
      - Decrease salt intake by 10% over the first 3 years
    - US efforts modeled on UK

The Washington Post

FDA plans to limit amount of salt allowed in processed foods for health reasons

By Lyndsey Layton
Washington Post Staff Writer
Tuesday, April 20, 2010, A01

The Food and Drug Administration is planning an unprecedented effort to gradually reduce the salt consumed each day by Americans, saying that less sodium in everything from soup to nuts would prevent thousands of deaths from hypertension and heart disease. The initiative, to be launched this year, would eventually lead to the first legal limits on the amount of salt allowed in food products.
**National Sodium Reduction Initiative (NSRI)**

- Setting targets with manufacturers of packaged foods:
  - 62 categories ranging from breakfast cereal to canned soup

- Setting targets with restaurants:
  - 25 categories ranging from biscuits to burritos

**Industry Sodium Reduction Initiatives 2010**

<table>
<thead>
<tr>
<th>Company</th>
<th>Plans to reduce sodium</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kraft</td>
<td>By 10% over next 2 years, in select products</td>
</tr>
<tr>
<td>ConAgra</td>
<td>By 20% over next 5 years, in all products</td>
</tr>
<tr>
<td>PepsiCo</td>
<td>By 25% over next 5 years, in all products</td>
</tr>
<tr>
<td>Campbell's Soup</td>
<td>By 35% over next 4 years; in past 4 years reduced 100 products by 25-50%</td>
</tr>
</tbody>
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**Tips for successful adoption of the DASH diet**

- Make reading food labels a habit
- Stick to fresh meats, fruits and vegetables rather than their packaged counterparts
- Avoid spices and seasonings that contain added sodium
- Check restaurant websites before dining out. And, request that your food be prepared without any added salt.
- In 6-8 weeks, you can adjust to eating less salt

Source: NKF Tips to “Stop Salting Your Kidneys”
Tips for successful adoption of the DASH diet

• Cook rice, pasta, and hot cereals without salt
• Choose ready-to-eat breakfast cereals that are lower in sodium
• Choose "convenience" foods that are lower in sodium
• Rinse canned foods to remove some sodium
• When available, buy low-sodium, reduced-sodium, or no-sodium versions of foods

Summary and conclusions

• Considerable evidence linking dietary salt to blood pressure elevation and cardiovascular risk.
• Even modest population-wide reductions in dietary salt could yield substantial health benefits in the US.
• The growing burden of hypertension in the US suggests that both individual and public health efforts are warranted.