



# Orthostatic Hypotension in the Elderly (from a Geriatrician's POV)

**Workshops E**  
**Wed. Dec. 2<sup>nd</sup> 2020, 11-12h**

Wendy Chiu, MD.CM, FRCPC  
McGill Division of Geriatric Medicine  
[wendy.chiu@muhc.mcgill.ca](mailto:wendy.chiu@muhc.mcgill.ca)



# Disclosure statement

- No conflict of interest to declare.
- All medications presented are \*off-label\* use except midodrine & droxidopa.
- (Any Rx brand names mentioned are purely for ease of recognition.)

# Learning objectives

*As a result of attending this session, participants will be able to:*

- **Define** what is orthostatic hypotension (OH.)
- Cite some common - and some less common but important - **reasons for chronic OH in the elderly.**
- Cite pharmacologic and non-pharmacologic **treatments** that may be tried to treat OH.

# Clinical significance of OH in elderly

- Common
  - ~6% healthy old, ~50% “sicker” old (e.g. LTC)
- Mortality
  - Up to 2x ↑ all-cause mortality (vascular)
- ↑ Morbidity
  - Falls risk
  - Cognitive impairment
  - Frailty marker
  - ↑hospitalization LOS

Normal response to “orthostatic stress” (i.e. standing up!)

$$\mathbf{CO = HR \times SV}$$

↓VR

↓CO ~20%

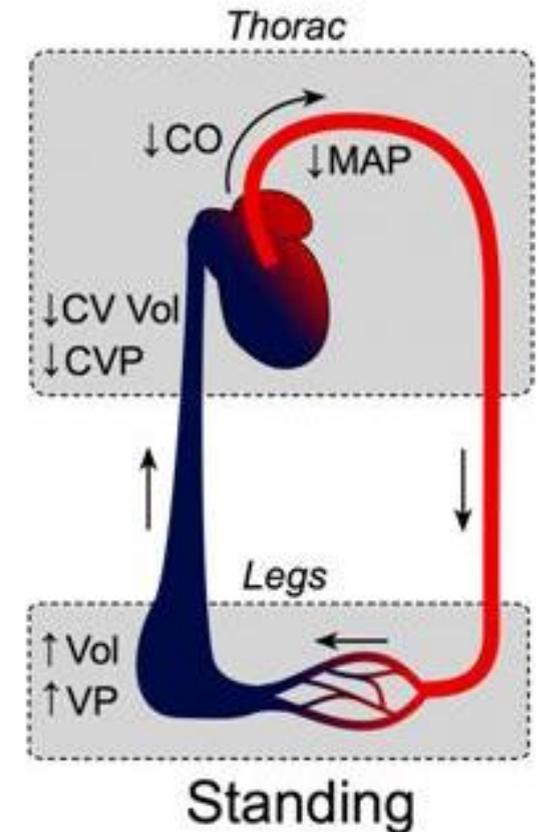
↓BPs < 5-10 mmHg

Baro-Rc (+)SNS, (-)PNS

↑HR ~5–25 beats/min - blunted with “(N) aging”?

Vasoconstriction (↑ arterial tone, ↓ venous compliance)

↑BPd > 5-10mmHg



# Definition OH (AAS, others)

- **Supine → Stand “within 3 min.”**  
**↓BPs  $\geq 20$  -or- ↓BPd  $\geq 10$  mmHg**
  - Supine resting 5-10 min.
  - Seated only if cannot stand
- **Note also:**
  - **$\Delta$ HR** (no  $\Delta$  → cause of OH?)
  - **Symptoms** (fit with history?)

# Note HR changes in DDx OH

- No ↑ HR – “Chronotropic incompetence”
  - ANS dysfunction? Blocked 2° Rx? (BB, CCB, digoxin)
- ↑ HR 5-25/min – “Blunted response”
  - “Normal” but insufficient to maintain BP
  - ↑ does not r/o ANS dysfxn
- ↑↑ HR >30/min
  - Hypovolemic? ANS dysfxn? (POTS)
- ↓(↓) HR
  - Vaso-vagal? ANS dysfxn?

# Symptoms of OH

Classic OH symptoms but no OH by #s?

Arm not relaxed (leaning on walker)

Pain, Fear of falling, etc.

“Orthostatic intolerance”?

Other causes of “dizziness”

- **None (asymptomatic)**

- “Normal aging” ...?

- **Classic cerebral hypoperfusion Sx**

- Postural lightheadedness

- End-organ hypoperfusion - vision dim OU, angina, TIA

- **Atypical / non-specific Sx – e.g.**

- Falls, injury from falls

- Fatigue, “weak”

- Cognitive slowing (“cloudy”)

- Neck / back pain (“coat hanger headache”)

# Causes of chronic OH: #1 = MEDS

- ~All cardiovascular meds
  - No clear “best” anti-HTN Rx to use re: OH, but...
    - Avoid direct vasodilators (hydralazine)
    - Avoid alpha-blockers (clonidine)
- Anticholinergics (“anticholinergic burden”) – e.g.
  - Bladder relaxants
    - e.g. older: oxybutinin > newer: solifenacin
  - Antihistamines (e.g. H1 diphenhydramine, H2 ranitidine)
  - Anti-emetics (e.g. H1 dimenhydrinate, antipsychotic metoclopramide)

- Parkinson's Rx
  - Dopaminergic Rx
    - L-dopa, Dopa agonists (pramipexole, ropinerol)
  - Amantadine - anticholinergic
    - Not used in Geri due to this + risk cognitive side effects
- Psych Rx – e.g.
  - TCA, Benztropine – anticholinergic
  - Antipsychotics – “low potency”, haloperidol, risperidone
- Narcotics

- BPH non-selective  $\alpha$ -blockers
  - e.g. Terazosin
    - Use  $\alpha$ -1a selective +/- @HS - e.g. tamsulosin CR
    - Still risk of OH...
  - Add 5- $\alpha$  reductase (-) e.g. finasteride
- Corticosteroid withdrawal
- OTC (e.g. anti-histamines, diuretics)
- Alcohol

# Causes of chronic OH: Disease

- Cardiovascular disease
  - ↓ CO or obstructed cardiac outflow tract
    - e.g. CHF, severe aortic stenosis
  - Isolated systolic hypertension
    - Up to 1/3 of pts with HTN have OH
    - Arterial stiffness → “HTN begets OH”
  - Severe chronic venous insufficiency (CVI)
    - Venous pooling

- Neurological – ANS dysfunction
  - Neurodegenerative
    - ~50% Parkinson’s disease have OH
    - Atypical parkinsonism (“Parkinson’s Plus”)
      - Multiple system atrophy (MSA-a, Shy-Drager)
  - Peripheral neuropathy
    - Diabetes DM1 & DM2: ~20%
      - Up to ~65% elderly w/ DM2
    - ↓ vit B12, ESRD, ↓thyroid, meds
      - Auto-immune, infectious, proteinopathy, etc.

- Deconditioning (severe)

- “Immobility syndrome”

- Idiopathic ~30%

- “Blunted” baro-Rc – element of (N) aging?

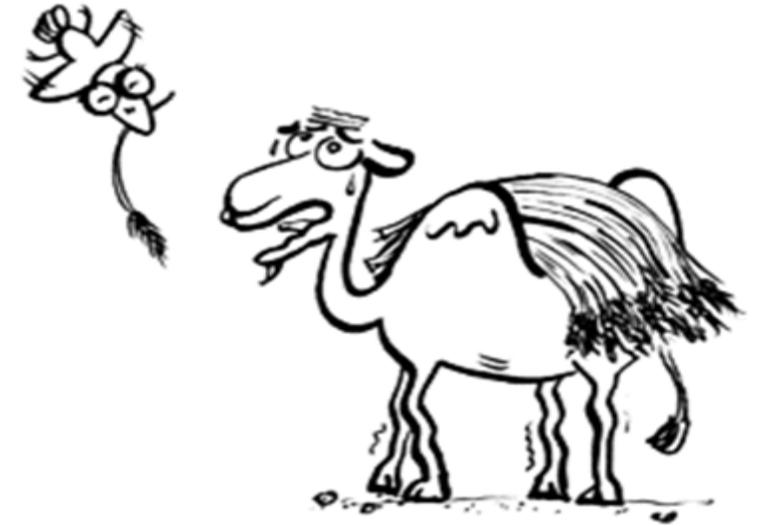
- Multifactorial...

- Typical “geriatric syndrome”

- e.g. PD on L-dopa with BPH alpha-blocker taking OTC hypnotic (ACh) for insomnia due to nocturia

- Presents as a “geri syndrome” - Falls

- “Atypical” presentation of common disease in frail elderly



# When to check for OH?

- When making Dx or follow up of pt known for e.g.:
  - HTN – ASK if postural dizziness or falls
  - Parkinson's
  - Diabetes - peripheral neuropathy
- Falls
- Polypharmacy
  - Esp. cardiovascular & anticholinergic Rx

# Investigation of OH

- **History** – symptoms of OH plus:
  - Possible causes (e.g. Parkinson's)
  - Other autonomic symptoms (GI, GU, dry mouth)
  - Post-prandial hypotension – esp. post-simple carbs
- **Medication review**
  - New? Dose increased?
  - Diurnal pattern  $\leftrightarrow$  symptoms?
- **Physical exam**
  - **Postural VS**
  - **Signs of possible causes** – e.g.
    - CV: Heart murmur, carotid bruits
    - Neuro: EPS (PD), PNP

- **Diary of symptoms**
  - BP  $\leftrightarrow$  Meds, specific activities, after meals, time of day
  - Home BP & HR \*when symptomatic\*
- Labs – looking for possible causes, e.g.:
  - Hb, electrolytes, renal, glucose / HbA1c, TSH
  - AM cortisol (>200)
  - Urine Na, UA (specific gravity), urine output
- Specialized BP measurement - usually not needed
  - ABPM – symptoms at specific time of day?
  - Tilt table testing
- Imaging - depending on history & exam

# Treatment – principles:

- Goals of treatment
  - “Treat the patient, not the numbers”
    - ...albeit the pt’s symptoms can be vague...
- Remove BP lowering Rx first, if possible
  - Alternatives
  - Lowest effective dose
- Non-pharmacologic, Pharmacologic

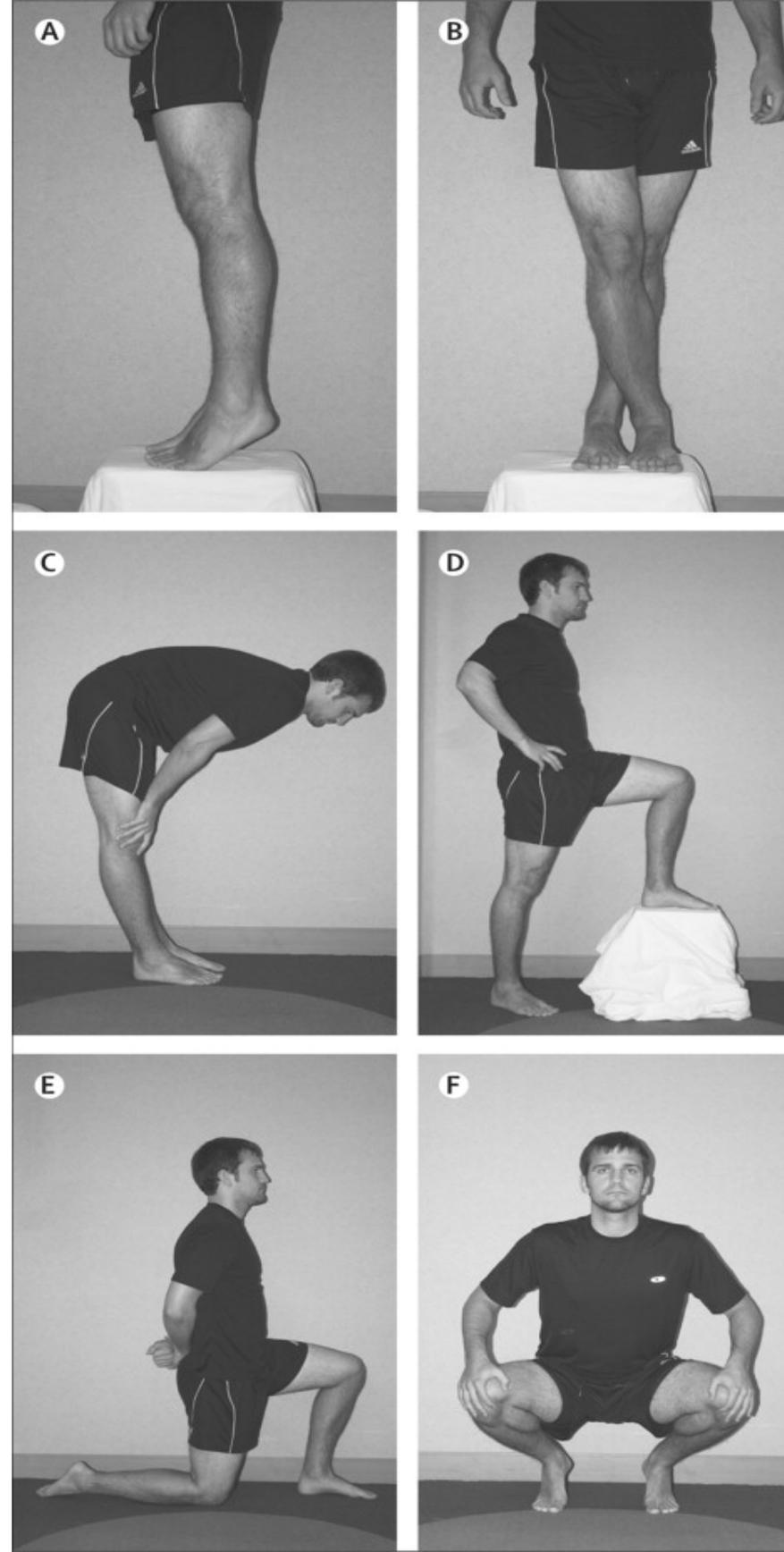
# Non-Rx – Principles:

- **↑VR** (↓venous pooling), **↑vascular resistance**
  - Positioning (“physical counter-manoevres”)
  - Compression (esp. abdominal binder)
- **↑IV volume** (volume expansion)
  - Dietary – fluids (esp. fluid bolus), salt
  - “Head-up tilt” (positioning, esp. in combination w/ dietary)
- **Avoid triggers of vasodilation**

# Positioning

Table 3. Effect of standing exercises on standing blood pressure.

Manoeuvre	Effect on standing BP (mmHg)
Toe raise	+20 ± 21
March in place	+22 ± 17
Leg crossing	+25 ± 19
Squat	+41 ± 23



# Compression

- Abdo binder:
  - 40mmHg
  - Able or has assist to apply (aide)
  - At / p/c meals for post-prandial OH?
- Result:
  - $\uparrow$ BPs up to 20?



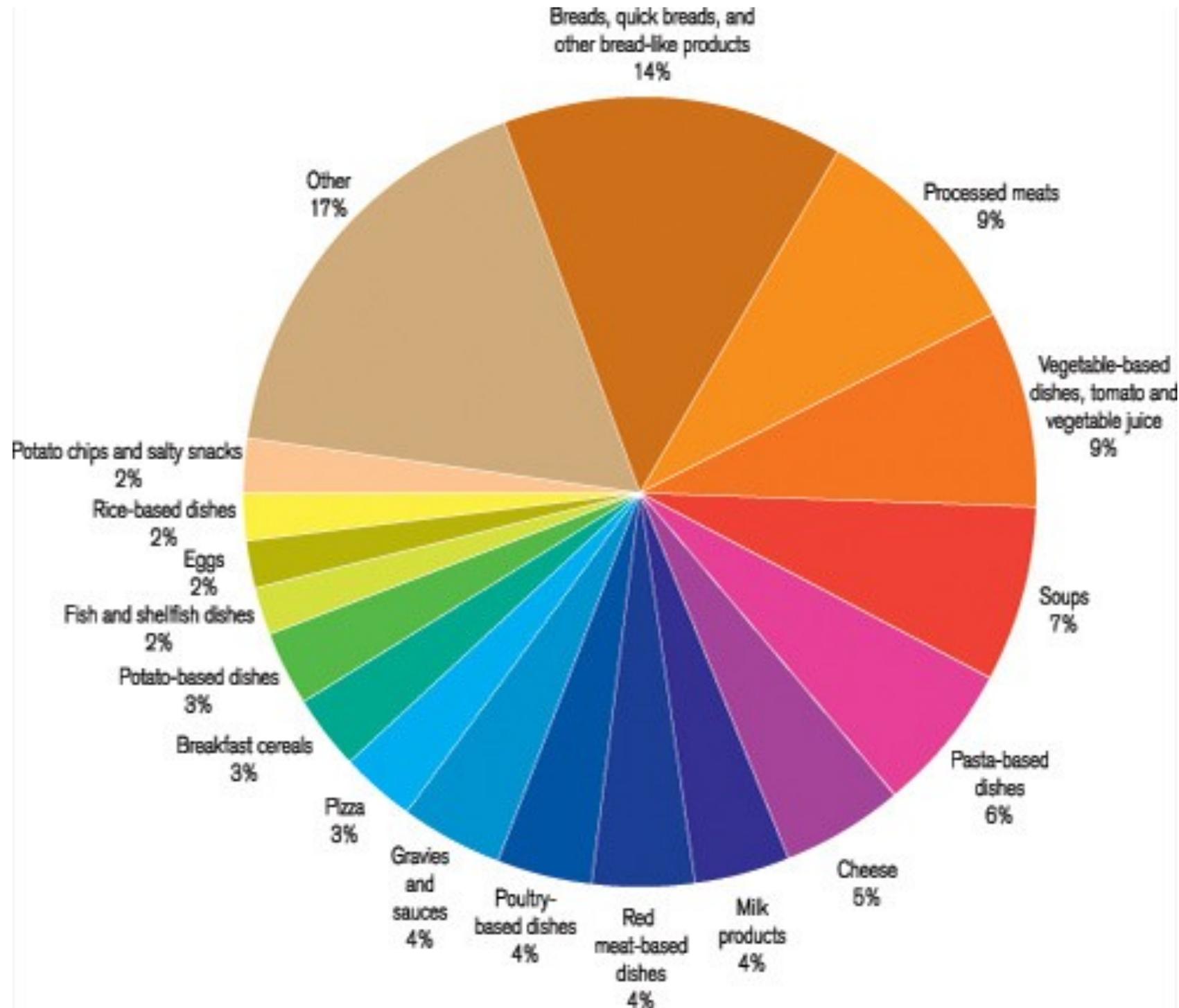


- Compression stockings
  - Fitted by Rx
  - 30-40 mmHg (**ABI >1.0**)
  - Waist or thigh-high  
(knee-high only to ↓VR)
  - Able or has assist to apply  
(device, home care)
- Result:
- ↑BPs n/s – ~15 mmHg?
  - **Not EBM...**

<b>Rx</b>	Date _____
	Patient _____
	Address _____
Compression stockings	
Prescription:	
Length:	Thigh-high
#:	2 pairs
Pressure:	30-40 mmHg
(Open/closed toe):	...
Diagnosis:	Orthostatic hypotension
Permission	_____

# Dietary Tx for volume expansion

- Hydration – not just water
  - $\geq 2\text{L/d}$  -or- Urine output  $\sim 2\text{L/d}$
  - Caffeine – stimulant vs. diuretic
  - Avoid alcohol
- **Water bolus**
  - Drink (1-) 2c. \*fast\*  $\rightarrow \uparrow$  BPs stand  $\sim 20+$  /  $\sim 2\text{h}$ 
    - 1<sup>st</sup> thing in AM
    - PRN e.g. a/c activity, a/c meal (post-prandial OH)
- Salt
  - Aim NaCl 9-12g/d (!) -or-  $\uparrow$  u.Na<sup>+</sup>  $>170$  mM



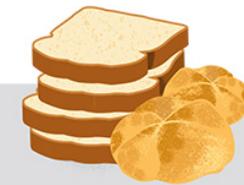
## DID YOU KNOW?

**These six popular foods can add high levels of sodium to your diet.**

As part of a healthy dietary pattern that emphasizes the intake of vegetables, fruits, nuts, whole grains, lean vegetable or animal protein, and fish and minimizes the intake of trans fats, red meat and processed red meats, refined carbohydrates, and sugary drinks, the American Heart Association recommends 2,300 milligrams (mgs) or less a day of sodium.\*



Daily suggested sodium referenced below is based on 2,300 mgs/day recommendation:



### BREADS & ROLLS

Some foods that you might eat throughout the day, such as bread, can add up to a lot of sodium even though each serving may not seem high in sodium.

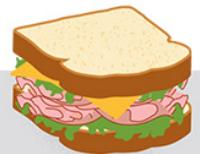
1



### PIZZA

A slice pepperoni pizza can contain almost a third of your daily recommended dietary sodium. Try swapping in veggies to your next slice.

2



### SANDWICHES

A sandwich or burger from a fast food restaurant can contain more than 100 percent of your daily suggested dietary sodium. Try half a sandwich with a side salad instead.

3



### COLD CUTS & CURED MEATS

One 2 oz. serving, or 6 thin slices, of deli meat can contain as much as a third of your daily recommended dietary sodium. Build a sandwich with fresh vegetables such as lettuce, tomatoes, avocados, and bell peppers.

4



### SOUP

Sodium in one cup of canned soup of the same variety can range from 49 to 830 milligrams — more than a third of your daily recommended intake. Check the labels to find lower sodium varieties.

5



### BURRITOS & TACOS

Taco toppings and burrito fillings can pack a big sodium punch. Choose burritos and tacos that are full of veggies and lean sources of protein.

6



Compare labels whenever possible and choose options with the lower amounts of added sugars, sodium and saturated fat and no trans fat and look out for the Heart-Check mark, a simple tool to help you eat smart. When you see it, you can be confident that a product aligns with the American Heart Association's recommendations for an overall healthy eating pattern, including sodium.

\*Also, remember serving size makes a difference. Eating double the serving size means you are eating double the sodium. 1,500 mg/d for those who are sensitive to sodium and /or at high risk for hypertension.

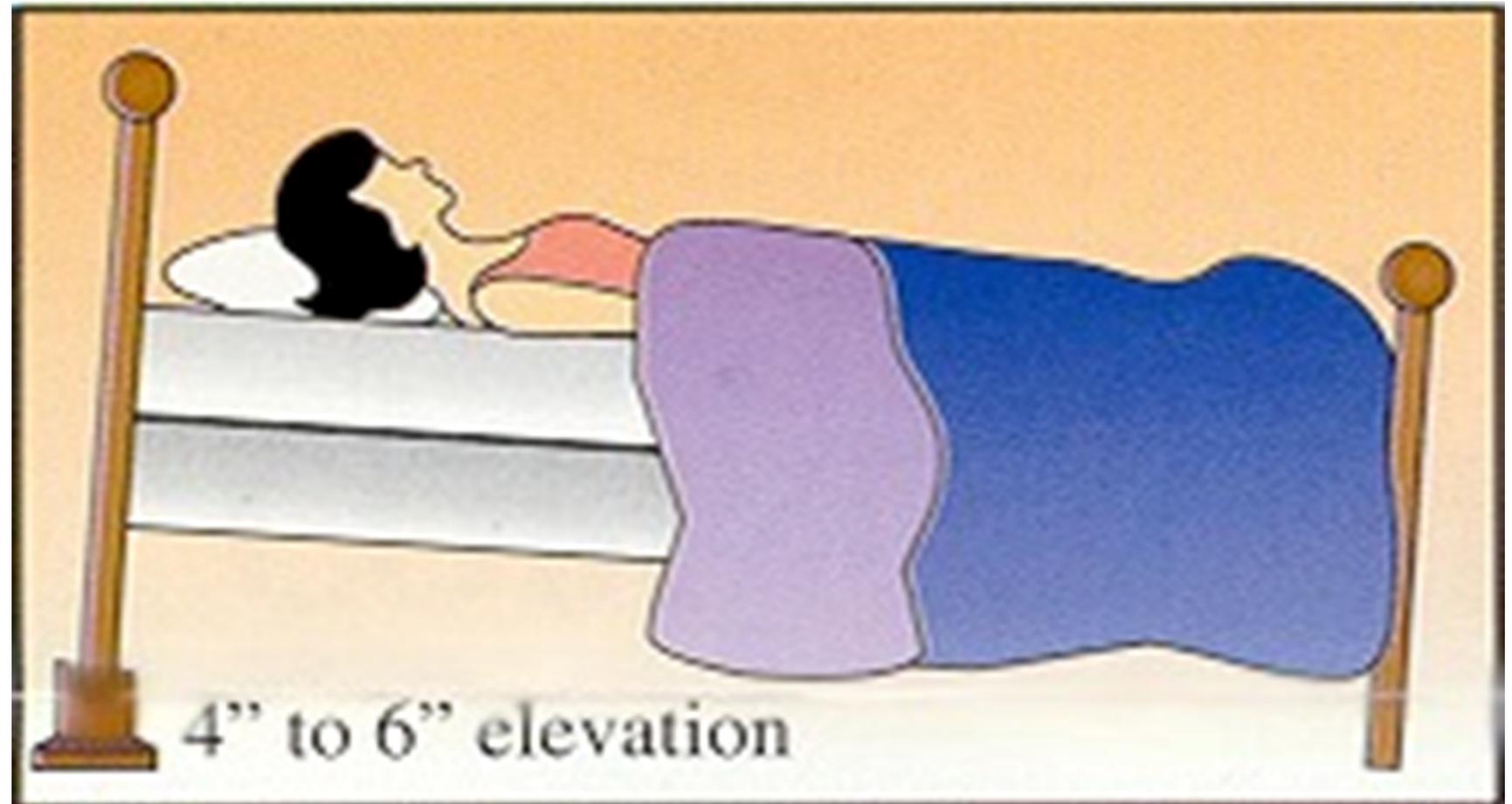
© Copyright 2020 American Heart Association, Inc., a 501(c)(3) not-for-profit. All rights reserved. Unauthorized use prohibited. D515225 2/20

# “Head-up tilt” - “Reverse Trendelenburg”

~12° = 15cm / 6”

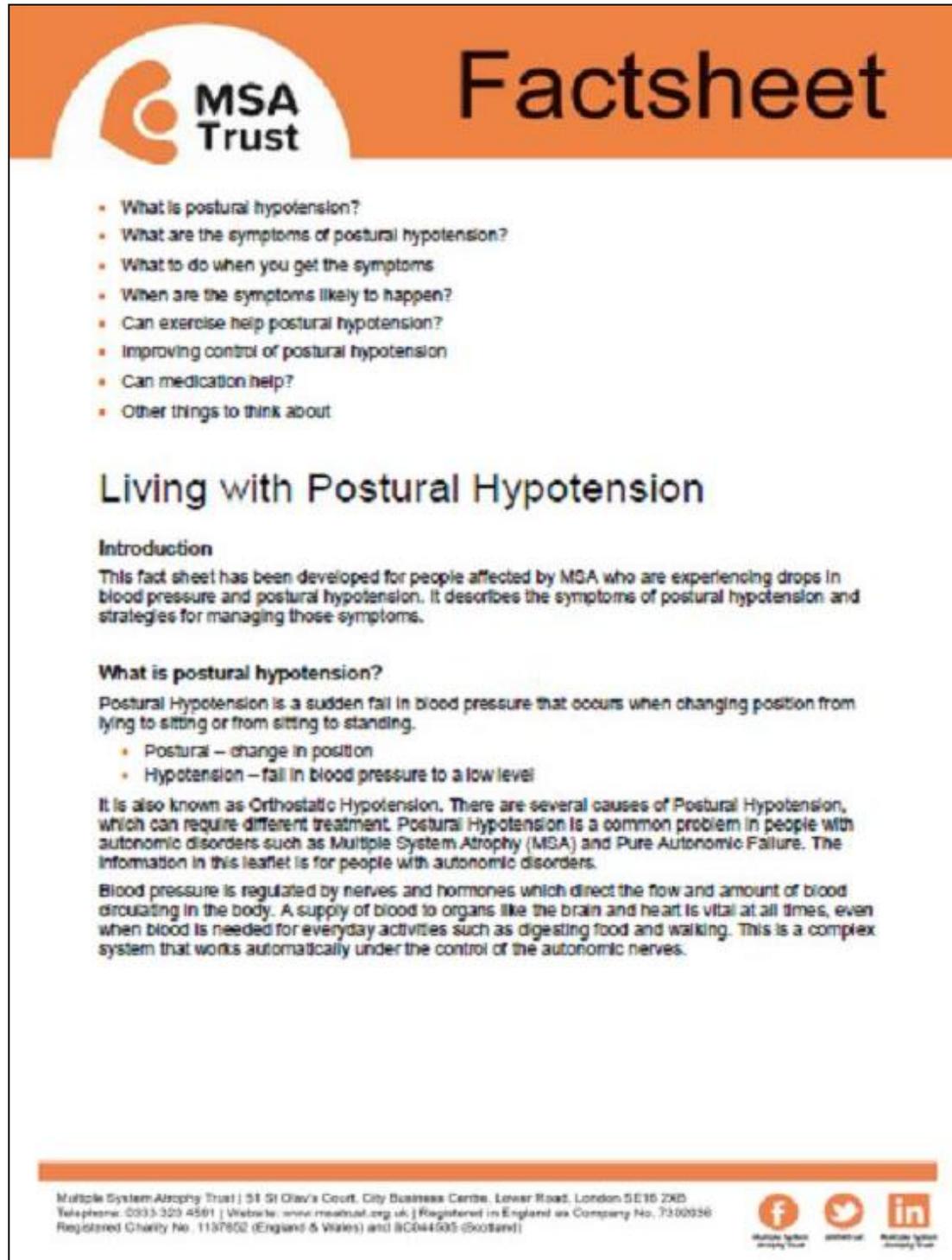
↓ Postural natriuresis

↓ Vascular  
redistribution  
of leg edema



# Avoid triggers

- Vasodilation
  - Heat - Hot weather, hot shower, hot tubs, sauna, fever
  - Alcohol
  - Large meals esp. high in simple carbohydrates (e.g. pasta)
- Toileting overnight
  - ↓ Nocturia – fluid mgmt, leg edema mgmt, caffeine/diuretics in AM
  - ↓ Getting up - Urinals / bedside commode, diapers (last resort)
- Prolonged standing
  - Modify activity
  - 4-wheeled walker, wheelchair (last resort)



**MSA Trust** Factsheet

- What is postural hypotension?
- What are the symptoms of postural hypotension?
- What to do when you get the symptoms
- When are the symptoms likely to happen?
- Can exercise help postural hypotension?
- Improving control of postural hypotension
- Can medication help?
- Other things to think about

### Living with Postural Hypotension

**Introduction**  
 This fact sheet has been developed for people affected by MSA who are experiencing drops in blood pressure and postural hypotension. It describes the symptoms of postural hypotension and strategies for managing those symptoms.

**What is postural hypotension?**  
 Postural Hypotension is a sudden fall in blood pressure that occurs when changing position from lying to sitting or from sitting to standing.

- Postural – change in position
- Hypotension – fall in blood pressure to a low level

It is also known as Orthostatic Hypotension. There are several causes of Postural Hypotension, which can require different treatment. Postural Hypotension is a common problem in people with autonomic disorders such as Multiple System Atrophy (MSA) and Pure Autonomic Failure. The information in this leaflet is for people with autonomic disorders.

Blood pressure is regulated by nerves and hormones which direct the flow and amount of blood circulating in the body. A supply of blood to organs like the brain and heart is vital at all times, even when blood is needed for everyday activities such as digesting food and walking. This is a complex system that works automatically under the control of the autonomic nerves.

Multiple System Atrophy Trust | 51 St Olav's Court, City Business Centre, Lower Road, London SE16 2XD  
 Telephone: 0203 303 4591 | Website: www.msatrust.org.uk | Registered in England as Company No. 7300956  
 Registered Charity No. 1137852 (England & Wales) and SC044695 (Scotland)

# Patient education material on OH (non-Rx mgmt of OH)

MSA Trust  
[www.msatrust.org.uk](http://www.msatrust.org.uk)

# Rx – NB: All “off-label” except midodrine & droxidopa

- *Before add Rx, see what Rx can take away first!*
- **↑ Intravascular volume**
  - Salt tabs (NaCl) 1 - 2g PO BID (AM, noon)
  - Fludrocortisone
  - NSAIDs?
- **↑ Vascular resistance (vasopressors)**
  - Midodrine
  - (Droxidopa)
- **In supine HTN w/ OH (SH-OH)**
  - Domperidone?
  - Pyridostigmine?
- Many other off-label agents...

# Volume expansion

- Fludrocortisone – off-label use
  - 0.05mg - 0.2mg PO BID (AM, noon)
  - **~20min before get out of bed in AM w/ water bolus**
  - ↑BP ~10-40 / 0-15?
- Salt & water retention (mineralocorticoid analogue)
  - Attn: CHF, leg edema
  - K<sup>+</sup> & Mg wasting
    - Check electrolytes 1-2 wks after start or ↑ dose
    - 0.1mg BID typically needs KCl ~20mEq/d
  - Some glucocorticoid effect
    - Taper to discontinue
    - OP fracture prevention Rx?

# Vasoconstriction

- Midodrine – on-label use
  - NB: Brand name “Amatine” (\*not\* amantadine)
  - 2.5 – 10mg PO TID (AM, noon, PM – not HS)
    - ~20min before get **OOB in AM w/ water bolus**
    - ↑BP ~20/10 vs. n/s...?
  - α-1 agonist
    - Vasoconstriction - Caution CAD, PAD
    - Caution: Urinary retention w/ BPH
    - Piloerection (scalp pruritis)

# “SH - OH”

- Supine hypertension w/ orthostatic hypotension
  - Excess or continuous effect of vasopressors
  - Progressing ANS dysfunction
  - Can cause hypertensive urgency / emergency...
- Tx – not EBM...
  - Elevate head when sleep/nap
  - Avoid vasopressors towards HS
  - If severe, anti-HTN Rx @HS
    - Short-acting, lowest dose possible
      - e.g. captopril 6.25mg, metoprolol 12.5mg, hydralazine 5mg
      - e.g. NTP 0.2mg/h @HS → remove before get OOB in AM

- **Domperidone** – off-label use
  - PD on dopa agonist (apomorphine) - ↓/↔ OH drop (↑BP ~?)
  - Peripheral D2 dopamine antagonist
  - 2.5-10mg PO TID
    - “EBM” 10mg QID → caution QTc syndrome esp. elderly
    - Side effects – Diarrhea, Parkinsonism, ?HTN w/ renal accumulation
- **Pyridostigmine** – off-label use
  - ↑ vascular resistance - ↑BP ~?/7
    - “Position dpdt stimulation of ANS w/o causing SH...”
  - Acetylcholinesterase inhibitor 30 - 60mg PO TID
    - Side effects: “sludge” - Diarrhea, UI, drooling, tearing, etc.

## Other Rx... (Neuro referral)

- Droxidopa (L-DOPS)
  - ↑ vascular resistance
  - Pro-drug → Norepinephrine
  - N/A Canada
- Stimulants to ↑ vascular resistance & HR
  - e.g. Caffeine, Pseudoephedrine
  - ++ side effects...

- **Erythropoietin**
  - Only if anemic
  - 50 U/kg x3/wk? → ↑BPs ~20 standing (NEJM 1993)
  - Ensure adequate iron, injection; long-term FX?
    - NB: ESRD - ↑ mortality / CV events when Rx Hb >130g/L
- **Desmopressin (DDAVP, ADH analogue)**
  - ↓ nocturnal polyuria
  - 0.1 - 0.2mg PO –or- 0.01mg / inh x1 I/N spray QHS
  - Caution: ↓↓↓Na+
- **Octreotide (somatostatin analogue)**
  - ↑ vascular resistance, ↓ splanchnic pooling p/c meals
  - +++ GI side FX, injection

# Additional readings

## Management of Orthostatic Hypotension.

- Autonomic Disorders, Feb 2020; 26(1): 154-77.
- [https://journals.lww.com/continuum/Fulltext/2020/02000/Management\\_of\\_Orthostatic\\_Hypotension.12.aspx](https://journals.lww.com/continuum/Fulltext/2020/02000/Management_of_Orthostatic_Hypotension.12.aspx)

## Parkinson Disease and Orthostatic Hypotension in the Elderly: Recognition and Management of Risk Factors for Falls.

- Aging Dis, 2020 June; 11(3): 679–91.
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7220277/>

## UpToDate.com

- Mechanisms, causes and evaluation of OH
- Treatment of orthostatic and postprandial hypotension