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Webinar: Nutrition in cardiometabolic disorders

Nutrition Therapy & Lifestyle Modifications for Hypertension Management

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Introduction



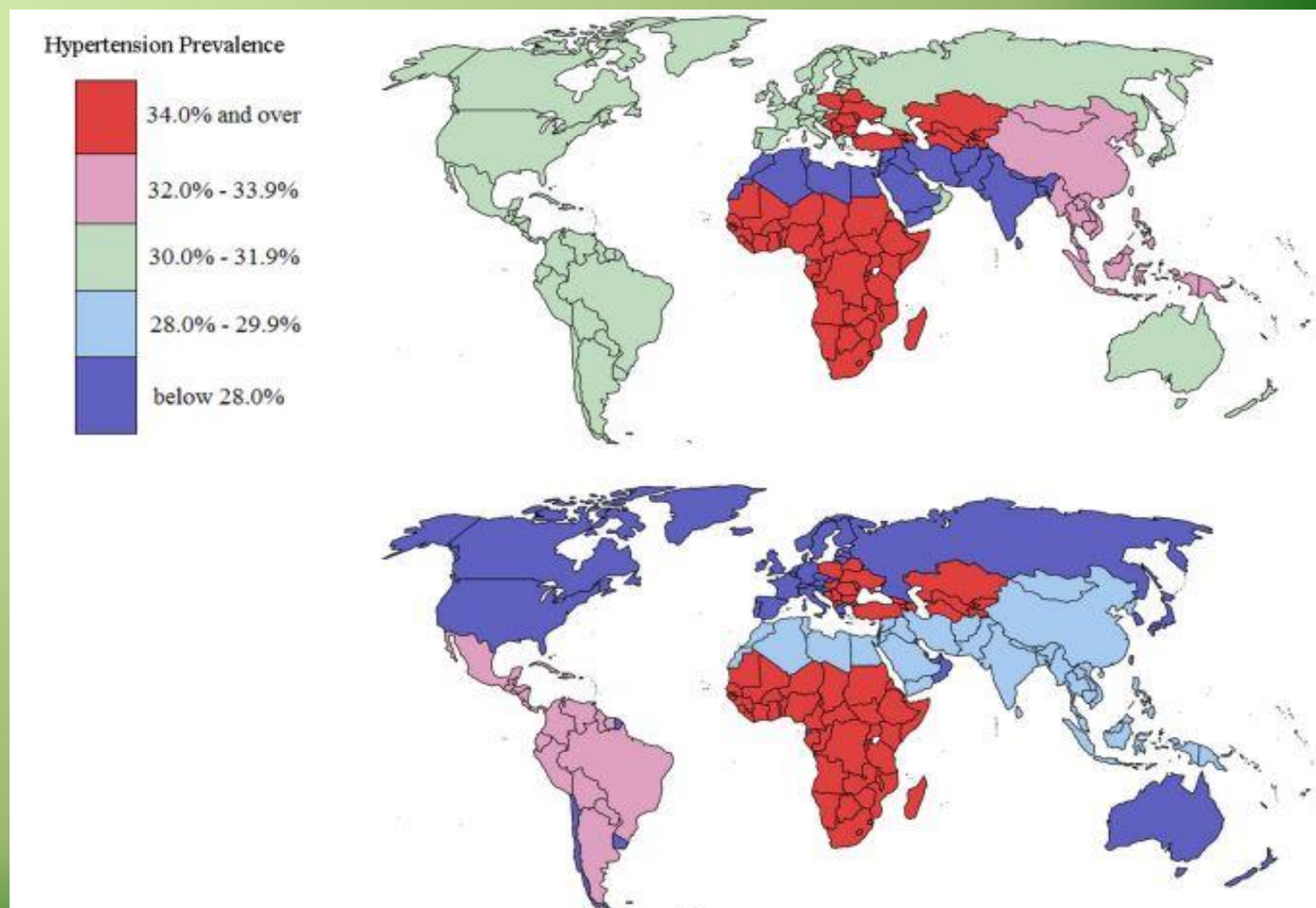
- **Hypertension**, also known as the **silent killer** (as a primary risk factor)
- One of the most important **preventable cardiovascular risk factor** which impacts **health**, **disease**, and **death**
- **High prevalence** in most of the developed, underdeveloped, and developing countries.
- It is estimated to **affect** around a **third of the adult population worldwide**
- **If not treated properly** can lead to various serious complications such as myocardial infarction, stroke, renal failure, and death



Epidemiology



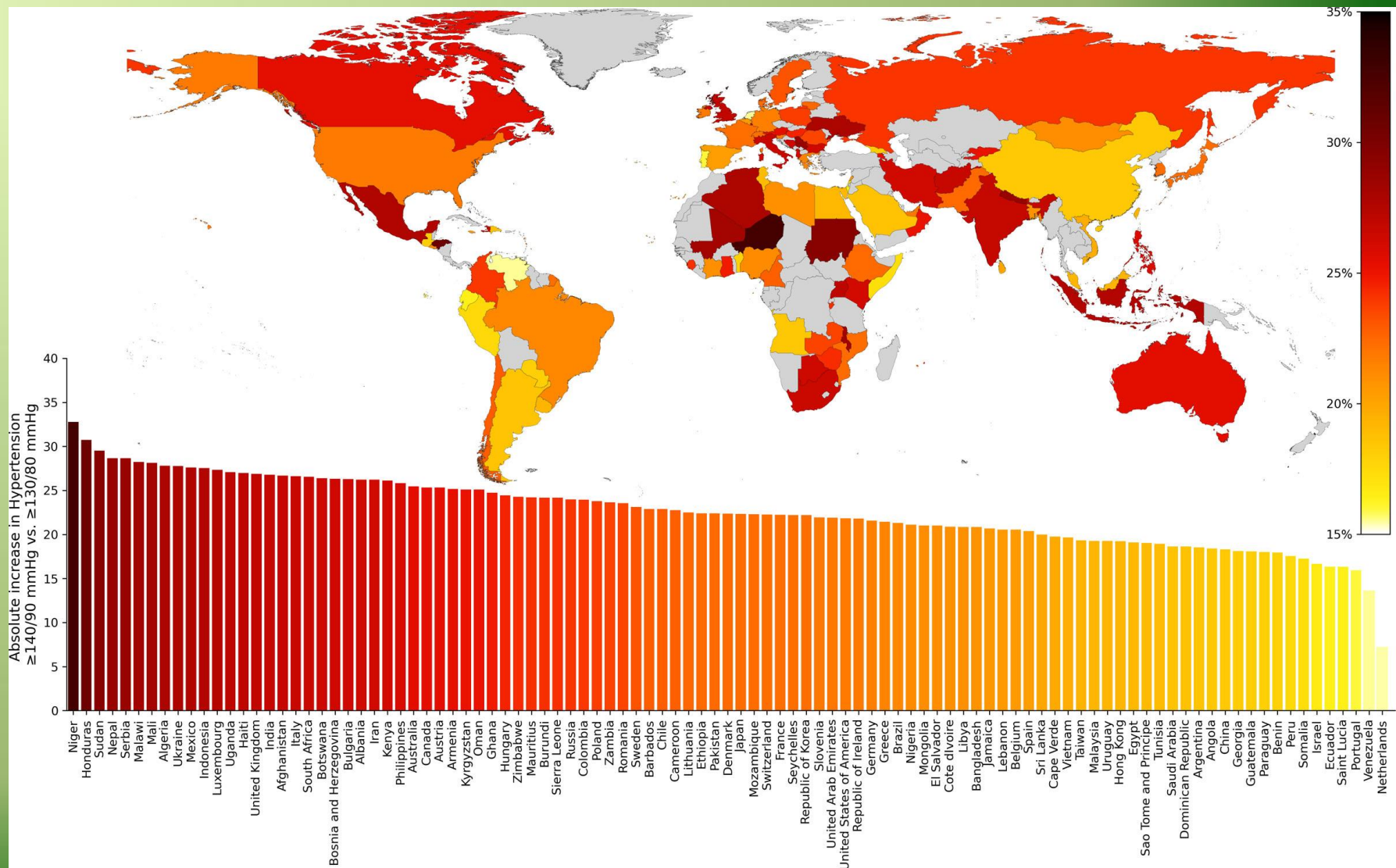
- **Hypertension prevalence by world region**
- Prevalence of hypertension defined as **systolic BP ≥ 140 mmHg** or **diastolic BP ≥ 90 mmHg** or **use of antihypertensive medication**





Epidemiology (cont.)

World map and bar plot visualizing the corrected absolute increase of estimated prevalence of hypertension **when applying the threshold of $\geq 130/80$ mm Hg compared to a threshold of $\geq 140/90$ mm Hg**





Definition



Summary Table: Seventh report of the **Joint National Committee (JNC7)** on Blood Pressure Classification

Category	Systolic BP (mm Hg)	Diastolic BP (mm Hg)	Treatment Recommendation
Non-elevated	<120	<80	Maintain healthy lifestyle
Pre-hypertension	120–139	80–89	Lifestyle modifications alone can prevent progression.
Stage 1 Hypertension	140-159	90-99	Lifestyle changes + possible medications (if no improvement in 3–6 months or if high-risk).
Stage 2 Hypertension	≥160	≥100	Lifestyle + medications required (immediate drug therapy in most cases).



Definition (cont.)



Key points of the **American College of Cardiology/American Heart Association (ACC/AHA)** definition of hypertension

Category	Systolic BP (mm Hg)	Diastolic BP (mm Hg)	Treatment Recommendation
Normal BP	<120	and <80	Lifestyle modifications <u>recommended</u>
Elevated BP	120–129	and <80	Lifestyle changes <u>strongly encouraged</u>
Stage 1 Hypertension	130–139	or 80–89	Initiate lifestyle modifications <u>for 3–6 months</u> ; if uncontrolled ($\geq 130/80$), add pharmacotherapy Drug therapy <u>recommended</u> if clinical ASCVD, diabetes, CKD, or 10-year ASCVD risk >10%
Stage 2 Hypertension	≥ 140	or ≥ 90	Drug therapy <u>recommended</u> regardless of risk factors



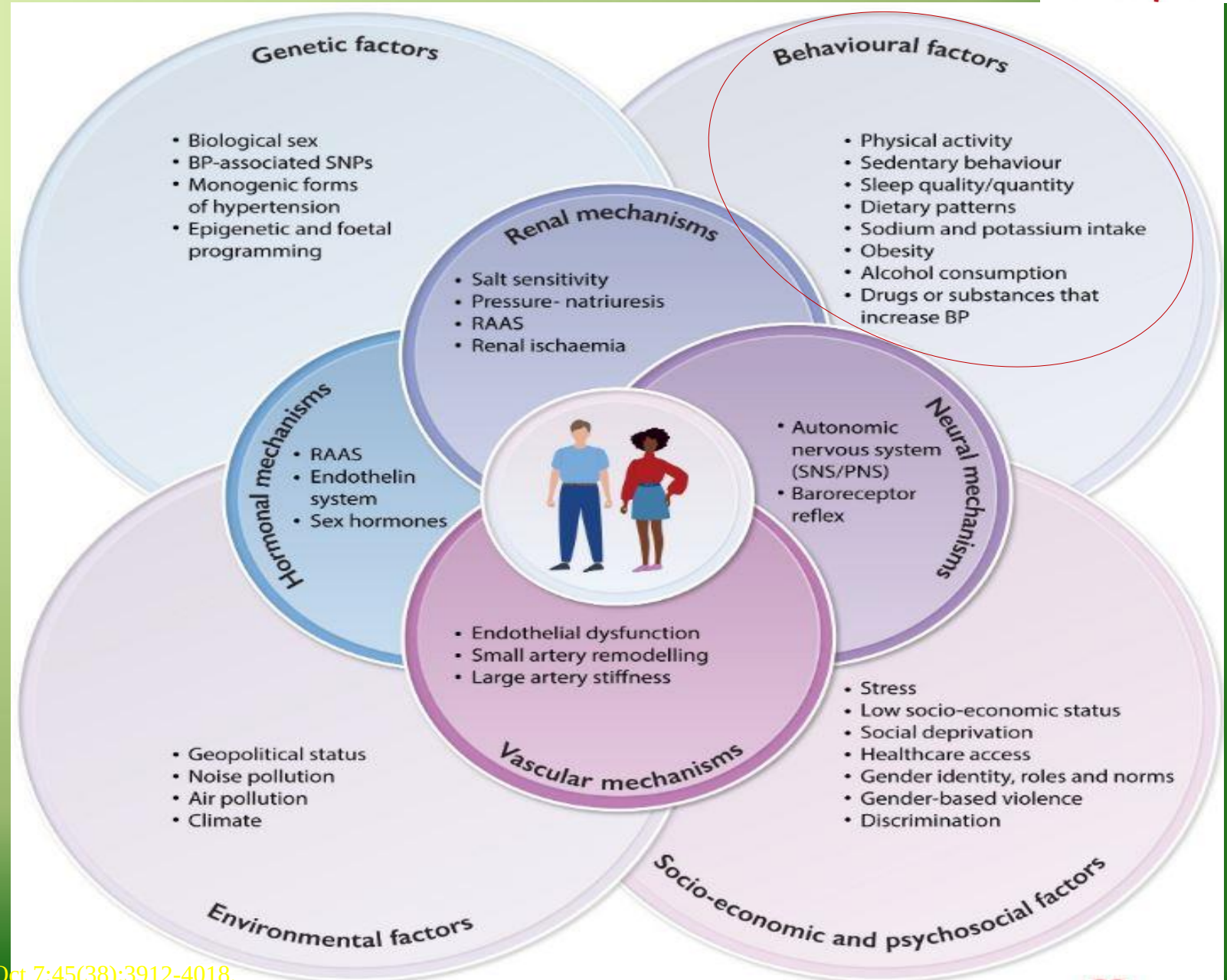
Key points of the **European Society of Cardiology (ESC) Guidelines** for the management of elevated blood pressure and hypertension

Endorsed by the **European Society of Endocrinology** (ESE) and the **European Stroke Organisation** (ESO)

Category	Systolic BP (mm Hg)	Diastolic BP (mm Hg)	Treatment Recommendation
Normal BP	<120	and <70	Healthy lifestyle <u>maintenance</u>
Elevated BP	120–139	and 70-89	▪ Lifestyle changes <u>strongly encouraged</u> + ▪ Risk-based: If high CVD risk ($\geq 10\%$ or CKD/DM) and BP remains $\geq 130/80$ after 3 months → Drug therapy start. ▪ If low-moderate risk → wait until BP $\geq 140/90$.
Hypertension	≥ 140	≥ 90	Lifestyle changes + Start drug therapy immediately in all patients.



Why Does Hypertension Occur? A Multifactorial Pathophysiological Framework





Approach for Hypertension Management



- The management of hypertension requires a comprehensive approach that integrates lifestyle modifications and pharmacotherapy.
- Lifestyle interventions include a healthy diet, weight management, physical activity, reduction or avoiding of alcohol consumption, smoking cessation, and stress management.
- The therapeutic strategy for hypertension strives to decrease arterial pressure elevations and minimize the probability of cardiovascular pathologies.



Medical Nutrition Therapy for Hypertension Management



- **Dietary pattern** is a very important part of **non-pharmacologic management** of blood pressure.
- It is influenced by **appropriate calorie requirements**, **personal, cultural food preferences**, and **nutritional therapy for other medical conditions**, such as diabetes mellitus and chronic kidney disease.
- **Weight** and **body fat** are key factors in **shaping dietary approaches** for managing hypertension in individuals.
- Making **healthy food choices** and **avoiding** or **reducing unhealthy food choices** is essential for improving blood pressure.
- This can be achieved by **various healthy dietary plans**.
- **Various diet strategies** have been identified as **effective** for management of hypertension: such as **DASH** diet, **Mediterranean** diet, **low-sodium** diet, **vegetarian** diet, and **portfolio** diet.



Follow healthy dietary pattern

When designing an antihypertensive diet, a personalized, multifactorial approach is critical **to** ensure efficacy, safety, and adherence.

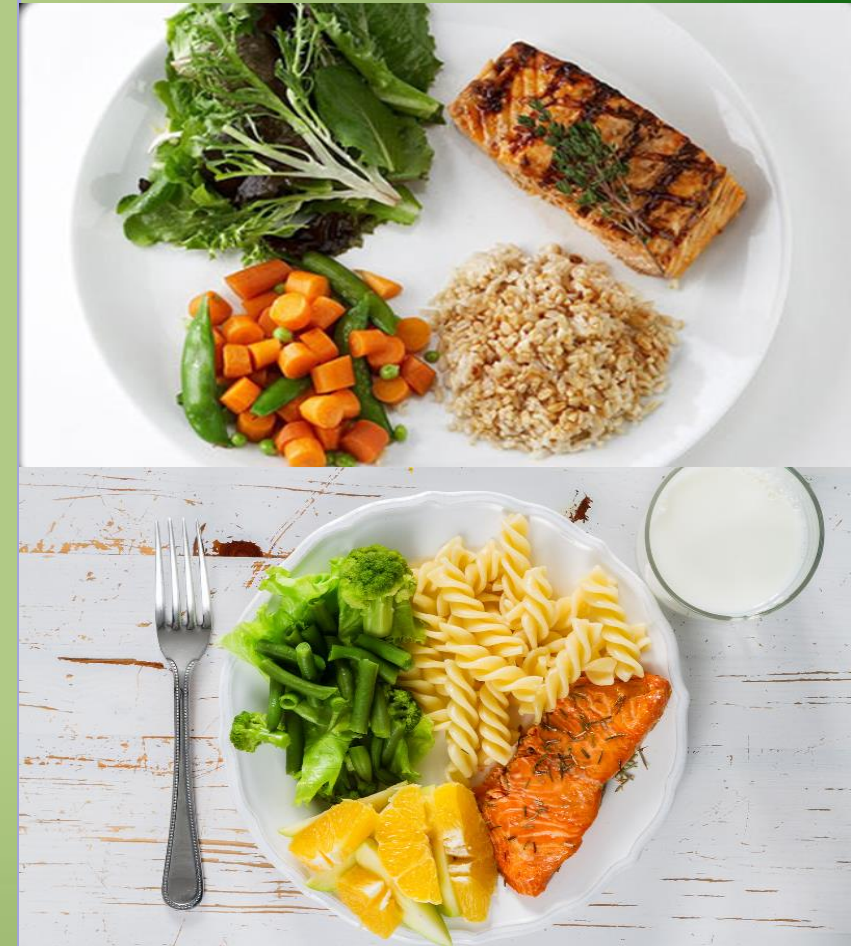
Essential factors to evaluate include:

- **Anthropometrics & Metabolic Status** (Current weight/BMI/Body fat distribution)
- **Current Dietary Intake** (Energy intake, food choices, sodium intake, etc.)
- **Pharmacotherapy Interactions** (such as ACE inhibitors/ARBs/potassium-rich foods or Diuretics/magnesium/zinc intake)
- **Comorbidities** (such as Diabetes, CKD)
- **Socioeconomic Factors** (Cost: Recommend affordable Healthy-diet staples).
- **Cultural preferences** (Adapt sodium limits to traditional diets (e.g., using herbs vs. Salty condiments).
- **Physical Activity**
- **Food Preferences**, Address **food allergies, intolerances**, and **ethical choices**.



Follow healthy dietary pattern (cont.)

- **Key point** in dietary management of hypertension:
 - ❖ **Portion Control & Weight Management**
 - ❖ A **calorie-restricted diet** based on **healthy choices** should be considered for **hypertensive patients with excess weight**.
 - ❖ **Avoiding overeating** supports blood pressure control by **minimizing** circulatory stress (Short-term) and **preventing** obesity-related hypertension (long-term)
 - ❖ **Losing 5–10% of body weight** (if obese or overweight) **can reduce BP** by 5–20 mmHg.





Follow a healthy dietary pattern (cont.)

- A diet consisting of whole grains, more vegetables, and fruits is recommended.
- Other recommendations include consuming low-fat dairy products, poultry, fish, legumes, non-tropical vegetable oils (rich in MUFA and PUFA), and nuts.
- Reducing intake of **salts**, **sweets**, **sugar-sweetened beverages**, **saturated fats**, and **red and processed meat**
- This can be achieved by various healthy dietary plans such as DASH diet, Mediterranean Diet, ...).





Follow a healthy dietary pattern (cont.)

DASH Eating Plan-Number of Daily Servings for three calorie levels

Food Groups	Servings/Day		
	1,600 calories/day	2,600 calories/day	3,100 calories/day
Grains*	6	10–11	12–13
Vegetables	3–4	5–6	6
Fruits	4	5–6	6
Fat-free or low-fat milk and milk products	2–3	3	3–4
Lean meats, poultry, and fish	3–6	6	6–9
Nuts, seeds, and legumes	3/week	1	1
Fats and oils	2	3	4
Sweets and added sugars	0	≤2	≤2

Daily Nutrient Goals Used in the DASH Studies (for a 2,100 Calorie Eating Plan)

Total fat	27% of calories	Sodium	2,300 mg*
Saturated fat	6% of calories	Potassium	4,700 mg
Protein	18% of calories	Calcium	1,250 mg
Carbohydrate	55% of calories	Magnesium	500 mg
Cholesterol	150 mg	Fiber	30 g



Focus on Whole, Unprocessed Foods

➤ Eat More:

- ❖ **Fruits & vegetables** (7–10 servings/day)- **provide** potassium, magnesium, and **fiber**—nutrients that help **lower BP**
- ❖ **Whole grains** (6-12 servings/day) (whole wheat bread, oats, brown rice). **contribute** fiber and nutrients **beneficial for BP control**
- ❖ **Lean protein sources** (3-6 servings/day) (consuming lean meats, fish, skinless poultry, beans, seeds, and nuts to **reduce saturated fat and cholesterol intake**).
- ❖ **Low-fat or fat-free dairy products** (2-3 servings/day): **provide** calcium and protein while **limiting** saturated fat intake
- ❖ **Healthy fats** (avocados, olive oil, Flaxseed oil, nuts).

➤ Avoid:

Processed snacks, fried foods, sugary drinks.



Low Sodium (Salt) Intake

- **Goal:** <1,500–2,300 mg/day (lower is better for hypertension).
- **Why?** Excess sodium increases fluid retention and blood pressure.
- **How?**
 - ❖ **Avoid processed foods** (canned foods, processed meats, fast food).
 - ❖ Use herbs/spices instead of salt.
 - ❖ **Check food labels** for "sodium" content.

High Potassium-Rich Foods

- **Goal:** 3,500–5,000 mg/day (**balances sodium effects**).
- **Why?** Potassium relaxes blood vessels and counteracts sodium.
- **Best Sources:**
 - ❖ **Vegetables** and **fruits** (Bananas, oranges, spinach, avocados), **beans**.

Magnesium & Calcium for Vascular Health

- **Magnesium** (310-420 mg for adults) (nuts, seeds, leafy greens, whole grains) → **helps** blood vessels relax.
- **Calcium** (1000-1300 mg) (low-fat dairy) → **supports** blood pressure regulation.



Low Saturated/Trans Fats and cholesterol

Reduce consumption of red meat, full-fat dairy products, sweets

Avoid: Butter, fatty meats, fried foods, packaged baked goods.

Choose: Omega-3-rich foods (fatty fish, flaxseeds, walnuts).

High Fiber for Heart Health

Goal: 25–38 g/day (lowers BP by improving arterial function).

Sources: Legumes, vegetables, whole grains.

Reduce consumption of **refined grains**

Limit Alcohol & Caffeine

Alcohol: **Avoid alcohol altogether** OR ≤ 1 drink/day (women), ≤ 2 (men). **Excess raises BP.**

Caffeine: **Moderate intake** (some people are sensitive to BP spikes).

Hydration with Water & Herbal Teas

Avoid sugary drinks (linked to hypertension).

Hibiscus tea may modestly lower BP.



Medical Nutrition Therapy for Hypertension Management (cont.)



Nutrient	Recommended daily intake	Potential benefits
Sodium	Less than 2,300 mg or ideally 1,500 mg for people with hypertension	Lower sodium intake can help reduce blood pressure levels . High sodium consumption is linked to increased blood pressure.
Potassium	3,500-4,700 mg	Potassium can help balance the amount of sodium in cells , which can aid in blood pressure control.
Magnesium	310-420 mg for adults	Magnesium can help lower blood pressure levels . It <u>also</u> aids in nerve function, blood glucose control, and protein synthesis.
Calcium	1000-1300 mg for adults	Calcium can help blood vessels tighten and loosen , thus aiding in blood pressure control. It also helps in muscle function and nerve signaling.
Fiber	25-38 g per day	A diet high in fiber can contribute to overall heart health and indirectly aid in blood pressure control.



Herbs in hypertension management

Findings of several meta-analyses were mixed:

- For various spices administered to humans, **a little evidence of improved BP was reported.**
- For **black seed, cinnamon, garlic, ginger**, and **sesame**, there is evidence suggestive of clinical benefit for BP lowering.
- Based on inconsistencies in the evidence, caution is warranted in establishing intake recommendations for health benefits, **especially for the use of elevated, nonculinary amounts** that can be consumed as supplements containing concentrated whole spices or isolated constituents.
- Using **spices/herbs** instead of salt in the Iranian population can help control blood pressure.





Summary of BP-Lowering Effects of Nutrition Therapy & Lifestyle Modifications

Intervention	SBP Reduction (mmHg)
DASH Diet	5–11
Sodium Restriction	2–8
Weight Loss (5–10%) (By adopting a healthy, calorie-restricted diet)	5–20
Physical activity	5–8
Alcohol Moderation	2–4
Stress Management	4–5



Drug–Nutrient Interactions in Hypertension Management



- 1. Potassium** is the most critical electrolyte – ACE inhibitors (e.g., lisinopril, enalapril, captopril), ARBs (e.g., losartan, valsartan, irbesartan), and **K⁺-sparing diuretics** (e.g., spironolactone, amiloride, triamterene) **increase K⁺** (hyperkalemia risk); thiazide/loop diuretics **deplete K⁺** (hypokalemia risk). **Combination therapy requires careful K⁺ monitoring.**
- 2. Grapefruit** is **strictly contraindicated** with **all calcium channel blockers** (e.g., amlodipine, nifedipine, felodipine, verapamil) – interaction persists for **72 hours**; **separating timing is ineffective.**
- 3. Magnesium depletion** from thiazide/loop diuretics is often **undetected** (serum Mg²⁺ may be normal despite cellular depletion).
- 4. Natural licorice** is **universally contraindicated** in hypertension – raises BP and antagonizes all antihypertensives.
- 5. Team-based care** (physician + dietitian + pharmacist) is essential for safe, effective management of drug–nutrient interactions in polypharmacy patients



A Multidisciplinary Approach to Nutritional Adherence in Hypertension



- ❖ Healthcare team (Physicians and Nutritionist) **play a critical role** in guiding hypertensive patients to adhere to nutritional interventions.
- ❖ The **treatment strategies** is **successful** and **effective** **when the following are considered**:
 - Appropriate education
 - Motivation in patients
 - Use the latest tools, techniques, sciences, technology
 - Making behavioral changes
 - Personalized advice
- ❖ All of which are backed by **empirical evidence** and **influential statistics**.
- ❖ **Education** remains the **cornerstone** of patient adherence.





Other lifestyle modification for management of Hypertension



Physical activity

- All individuals should be **encouraged** to be physically active for the management of hypertension.
- Both **aerobic** and **dynamic resistance exercise** or their combinations can be used in **management of hypertension**.
- The **chosen type of activity/exercise** should be individually tailored: consider **baseline fitness**, **comorbidities**, **pharmacological treatment**, **situational context** and **be progressive in nature**.
- **Emphasis** should be on **reducing daily sedentary time** and **increasing movement** wherever possible.
- **Any type**, **amount** and **intensity** of regular exercise/activity will be beneficial with minimum recommendations for **maintenance of health** and **prevention and management of hypertension**.



Physical activity

Lifestyle modification guidelines published by the **American Heart Association** (AHA) and the **American College of Cardiology** (ACC): Physical activity

Aerobic exercise	Muscle-strengthening (resistance) exercise
▪ 150–300 min/week of moderate-intensity physical activity (3 to 5 times a week- 45 to 60 minutes each time), (Brisk walking, water aerobics, Leisure cycling, etc) <u>OR</u> ▪ 75–150 min/week of vigorous-intensity physical activity (Running, Fast cycling, Competitive sports, etc) <u>OR</u> ▪ An equivalent combination of moderate- and vigorous-intensity physical activity	▪ ≥2 times/week ▪ Involving all major muscle groups ▪ At moderate intensity or greater (Push-ups, Pull-ups/chin-up, Squats, Planks, Bench press, Deadlifts, Shoulder press, etc.)

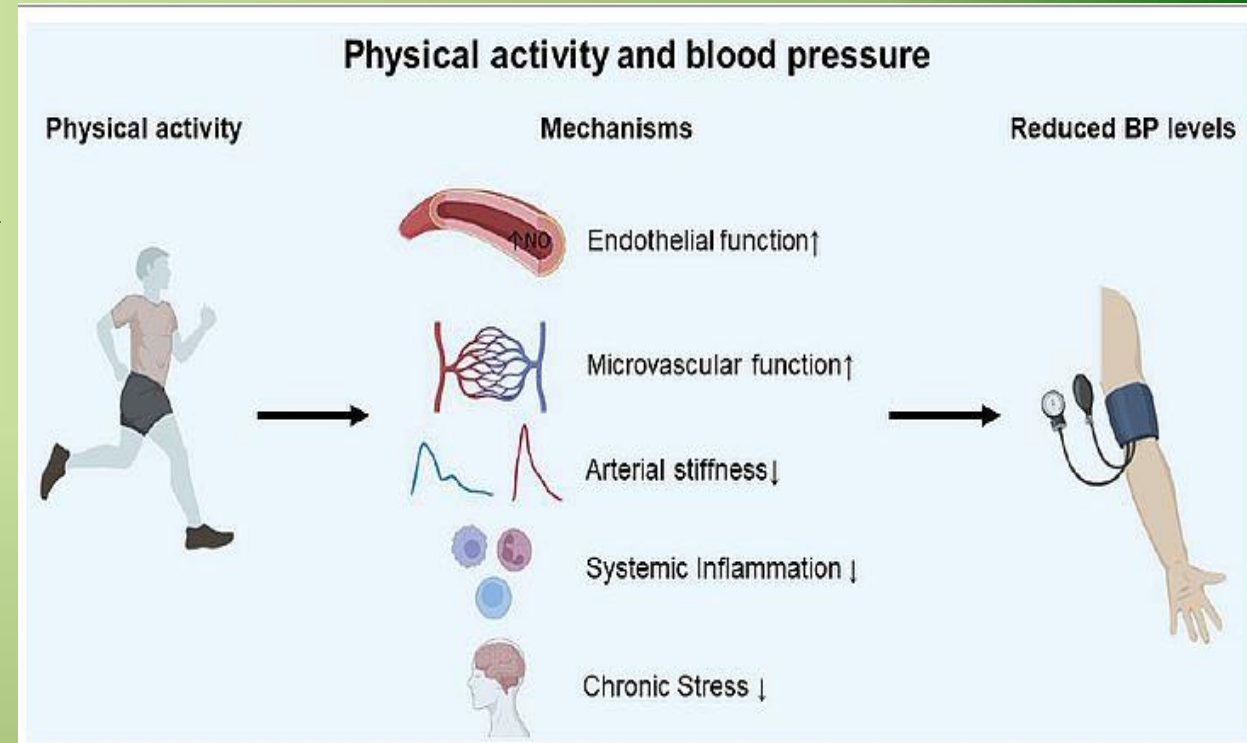
Even greater health benefits are realized by **exceeding these recommendations** (eg, moderate-intensity activity >300 minutes per week or vigorous-intensity physical activity >150 minutes per week).



Physical activity

How can physical activity reduce blood pressure?

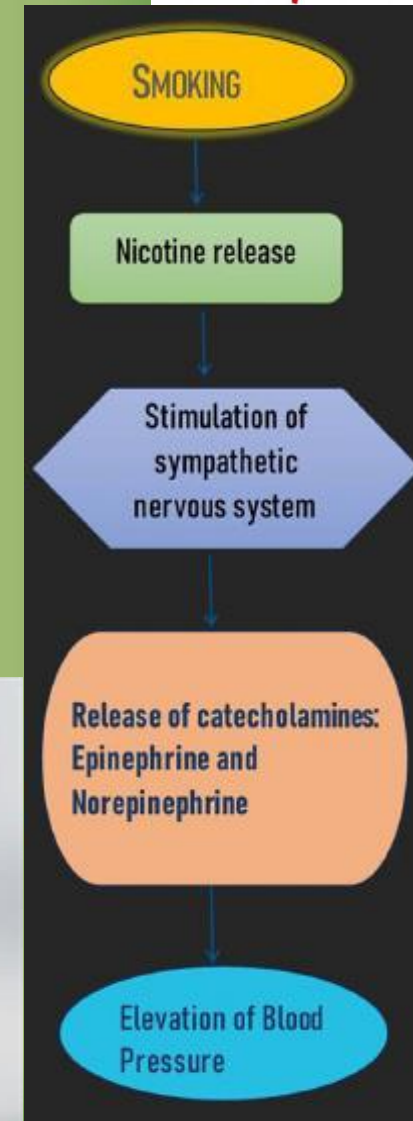
- Enhanced **Endothelial Function**
- Reduced **Sympathetic Nervous System** Activity
- **Weight Loss & Adipokine** Regulation (lowering leptin (pro-hypertensive) and increasing adiponectin (vasoprotective))
- Reduction of **systemic vascular resistance**
- **Renin-Angiotensin System** Modulation
- **Stress** Reduction
- lowers **inflammation**
- Improves **lipid profile**
- Improved **Insulin Sensitivity**





Smoking

- Is an important risk factor for HTN
- **Physicians** play a key role in **encouraging and helping patients achieve smoking cessation.**
- HTN has also **been associated** with **second-hand smoke.**
 - This emphasizes the **necessity to keep places smoke-free** to **reduce the risk of hypertension and cardiovascular disease**





Alcohol consumption

- **Longitudinal studies** suggesting that blood pressure changes **are positively correlated** with alcohol drinking changes.
- **Clinical trials** involving counseling or substitution of **low alcohol substitutes** for **hazardous drinkers** have confirmed that **BP reduction** will follow drinking reduction in days to weeks.
- **Alcohol-Induced Hypertension:**
 - ✓ **Fluid Retention:** Alcohol suppresses vasopressin, increasing water retention and blood volume.
 - ✓ **Vascular Dysfunction:** Acetaldehyde (alcohol metabolite) reduces nitric oxide bioavailability.
 - ✓ **Weight Gain:** High-calorie content promotes obesity, exacerbating hypertension





Alcohol consumption

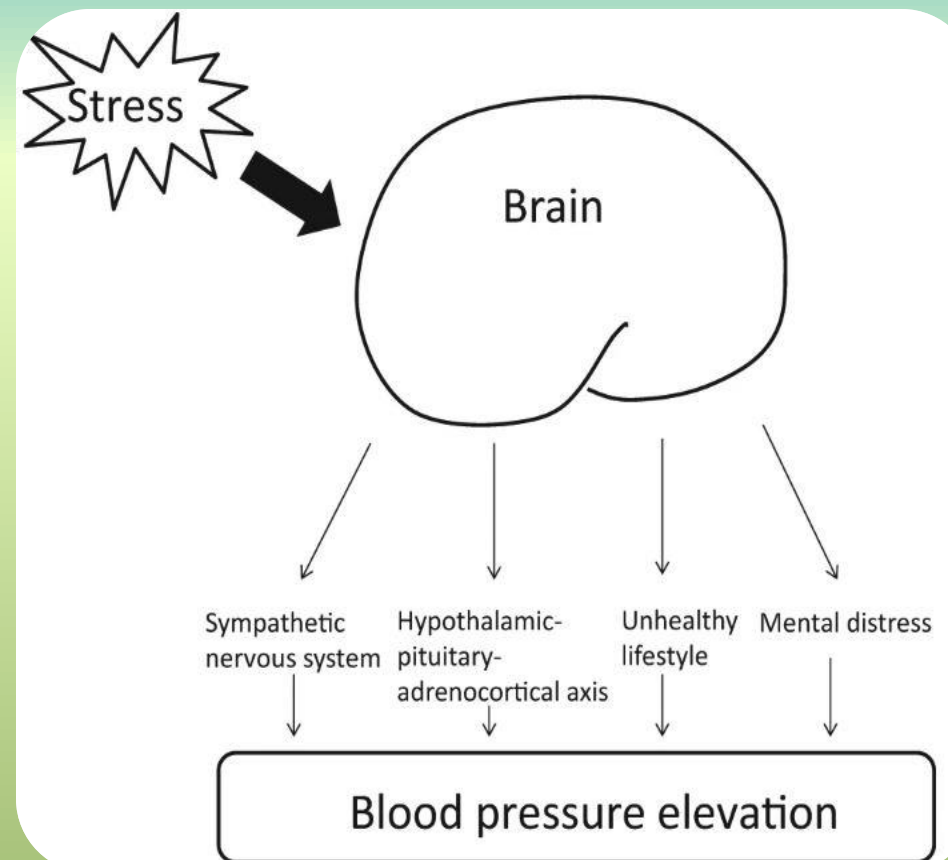
- Alcohol consumption **should be zero** for the best cardiovascular outcomes.
- **There is no safe limit** for alcohol consumption to prevent hypertension and adverse cardiovascular outcomes.
- **Binge drinking should be avoided.**
- If **you do not drink, do not start.**
- However, the recommended daily **upper limit** for alcohol consumption is **two standard drinks** for **men** and **1** for **women** (1 drink:14 grams (0.6 ounces)).





Psychological stress

- Is another contributor to HTN.
- Stress induce neuroendocrine responses and triggers the release of hormones like adrenaline and cortisol, which cause the heart to beat faster and blood vessels to narrow, resulting in temporary spikes in blood pressure
- A range of factors like Work-related (Job pressure, financial strain), Health-related (Chronic illness, disability), Relationship/family (Marital conflict, loneliness), Life changes (relocation, major transitions), and Psychological (Anxiety, depression, trauma) have led to an increased number of people experiencing chronic psychological stress in recent times.



Blood pressure elevation



Psychological stress

- **Managing stress** effectively begins **with identifying the root causes** (stressors) and tailoring interventions to the individual's needs.
- **Cognitive-Behavioral Techniques, Lifestyle Modifications, Social Support, Professional Referrals**
- **Incorporating stress management techniques**, such as relaxation exercises, meditation, deep breathing, regular physical activity, and maintaining healthy sleep habits can help reduce the physiological arousal caused by stress, promote emotional well-being, and ultimately support healthier blood pressure levels.



Sleep Management

The 2025 ACC/AHA high BP guideline:

- highlights **sleep duration, quality, and regularity**
- **Sleep health** is defined as **7 to 9 hours** of sleep per night
- **Maintain a consistent bedtime** – regularizing bedtime (**without changing sleep duration**) may improve BP control
- **Avoid** caffeine and alcohol **in the evening**



Sleep deprivation:

Sympathetic Nervous System Hyper-activation, Endothelial Dysfunction (vasomotor imbalance), Systemic Inflammation & Oxidative Stress, Circadian Misalignment, Metabolic Disturbances



Conclusions



- ❑ A healthy diet to control high blood pressure should be low in **sodium** and **saturated fat**, rich in **fruits**, **vegetables**, **whole grains**, and **low-fat dairy**, and include lean protein sources, while limiting **processed foods**, **simple sugar**, and **excessive alcohol**.
- ❑ This approach **effectively lowers** blood pressure and **reduces** cardiovascular risk.
- ❑ **Weight Management, Increasing Physical Activity, Not Smoking, Avoiding Alcohol, Managing Stress, Sleep Management.**



Conclusions (cont.)



Lifestyle changes

1

Combination therapy

3

Patient education

5

2

Medications

4

Blood pressure
monitoring

6

Follow-up care

با تشکر از توجه شما