



# Functional Nutrition Evaluation

## Anthropometrics: Blood Pressure Quick Reference Guide

An elevated blood pressure determination made in the clinic, at home, or with continuous ambulatory blood pressure monitoring needs to be evaluated further. Normal and abnormal elevations in blood pressure are highlighted in the table below.

A person's age, smoking history, pulse pressure, dyslipidemia and other clinical variables, along with any signs of subclinical organ damage can further increase the associated risk of elevated blood pressure and influence the degree and aggressiveness of needed interventions. The grades of concern are determined based on the blood pressure reading and number of risk factors.

### Blood Pressure (mmHg) Risk Assessment

Risk Factors or Disease	Normal SBP <120 or DBP <80	Prehypertension SBP 120 –139 or DBP 80- 89	Grade 1 HTN SBP 140 –159 or DBP 90-99	Grade 2 HTN SBP 160–179 or DBP 100–109
<b>No Other Risk Factors</b>	<b>Average Risk;</b> No BP intervention needed	<b>Low Added Risk;</b> Lifestyle changes, exercise and diet interventions	<b>Moderate Added Risk;</b> Lifestyle changes for several months then drug treatment if BP uncontrolled	<b>High Added Risk;</b> Lifestyle changes and consider drug treatment
<b>1–2 Risk Factors</b>	<b>Low Added Risk;</b> Lifestyle changes, exercise and diet interventions	<b>Moderate Added Risk;</b> Lifestyle changes for several months then drug treatment if BP uncontrolled	<b>High Added Risk;</b> Lifestyle changes and consider drug treatment	<b>Very High Added Risk;</b> Lifestyle changes and immediate drug treatment
<b>&gt;3 Risk Factors, Metabolic Syndrome or Other Disease</b>	<b>Moderate Added Risk;</b> Lifestyle changes for several months then drug treatment if BP uncontrolled	<b>High Added Risk;</b> Lifestyle changes and consider drug treatment	<b>High Added Risk;</b> Lifestyle changes and consider drug treatment	<b>Very High Added Risk;</b> Lifestyle changes and immediate drug treatment
<b>Diabetes</b>	<b>Moderate Added Risk;</b> Lifestyle changes for several months then drug treatment if BP uncontrolled	<b>High Added Risk;</b> Lifestyle changes and consider drug treatment	<b>High Added Risk;</b> Lifestyle changes and consider drug treatment	<b>Very High Added Risk;</b> Lifestyle changes and immediate drug treatment
<b>Established CV or Renal Disease</b>	<b>Very High Added Risk;</b> Lifestyle changes and immediate drug treatment	<b>Very High Added Risk;</b> Lifestyle changes and immediate drug treatment	<b>Very High Added Risk;</b> Lifestyle changes and immediate drug treatment	<b>Very High Added Risk;</b> Lifestyle changes and immediate drug treatment

\*Adapted from the JNC6 risk stratification, JNC7 grade guidelines. For drug treatment interventions refer to JNC8 guidelines (see full Companion Guide).  
BP = Blood pressure; DBP = diastolic blood pressure; SBP= systolic blood pressure; CV = cardiovascular; HTN = hypertension

#### Clinical Variables Influencing Prognosis (Risk Factors)

- Elevated Systolic or Diastolic Blood Pressures
- Age (>60)
- Race/Ethnicity
- Smoking
- Elevated Pulse Pressure in the elderly
- Dyslipidemia
  - Total cholesterol >5.0 mmol/L (190 mg/dL)
  - Low-density lipoprotein (LDL) >3.0 mmol/L (115 mg/dL)
  - High-density lipoprotein (HDL): males <1.0 mmol/L (40 mg/dL), females <1.2 mmol/L (46 mg/dL)
  - Triglycerides >1.7 mmol/L (150 mg/dL)
- Fasting plasma glucose 5.6–6.9 mmol/L (102–125 mg/dL)
- Abnormal 1 or 2 hour glucose tolerance test
- Abdominal obesity (waist circumference males >102 cm or >40 in, females >88 cm or >35 in)
- Family history of premature cardiovascular disease (males <55, females <65)
- Diabetes mellitus
- Autoimmune disease
- Heavy metal burden (lead, cadmium, arsenic, etc.)
- Infections of the mouth, teeth, or gums

#### Signs/Symptoms of Subclinical Organ Damage Influencing Prognosis

- Electrocardiogram showing left ventricular hypertrophy (LVH) >38 mm
- ECHO documented LVH (males >125 g/m<sup>2</sup>, females >110 g/m<sup>2</sup>)
- Carotid wall thickening (CIMT>0.9 mm) or plaque
- Carotid-femoral pulse wave velocity >12 m/sec
- Ankle/Arm Index <0.9
- Increase in plasma creatinine  
Males: 115–133 mmol/L (1.3–1.5 mg/dL)  
Females: 107–124 mmol/L (1.2–1.4 mg/dL)
- Low glomerular filtration rate (<60 mL/min/1.73 m<sup>2</sup>) or creatinine clearance <60 mL/min
- Microalbuminuria 30–300 mg/24 hr or albumin/creatinine ratio >22 (males) or >31 (females) mg/g creatinine
- Established cerebrovascular disease, stroke, or transient ischemic attack
- Heart disease: myocardial infarction, angina, coronary revascularization, congestive heart failure, stent
- Renal disease: diabetic nephropathy, renal impairment, proteinuria
- Peripheral artery disease or advanced retinopathy

## Nutrition Interventions to Improve Blood Pressure

Many diet and lifestyle habits are associated with abnormal blood pressure. Remediating the effects of these habits is critical to regaining health. The table below addresses some of the nutritional interventions that have been shown to have a beneficial effect on hypertension. (To view specific citations, please refer to the Companion Guide.)

### Improving Nutrition Improves Blood Pressure

Nutrient	Effect on Blood Pressure
<b>Protein</b>	<p>Reduces sympathetic activity, induces natriuresis, inhibits tyrosine kinase, reduces vascular smooth muscle hypertrophy, lowers superoxide anion, decreases aldosterone. Whey protein stimulates glutathione production.<sup>18-20</sup> Carnitine limits end organ damage.<sup>22,23</sup></p> <ul style="list-style-type: none"> <li>■ 1.5-1.8 g/kg body weight /day of non-animal protein</li> <li>■ Whey 30 g/day (ACEI)</li> <li>■ Carnitine 1g/bid</li> <li>■ Sardine muscle protein 3 g/d (ACEI)</li> <li>■ Bonito protein 1.5 g/d (natural ACEI)</li> <li>■ Soy protein 40 g/d (activates PPARs)</li> <li>■ Arginine up to 10 g/d from food or supplement; precursor vascular nitric oxide.<sup>23</sup></li> <li>■ Taurine 6 g/day induces mild diuresis, vasodilation, increases atrial natriuretic factor, improves insulin sensitivity, reduces homocysteine levels</li> </ul>
<b>Fats</b>	<p>Emphasize polyunsaturated/monounsaturated fats, limited saturated fats, no trans fats</p> <ul style="list-style-type: none"> <li>■ EPA and DHA 1:1-4:1 ratio 3-4 g/d</li> <li>■ Olive oil 40 gm/d</li> <li>■ Sesame oil : 35 g/d</li> </ul>
<b>Carbohydrates</b>	<ul style="list-style-type: none"> <li>■ Fiber: Oatmeal fiber, psyllium, glucomannan, or betaglucan improves insulin sensitivity</li> </ul>
<b>Minerals</b>	<ul style="list-style-type: none"> <li>■ Sodium (Na): reduce to 2400 mg/d</li> <li>■ Potassium (K): increase to 60-120 mEq/d; 5:1 ratio K:Na</li> <li>■ Magnesium: 500-1000 mg/d</li> <li>■ Calcium: 500-1000 mg/d in food or mixed supplement.</li> <li>■ Zinc: 25-50 mg/d inhibits NFkB</li> </ul>
<b>Vitamins</b>	<ul style="list-style-type: none"> <li>■ Vitamin D to maintain adequate serum levels (36-50 ng/mL); many people need 5000 iu/d to obtain and maintain optimum levels</li> <li>■ Vitamin E: 100 iu Vitamin E/1 g EFA</li> <li>■ Vitamin C: 250-500 mg twice a day if lack of adequate ascorbates from fruits/vegetables</li> <li>■ B2 (riboflavin): 25 mg/d</li> <li>■ Vitamin B6: 5 mg/kg/d reduces sympathetic nervous system activity, improves insulin sensitivity</li> <li>■ Methyl folate or folic acid if the patient is hyperhomocysteinemic</li> <li>■ B12 if the patient is hyperhomocysteinemic</li> </ul>
<b>Phytonutrients</b> (or foods providing phytonutrients)	<ul style="list-style-type: none"> <li>■ Dark chocolate and cocoa: up to 100 gm/d</li> <li>■ Lycopene: 10 mg; found in tomato, guava, watermelon, papaya, apricots</li> <li>■ Green tea, black tea: &gt;600cc</li> <li>■ Quercetin: 500 mg twice a day</li> <li>■ Celery: high in 3-N butyl phthalide, apigeniin; 4 large sticks/d</li> <li>■ Garlic: 2-4 cloves/d</li> <li>■ Wakame seaweed: 3-4 g/d</li> <li>■ Pomegranate juice: 330 ml/d</li> </ul>

ACEI = Angiotension converting enzyme inhibitor; EFA = essential fatty acid; EPA = eicosapentaenoic acid; K = potassium; N = nitrogen; NFkB = nuclear factor kappa B; PPARs = peroxisomal proliferator-activated receptors

For more information, watch the free videos at [nsight.org](http://nsight.org) and see the Functional Nutrition Evaluation; Anthropometrics; Blood Pressure Companion Guide



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