

AHA/ACC SCIENTIFIC STATEMENT

Eligibility and Disqualification Recommendations for Competitive Athletes With Cardiovascular Abnormalities: Task Force 6: Hypertension



A Scientific Statement from the American Heart Association and the American College of Cardiology

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An elevation of blood pressure (BP) in the systemic circulation (hypertension) is the most common cardiovascular condition in the general population and considered to be the most ubiquitous cardiovascular risk factor in competitive athletes. Competitive athletes include those athletes involved in organized sports that typically occur in schools, communities, and professional leagues, including but not limited to intramural and league sports in which medical supervision is typically required. Although most competitive athletes are between the ages of 20 and 40 years, many younger people now participate in

competitive athletics. The 2013 update from the American Heart Association using the National Health and Nutrition Examination (NHANES) data from 2007 to 2010 estimates that 9.1% of men aged 20 to 34 years and 6.7% of women of that age are hypertensive, based on having an elevated BP measurement or answering “yes” to the question, “Are you taking antihypertensive medication or were you told that you had hypertension?” (1) The prevalence in children and adolescents is estimated to be \approx 3.5%, with higher percentages in older and obese children (2). The diagnosis of hypertension is based on the subject

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having an elevated BP at or above certain levels measured by routine sphygmomanometry under appropriate conditions on at least 2 separate occasions separated by at least 1 week (3). However, BP measurements in the competitive athlete are typically obtained by different healthcare providers, which makes it particularly necessary that the testing conditions be standardized before the diagnosis of hypertension is made. People >18 years of age with a BP >140 mm Hg systolic and/or >90 mm Hg diastolic are considered to have hypertension (3). In children and adolescents, hypertension is defined as average systolic or diastolic BP levels greater than the 95th percentile for sex, age, and height; however, earlier physical maturation of the competitive athlete leaves open to question when an adult age criterion for hypertension should be applied to the adolescent (4). In determining the level of competitive athletic activity that a hypertensive person may engage in, it is also important to determine the degree of hypertension-related target-organ damage. Although hypertension has been associated with an increased risk for complex ventricular arrhythmias and sudden death, this cardiovascular risk factor per se has not been implicated in sudden death in young competitive athletes (5). For the general population, increased levels of noncompetitive recreational physical activity are generally regarded as beneficial. With physical activity, BP typically falls, the incidence of hypertension drops (6,7), and protection against stroke is afforded (8). Those who are hypertensive derive protection from both all-cause and cardiovascular mortality by maintaining higher levels of cardiorespiratory fitness (9).

ASSESSMENT OF BP

BP should be accurately measured in all people who wish to participate in competitive athletics before they begin training. BP should be measured by standard techniques, using the guidelines listed in the **Table**. It is common in young athletes to have their BP measured with an inappropriately sized BP cuff because of their often larger (>33 cm) midarm circumference. In these people, BP measured this way is often spuriously increased and results in unnecessary referrals to clinicians for evaluation and consideration of antihypertensive therapy. Also, there are often discrepancies between in-office and out-of-office BP measurements. For example, elevations induced by anxiety related to the medical examination are seen in young people concerned about the potential negative consequences of the examination. Anxiety-related BP elevations may be marked by elevations in heart rate, which further complicates the interpretation of the physical examination findings. In such instances, it is advisable to obtain unbiased and more comprehensive information through the use of 24-hour ambulatory BP monitoring.

TABLE Guidelines for Clinic (or Office) BP Measurement

Posture	BP obtained in the seated position is recommended. The subject should sit quietly for 5 min, with the back supported in a chair, with feet on the floor and the arm supported at the level of the heart, before BP is recorded.
Circumstances	No caffeine should be ingested during the hour preceding the reading, and no smoking during the 30 min preceding the reading. A quiet, warm setting should be available for BP measurements.
Equipment	Cuff size The bladder should encircle and cover at least 80% of the length of the arm; if it does not, use a larger cuff. If bladder is too short, misleadingly high readings may result.
Manometer	Use a validated electronic (digital) device, a recently calibrated aneroid or mercury column sphygmomanometer.
Technique	Number of readings On each occasion, take at least 2 readings, separated by as much time as is practical. If readings vary by >10 mm Hg, take additional readings until 2 consecutive readings are within 10 mm Hg. If the arm pressure is elevated, take the measurement in 1 leg to rule out aortic coarctation (particularly in patients <30 y of age). Initially, take pressures in both arms; if the blood pressures differ, use the arm with the higher pressure. If the initial values are elevated, obtain 2 other sets of readings at least 1 wk apart.
Performance	Inflate the bladder quickly to a pressure 20 mm Hg above the systolic BP, as recognized by the disappearance of the radial pulse; deflate the bladder at 2 mm Hg/s. Record the Korotkoff phase I (appearance) and phase V (disappearance) sounds. If the Korotkoff sounds are weak, have the patient raise the arm, then open and close the hand 5-10 times, and then reinflate the bladder quickly.

BP indicates blood pressure.

In some people, extremely high BPs may occur on a single measurement. In this type of patient, ambulatory BP monitoring would help to further stratify the athlete's risk of hypertension at present or in the future if borderline values were obtained. Ambulatory BP measurement in people with elevated exercise BP values improves the prediction of left ventricular hypertrophy (LVH) by echocardiography and development of sustained hypertension according to 1 study with an 8-year follow-up (10).

EVALUATION

All people who are diagnosed as hypertensive, whether competitive athletes or not, need a thorough but directed history and physical examination with a minimal number of laboratory tests. The history should be sure to determine whether the person has a family history of hypertension or cardiovascular disease, symptoms suggestive of a pheochromocytoma (paroxysmal hypertension, headache,

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