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Articles

Prevalence of Hypertension in the US Adult Population

Results From the Third National Health and Nutrition Examination Survey, 1988-1991

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► Abstract

Abstract The purpose of this study was to estimate the current prevalence and distribution of hypertension and to determine the status of hypertension awareness, treatment, and control in the US adult population. The study used a cross-sectional survey of the civilian, noninstitutionalized population of the United States, including

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an in-home interview and a clinic examination, each of which included measurement of blood pressure. Data for 9901 participants 18 years of age and older from phase 1 of the third National Health and Nutrition Examination Survey, collected from 1988 through 1991, were used. Twenty-four percent of the US adult population representing 43 186 000 persons had hypertension. The age-adjusted prevalence in the non-Hispanic black, non-Hispanic white, and Mexican American populations was 32.4%, 23.3%, and 22.6%, respectively. Overall, two thirds of the population with hypertension were aware of their diagnosis (69%), and a majority were taking prescribed medication (53%). Only one third of Mexican Americans with hypertension were being treated (35%), and only 14% achieved control in contrast to 25% and 24% of the non-Hispanic black and non-Hispanic white populations with hypertension, respectively. Almost 13 million adults classified as being normotensive reported being told on one or more occasions that they had hypertension; 51% of this group reported current adherence to lifestyle changes to control their hypertension. Hypertension continues to be a common finding in the general population. Awareness, treatment, and control of hypertension have improved substantially since the 1976-1980 National Health and Nutrition Examination Survey but continue to be suboptimal, especially in Mexican Americans. Consideration should be given to revision of the criteria for classification of hypertension to reflect the widespread use of lifestyle modification for treatment of hypertension.

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Key Words: hypertension, essential • blood pressure • prevalence • cross-sectional studies • NHANES

► Introduction

High blood pressure is one of the most important modifiable risk factors for cardiovascular disease. It is an extremely common finding in the community and a risk factor for myocardial infarction, stroke, congestive heart failure, end-stage renal disease, and peripheral vascular disease.^{[1](#) [2](#) [3](#) [4](#) [5](#)}

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Pharmacological treatment of hypertension has been shown to decrease the risk of cardiovascular disease complications, including stroke, coronary heart disease, and renal insufficiency.^{[6](#) [7](#) [8](#)}

Nonpharmacological intervention provides an effective means to lower blood pressure and has been emphasized increasingly as a useful method for both prevention and treatment of high blood pressure.^{[9](#) [10](#)}

For more than 20 years, the National High Blood Pressure Education Program has been working with health professionals and the public to increase rates of detection, treatment, and control of high blood pressure in the general community and in subgroups of the population who bear a disproportionate burden of hypertension-related cardiovascular disease. The conduct of periodic national surveys provides the best means to assess the success of these efforts.

The National Center for Health Statistics (NCHS) of the Centers for Disease Control and Prevention has conducted a series of such surveys, beginning with the 1960-1962 National Health Examination Survey.^{[11](#)} In this article, we report hypertension prevalence results from the first phase of the third

National Health and Nutrition Examination Survey (NHANES III), conducted from 1988 through 1991. In addition, we provide estimates of awareness, treatment, and control of high blood pressure in the general population and in major subgroups of the population.

► **Methods**

NHANES III Sample Design

The NHANES III was designed to estimate the prevalence of common chronic conditions and associated risk factors for a representative sample of the civilian, noninstitutionalized population of the United States.¹² The first phase was conducted by the NCHS from 1988 through 1991.

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The NHANES III component on adult blood pressure was designed to provide estimates of the prevalence, awareness, treatment, and control of hypertension in the general population and in the non-Hispanic black, non-Hispanic white, and Mexican American population subgroups. Persons 60 years of age and older in the non-Hispanic black and Mexican American populations and those 60 to 69, 70 to 79, and 80 years of age and older in the non-Hispanic white population were oversampled to improve the precision of estimates in these older age groups.

Eighty-two percent (9901) of a national sample of 12 138 adults 18 years of age or older agreed to be interviewed in their home; 71% (8618) agreed to an extensive medical examination at the Mobile Examination Center (MEC). Table 1 gives the composition of the interviewed sample. Those in the "all other" category were included in estimates for the total population but are not presented separately because of insufficient sample size. Age-specific estimates for non-Hispanic blacks and Mexican Americans 80 years of age and older are presented but should be interpreted with caution because these groups had an insufficient sample size to yield precise estimates.

View this table: **Table 1.** Number of Adults 18 Years and Older Interviewed in NHANES III by [\[in this window\]](#) Self-Reported Race/Ethnic Group [\[in a new window\]](#)

Blood Pressure Measurement

Participants were initially evaluated during a 1-hour visit in their home. Most of the home visit was devoted to administration of an interview focused on health conditions and associated risk factors. The interview included four questions related to the diagnosis and treatment of high blood pressure (Fig 1).¹³ At the end of the interview, the participant's blood pressure was measured three times. A second set of blood pressure measurements was obtained during the 4-hour physical examination at the MEC. This second set of measurements was obtained by a physician, usually at the beginning of the physician's examination, which could be performed at any time during the visit. In both settings, blood pressures were measured with the participant in the sitting position after 5 minutes of rest.

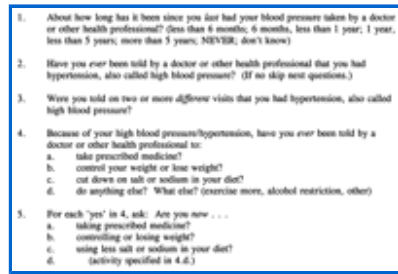


Figure 1. Third National Health and Nutrition Examination Survey (NHANES III) questionnaire items on hypertension. Source: NHANES III, the Centers for Disease Control and Prevention, and the National Center for Health Statistics.

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A standard mercury sphygmomanometer (W.A. Baum Co, Inc) was used, and one of four cuff sizes (pediatric, regular adult, large, or thigh) was chosen on the basis of the circumference of the participant's arm, as indicated by the manufacturer's guidelines. The cuff was placed on the participant's right arm and inflated in 10 mm Hg increments until the cuff pressure was 30 mm Hg above the level at which the radial pulse disappeared.¹⁴ Three blood pressure measurements were obtained, with a 60-second interval between each cuff inflation (30 seconds for physicians).

Subjects were referred for follow-up according to the recommendations of the 1984 Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure.¹⁵ All the blood pressure observers were required to participate in a period of specialized training in the use of a standardized protocol for measurement of blood pressure. This consisted of a 3-day training for interviewers and a 1½-day training for physicians. Satisfactory performance during a standardized videotape examination and during concordant measurements of blood pressure with an instructor was a requirement for certification as a NHANES III blood pressure observer.

Hypertension or high blood pressure was defined as mean systolic blood pressure (SBP) ≥ 140 mm Hg, mean diastolic blood pressure (DBP) ≥ 90 mm Hg, or current treatment for hypertension with prescription medication.⁹ Awareness of hypertension reflects any prior diagnosis of hypertension or high blood pressure by a health professional among the population defined as having high blood pressure (Fig 1, question 2). Treatment of hypertension was defined as use of a prescription medication for management of high blood pressure at the time of the interview. Control of hypertension was defined as pharmacological treatment of hypertension associated with SBP < 140 mm Hg and DBP < 90 mm Hg. Control rates were calculated separately for all participants with hypertension and for the subgroup of individuals being treated with antihypertensive medications. Additional treatment-related information collected during the home interview (Fig 1) is presented in the "Results" section.

Six blood pressure measurements (three in the home and three in the MEC) were available for 7747 (78.2%) of the 9901 participants; three of the six blood pressure readings were available for an additional 1746 (17.6%) participants; and partial data on one or two occasions were available for 248 (2.5%) participants. No blood pressure measurements and no report of current antihypertensive therapy status were available for 160 (1.6%) participants. Missing data increased with age. The mean of the available blood pressures (1 to 6) was used for all analyses presented.

The content and conduct of the NHANES III were subject to an institutional review board. All individuals participating in the MEC examination were required to sign an informed consent document.

Statistical Methods

Estimates were weighted to represent the total civilian, noninstitutionalized population of the United States. The weights were adjusted to reduce bias from nonresponse at the interview stage.¹⁶ Standard errors (SEs) were calculated by a technique appropriate to the complex survey design and estimation procedure.¹⁷ Estimates of prevalence and mean SBP and DBP were standardized by the direct method to the age distribution of the 1990 adult, civilian, noninstitutionalized population of the United States. Estimates for the black and white populations, including Hispanics, did not differ significantly from the corresponding estimates for the more restrictive non-Hispanic black and white populations; therefore, only the latter are presented.

► Results

Prevalence

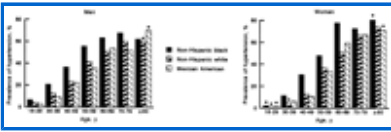
Twenty-four percent, or an estimated 43 million, of the adult, civilian, noninstitutionalized population of the United States had hypertension (Table 2). The overall prevalence of hypertension was slightly higher among men than women. Non-Hispanic black men and women had higher crude and age-adjusted prevalence rates of hypertension than their non-Hispanic white or Mexican American counterparts. The crude overall prevalence rate for non-Hispanic whites (24.6%) was much higher than that for Mexican Americans (14.3%). After age adjustment, however, non-Hispanic whites and Mexican Americans had similar overall prevalence rates of hypertension (23.3% and 22.6%, respectively).

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View this table: **Table 2.** Prevalence of Hypertension in US Adult Population
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Fig 2 presents age-specific estimates of the prevalence of hypertension in the adult population of the United States. Non-Hispanic black men and women had a higher prevalence of hypertension than their non-Hispanic white or Mexican American counterparts in all but the oldest age range for men. For every age-race group up to 59 years of age, men had a higher age-specific rate of hypertension than women. However, the reverse was true for non-Hispanic black and Mexican American men and women 60 years of age and older and non-Hispanic white men and women 70 years of age and older. In the oldest group (80 years and older), the overall age-specific prevalence of hypertension was 14.2% higher in women than in men.

Figure 2. Prevalence of high blood pressure by age and race/ethnicity for men and women, US population 18 years of age and older. *Estimate based on sample size not meeting



minimum requirements of the National Health and Nutrition Examination Survey III design or relative SEM greater than 30%.

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Mean Blood Pressure Levels

Table 3 presents age-adjusted and gender- and race-specific mean blood pressure values for the overall sample and for three subgroups defined by treatment status. Non-Hispanic black men and women had the highest average SBP and DBP. Non-Hispanic white men and women had the lowest average blood pressures. The mean values for SBP and DBP in the normotensive subjects were similar for each of the racial/ethnic groups. In each group, men had average SBPs and DBPs that were 6 to 7 and 3 to 5 mm Hg higher, respectively, than the average values in women.

View this table: **Table 3.** Mean Systolic and Diastolic Blood Pressures for Total Adult Population

[\[in this window\]](#) and Normotensive, Treated Hypertensive, and Untreated Hypertensive

[\[in a new window\]](#) Populations¹

Overall, the average SBP of participants with untreated hypertension was 27 mm Hg higher than the corresponding value for the normotensive group. The equivalent difference for DBP was 17 mm Hg. The average blood pressures of participants treated for hypertension were lower than those seen in their untreated counterparts. For SBP, differences ranged from 6 mm Hg in non-Hispanic white men to 17 mm Hg in Mexican American men. For DBP, differences ranged from 4 mm Hg in non-Hispanic white men to 9 mm Hg in Mexican American men.

In every race-sex group except Mexican American men, there was a greater difference between the average blood pressures in normotensive subjects and those receiving treatment than between treated and untreated participants with hypertension. Overall, the average SBP and DBP for normotensive subjects were 18 and 12 mm Hg, respectively, lower than the corresponding values for those treated for hypertension. In contrast, the overall SBP and DBP differences between treated and untreated participants with hypertension were only 9 and 5 mm Hg, respectively.

Fig 3 shows the mean SBP and DBP values for succeeding decades of life in non-Hispanic black, non-Hispanic white, and Mexican American men and women. There was a general tendency for SBP to rise progressively in both men and women throughout adult life. The mean values for SBP were lower in women than men during early adulthood. However, the subsequent rate of rise in blood pressure was steeper for women than men. As a result, average SBPs for women in each of the three racial/ethnic groups were as high as or higher than the corresponding values for men during and after the seventh decade.

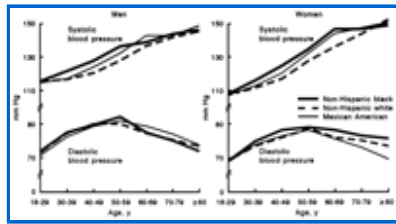


Figure 3. Mean systolic and diastolic blood pressures by age and race/ethnicity for men and women, US population 18 years of age and older.

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In both men and women, non-Hispanic blacks had the highest and non-Hispanic whites had the lowest average SBPs until the end of the fifth decade. In the sixth and later decades, among men, Mexican Americans tended to have the highest average SBPs, although the differences among the three racial/ethnic groups were small. In women, non-Hispanic blacks continued to have the highest and non-Hispanic whites continued to have the lowest average SBPs during the sixth decade. By the seventh decade, however, the three racial/ethnic groups had similar average SBP values. For both men and women, average DBP increased from early adulthood until the end of the fifth decade. However, the rate of increase was more gradual than for SBP. Mean DBP was lower from the sixth decade on, and pulse pressure became increasingly greater with advancing age.

Throughout adult life, men had a slightly higher average level of DBP than women. Non-Hispanic black women had a higher average DBP than non-Hispanic white or Mexican American women. The same was true in men until the end of the fifth decade. Thereafter, DBPs were similar in the three racial/ethnic groups.

Distribution of Blood Pressure

Table 4 provides age-, race-, and gender-specific estimates of the distribution of blood pressure according to the classification system recommended by the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure.⁹ Overall, nearly half (47%) of the adult population had blood pressures within the optimal range (SBP <120 mm Hg and DBP <80 mm Hg). Within each racial/ethnic group, at least 19% more women than men had blood pressures within the optimal range. Virtually all of this difference was accounted for by those participants 18 to 49 years of age.

View this table: **Table 4.** Percentage Distribution of Blood Pressure Levels¹ in US Adult

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The majority of those surveyed within this age range had blood pressures that were within the optimal or normal range (SBP <130 mm Hg and DBP <84 mm Hg). For example, this was the case for 71% and 85% of 18- to 49-year-old non-Hispanic black men and women, respectively. The corresponding percentages were even higher for non-Hispanic white men and women (75% and 91%, respectively) and Mexican American men and women (78% and 91%, respectively).

In each of the six sex-race groups, aging was associated not only with an increasing prevalence of hypertension but also with an increasing severity of hypertension. For example, 49% of Mexican American men 70 years of age and older with high blood pressure had hypertension at stages 2 through 4.

Awareness, Treatment, and Control of High Blood Pressure

Table 5 displays the percentages of participants with hypertension in each of the three racial/ethnic groups who were aware of their high blood pressure, who were being treated with antihypertensive medications, and who were being both treated and controlled. Among non-Hispanic blacks and non-Hispanic whites, approximately two thirds of the men and three quarters of the women were aware of their high blood pressure. The corresponding percentages were lower for Mexican American men and women (44% and 64%, respectively).

View this table: [Table 5. Percentage of Persons With Hypertension Who Are Aware, Treated,¹ and Controlled and Percentage of Treated Persons With Hypertension Who Are Controlled in US Population](#)

Awareness varied by age, but there was no fixed pattern to this variation across the six race-sex groups. For all three racial/ethnic groups, women were more aware of their hypertension than men. The discrepancy in knowledge between men and women was greatest among Mexican Americans (20%) and lowest among non-Hispanic blacks (10%). Treatment and control of hypertension were also more common among women than men and among non-Hispanic blacks and non-Hispanic whites than Mexican Americans.

Except for non-Hispanic black and non-Hispanic white women, fewer than 50% of those with hypertension in each race-sex group reported that they were taking antihypertensive medication for their high blood pressure. Fewer than one third (28%) of Mexican American men were being treated in this fashion, and the percentage was even lower for Mexican Americans 18 to 49 years of age (17%). Even when the analysis was confined to those who were being treated, fewer than 50% were being controlled in each of the six race-sex groups; the percentage was as low as 38% for Mexican American men. There was less discrepancy between the percentage of participants treated for hypertension who were being controlled in each of the six race-sex groups than between the percentage who reported being treated per se.

Nonpharmacological Interventions

The current standard definition of hypertension excludes those individuals who have lowered their blood pressure below 140/90 mm Hg by nonpharmacological interventions.^{9 10} Tables 6 and 7 present data on those who reported a history of hypertension during the interview component of the survey (Fig 1, questions 2 through 5). Only those persons in the sample who reported a prior diagnosis of hypertension by a health care provider were asked about past or current prescribed therapies for high blood pressure.

View this table: [Table 6. Estimates of Nonpharmacological Therapies Prescribed by Health](#)

[\[in this window\]](#) Professionals for Treatment of Hypertension in US Adult Population
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View this table: **Table 7.** Prevalence of Hypertension in the US Adult Population by Treatment
[\[in this window\]](#) Status and Percent of the Normotensive Population Reporting a History of
[\[in a new window\]](#) Hypertension

Table 6 provides information on reported prescription of the following four nonpharmacological therapies by health care providers: weight control or weight loss, reduction in salt intake, exercise, and reduced alcohol consumption. Overall, more than three quarters (76%) of those with a reported diagnosis of hypertension reported a prior prescription or current use of one or more of the nonpharmacological therapies identified in Table 6. More than two thirds (67%) reported that they were currently using one or more of these therapies to treat their hypertension. Reduction in salt intake was reported as the most common and decreased alcohol consumption as the least common form of these nonpharmacological therapies. The majority of those persons currently receiving antihypertensive medication reported previous prescription or current use of a nonpharmacological therapy to treat their hypertension.

Among the participants who reported nonpharmacological intervention as the sole means of treatment for their hypertension, the percentage using this form of therapy was greater for those with an average blood pressure $\geq 140/90$ mm Hg than for their counterparts whose average blood pressure was $< 140/90$ mm Hg (73% versus 63% for prior prescription and 55% versus 51% for current use of a nonpharmacological therapy).

More than 7% of the population who were not classified as having hypertension according to the current definition of hypertension⁶ had been told by a physician or other health professional that they had high blood pressure; 4.1% had been told on two or more occasions (Table 7). If the definition of hypertension were changed to include those told on two or more occasions, the prevalence of high blood pressure would have been increased to 28.1%, or about 50 million persons in the adult, civilian, noninstitutionalized population of the United States.

A more conservative approach to broadening the definition of hypertension would be to include those who had an average blood pressure $< 140/90$ mm Hg during the survey examination but reported both a history of hypertension and current use of one or more nonpharmacological interventions to lower their blood pressure. As indicated in Table 6, the latter represents 51% of the population who had normal blood pressure at the survey examination but reported a prior diagnosis of hypertension and current use of a nonpharmacological therapy. Inclusion of this group in the estimate of hypertension prevalence would have resulted in the addition of 3.6% of the population, for an overall hypertension prevalence estimate of 27.6%. This equates to a prevalence estimate of 49 685 000 hypertensive people in the adult, civilian, noninstitutionalized population of the United States.

Discussion

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The NHANES III represents the best available data to estimate the prevalence of hypertension and the extent to which it is being treated and controlled in the general population and in specific subgroups of special interest. Several design features strengthen the NHANES III blood pressure results compared with those from previous NCHS health examination surveys. For example, in previous NCHS surveys, blood pressure was measured on a single occasion.^{18 19} In contrast, in the NHANES III, 80% of the participants had their blood pressure measured on two occasions. Averaging across the measurements obtained on the two occasions provides a more precise estimate of an individual's blood pressure than that obtained by use of either set of readings alone. In addition, considering the extent to which training of blood pressure observers and quality control affect the data, the blood pressure estimates obtained in NHANES III are likely to be more accurate than those provided by previous national surveys. In addition, it is less likely that transient elevations of blood pressure caused by the "white coat" phenomenon played a role in NHANES III because only one of the two sets of measurements was obtained by a physician. For all these reasons, the NHANES III data probably provide the most accurate and precise estimates of hypertension detection, treatment, and control to date in the general population. Because of the extent to which the selection of the sample and the measurement protocol influence prevalence estimation, caution should be observed in comparisons of the findings presented here to corresponding data from previous surveys.

Overall, the NHANES III results suggest that at least 43 million adults in the general population of the United States have hypertension. As in previous surveys, there was evidence of a disproportionate burden of illness in subgroups of the population, with non-Hispanic blacks having an age-adjusted prevalence of hypertension (32.4%) almost 40% higher than that noted in non-Hispanic whites (23.3%) and Mexican Americans (22.6%).¹¹

More than 7% of the adults evaluated in the NHANES III were classified as normotensive but reported a history of hypertension. This corresponds to approximately 13 million adults in the general population. About half of this group reported modifying their lifestyles to control their high blood pressure. It is likely that at least some people of this group had hypertension and that they should be included in the prevalence estimate for hypertension. Thus, the true prevalence of hypertension may lie somewhere between the estimate of 24% (43 186 000 adults) using the standard criteria for definition of hypertension and 31.1% (55 930 000 adults). Given the increasing emphasis on lifestyle modification, the role of nonpharmacological therapy in the management of hypertension is likely to become increasingly important. National recommendations for classification of hypertension and the design and implementation of hypertension surveys should reflect this changing emphasis in management.

The Department of Health and Human Services has established a national goal to control high blood pressure in at least 50% of persons with hypertension in the general population by the year 2000.²⁰ Comparison of findings from the NHANES II and the NHANES III suggests substantial progress toward achievement of this goal.

The percentage of hypertensive adults with controlled hypertension has also increased from 11% of the population 18 to 74 years of age in the NHANES II⁹ to 24% of adults 18 years of age and older in the

NHANES III. When the definition of high blood pressure was expanded to include nonpharmacological therapy, the percentage of adults with controlled hypertension in the general population rose to 35% (17.3 of 49.7 million hypertensive individuals). Given the progressive evolution of nonpharmacological therapy as a means to treat hypertension, serious consideration should be given to the impact of this treatment strategy in evaluating the achievement of the Healthy People 2000 Objectives.

The NHANES III data identified variations in awareness, treatment, and control of hypertension in different subgroups of the population. In general, the percentage of persons who were aware of their hypertension was a rough proxy for the corresponding percentages of those who were being treated or treated and controlled.

The percentages of those with hypertension who were aware, treated, or treated and controlled were higher for women than men. The percentages were much lower for Mexican Americans. The success of non-Hispanic blacks and non-Hispanic whites in achieving progressively higher levels of awareness, treatment, and control bodes well for the future and suggests that increasing emphasis should be devoted to education programs targeted to the Mexican American community.

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► Footnotes

Reprint requests to Edward Roccella, PhD, National High Blood Pressure Education Program, National Heart, Lung, and Blood Institute, Bldg 31, Room 4A-05, Bethesda, MD 20892.

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► References

1. Whelton PK. Epidemiology of hypertension. *Lancet*. 1994; 334:101-106.
2. MacMahon S, Peto R, Cutler J, Collins R, Sorlie P, Neaton J, Abbott R, Godwin J, Dyer A, Stamler J. Blood pressure, stroke, and coronary heart disease, part I: prolonged differences in blood pressure: prospective observational studies corrected for the regression dilution bias. *Lancet*. 1990;335:765-774. [[Medline](#)] [[Order article via Infotrieve](#)]
3. Fiebach NH, Hebert PR, Stampfer MJ, Colditz GA, Willett WC, Rosner B, Speizer FE, Hennekens CH. A prospective study of high blood pressure and cardiovascular disease in women. *Am J Epidemiol*. 1989;130:646-654. [[Abstract/Free Full Text](#)]
4. Whelton PK, Perneger TV, Klag MJ, Brancati FL. Epidemiology and prevention of blood pressure-

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related renal disease. *J Hypertens*. 1992;10(suppl 7):S77-S84.

5. Stamler J, Stamler R, Neaton JD. Blood pressure, systolic and diastolic, and cardiovascular risks: U.S. population data. *Arch Intern Med*. 1993;153:598-615. [[Abstract/Free Full Text](#)]

6. Collins R, Peto R, MacMahon S, Hebert P, Fiebach NH, Eberlein KA, Godwin J, Qizilbash N, Taylor JO, Hennekens CH. Blood pressure, stroke, and coronary heart disease, part II: short-term reductions in blood pressure: overview of randomised drug trials in their epidemiological context. *Lancet*. 1990;335:827-838. [[Medline](#)] [[Order article via Infotrieve](#)]

7. Hebert P, Moser M, Mayer J, Glynn RJ, Hennekens CH. Recent evidence on drug therapy of mild to moderate hypertension and decreased risk of coronary heart disease. *Arch Intern Med*. 1993;153:578-581. [[Abstract/Free Full Text](#)]

8. Shulman NB, Ford CE, Hall WD, Blafox MD, Simon D, Langford HG, Schneider KA. Prognostic value of serum creatinine and effect of treatment of hypertension on renal function: results from the Hypertension Detection and Followup Program. *Hypertension*. 1989;13(suppl I):I-80-I-93.

9. Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure. The fifth report of the Joint National Committee on the Detection, Evaluation, and Treatment of High Blood Pressure. *Arch Intern Med*. 1993;153:154-183. [[Abstract/Free Full Text](#)]

10. Working Group on Primary Prevention of Hypertension. Report of the National High Blood Pressure Education Program Working Group on Primary Prevention of Hypertension. *Arch Intern Med*. 1993;153:186-208. [[Abstract/Free Full Text](#)]

11. National Center for Health Statistics. Blood pressure of adults by age and sex, United States, 1960-62. *Vital Health Stat 11*. 1964:4.

12. Ezzati TM, Massey JT, Waksberg J, Chu A, Maurer KR. Sample design: third National Health and Nutrition Examination Survey. *Vital Health Stat 2*. 1992:113.

13. National Center for Health Statistics. *National Health and Nutrition Examination Survey III: Data Collection Forms*. Hyattsville, Md: National Center for Health Statistics; 1991.

14. Frohlich ED, Grimm C, Labarthe DR, Maxwell MH, Perloff D, Weidman WH. Recommendations for human blood pressure determination by sphygmomanometer. *Hypertension*. 1988;11:210A-222A.

15. Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure. The 1984 report of the Joint National Committee on Detection, Evaluation, and Treatment of High Blood Pressure. *Arch Intern Med*. 1984;144:1045-1057. [[Abstract/Free Full Text](#)]

16. Ezzati T, Khare M. Non-response adjustments in a national health survey. *1992 Proceedings of the Survey Research Methods Section of the American Statistical Association*. Alexandria, Va: American Statistical Association. 1993:339-344.

17. Shah BV, Barnwell BG, Hunt PN, LaVange, LM. *SUDAAN User's Manual, Release 5.50*. Research Triangle Park, NC: Research Triangle Institute; 1991.

18. Dannenberg AL, Drizd T, Horan MJ, Haynes SG, Leverton PE. Progress in the battle against hypertension: changes in blood pressure levels in the United States from 1960 to 1980. *Hypertension*. 1987;10:226-233. [[Abstract/Free Full Text](#)]

19. Drizd T, Dannenberg AL, Engel A. Blood pressure levels in persons 18-74 years of age in 1976-80, and trends in blood pressure from 1960 to 1980 in the United States. *Vital Health Stat 11*. 1986:234.
20. Department of Health and Human Services. *Healthy People 2000: National Health Promotion and Disease Prevention Objectives for the Nation*. Washington, DC: Public Health Service; 1991.

This article has been cited by other articles:



age and ageing

▶ HOME

M. R. Nelson, A. N. Alkhateeb, P. Ryan, K. Willson, J. G. Gartlan, C. M. Reid, and On behalf of the Second Australian National Blood Pressure study cohort
Physical activity, alcohol and tobacco use and associated cardiovascular morbidity and mortality in the Second Australian National Blood Pressure study cohort
Age Ageing, January 1, 2010; 39(1): 112 - 116.

[\[Full Text\]](#) [\[PDF\]](#)



European Heart Journal

▶ HOME

B. Heidecker, G. Lamirault, E. K. Kasper, I. S. Wittstein, H. C. Champion, E. Breton, S. D. Russell, J. Hall, M. M. Kittleson, K. L. Baughman, *et al.*
The gene expression profile of patients with new-onset heart failure reveals important gender-specific differences
Eur. Heart J., December 22, 2009; (2009) ehp549v1.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Therapeutic Advances in Cardiovascular Disease

▶ HOME

J. Hashimoto and S. Ito
Some mechanical aspects of arterial aging: physiological overview based on pulse wave analysis
Therapeutic Advances in Cardiovascular Disease, October 1, 2009; 3(5): 367 - 378.

[\[Abstract\]](#) [\[PDF\]](#)



Asia-Pacific Journal of Public Health

▶ HOME

Chia Yook Chin and S. Pengal
Cardiovascular Disease Risk in a Semirural Community in Malaysia
Asia Pac J Public Health, October 1, 2009; 21(4): 410 - 420.

[\[Abstract\]](#) [\[PDF\]](#)



Hypertension

▶ HOME

Y. Wang and Z. Sun
Klotho Gene Delivery Prevents the Progression of Spontaneous Hypertension and Renal Damage
Hypertension, October 1, 2009; 54(4): 810 - 817.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)

**Stroke****▶HOME**

W. Feng, P. J. Nietert, and R. J. Adams

Influence of Age on Racial Disparities in Stroke Admission Rates, Hospital Charges, and Outcomes in South Carolina

Stroke, September 1, 2009; 40(9): 3096 - 3101.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Hypertension****▶HOME**

B. Rosner, N. Cook, R. Portman, S. Daniels, and B. Falkner

Blood Pressure Differences by Ethnic Group Among United States Children and Adolescents

Hypertension, September 1, 2009; 54(3): 502 - 508.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Hypertension****▶HOME**

M. Barton and M. R. Meyer

Postmenopausal Hypertension: Mechanisms and Therapy

Hypertension, July 1, 2009; 54(1): 11 - 18.

[\[Full Text\]](#) [\[PDF\]](#)**AMERICAN JOURNAL OF HEALTH-SYSTEM PHARMACY****▶HOME****S. S. Shord, L. R. Bressler, L. A. Tierney, S. Cuellar, and A. George
Understanding and managing the possible adverse effects associated with bevacizumab**

Am. J. Health Syst. Pharm., June 1, 2009; 66(11): 999 - 1013.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Circulation****▶HOME**

D. Conen, U. B. Tedrow, B. A. Koplan, R. J. Glynn, J. E. Buring, and C. M. Albert

Influence of Systolic and Diastolic Blood Pressure on the Risk of Incident Atrial Fibrillation in Women

Circulation, April 28, 2009; 119(16): 2146 - 2152.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**ARCHIVES OF INTERNAL MEDICINE****▶HOME****M. D. Solomon, D. P. Goldman, G. F. Joyce, and J. J. Escarce
Cost Sharing and the Initiation of Drug Therapy for the Chronically Ill**

Arch Intern Med, April 27, 2009; 169(8): 740 - 748.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Journal of the American College of Cardiology****▶HOME**

R. P. Vivo, S. R. Krim, C. Cevik, and R. M. Witteles

Heart failure in hispanics.

J. Am. Coll. Cardiol., April 7, 2009; 53(14): 1167 - 1175.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)

**ARCHIVES OF INTERNAL MEDICINE****▶HOME**

J. A. Chirinos, S. S. Franklin, R. R. Townsend, and L. Rajj

Body Mass Index and Hypertension Hemodynamic Subtypes in the Adult US Population

Arch Intern Med, March 23, 2009; 169(6): 580 - 586.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Hypertension****▶HOME**

E. C. Hart, N. Charkoudian, B. G. Wallin, T. B. Curry, J. H. Eisenach, and M. J. Joyner

Sex Differences in Sympathetic Neural-Hemodynamic Balance: Implications for Human Blood Pressure Regulation

Hypertension, March 1, 2009; 53(3): 571 - 576.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Nephrology Dialysis Transplantation****▶HOME**

Y. L. Liu, J. Prowle, E. Licari, S. Uchino, and R. Bellomo

Changes in blood pressure before the development of nosocomial acute kidney injury

Nephrol. Dial. Transplant., February 1, 2009; 24(2): 504 - 511.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**American Journal of PUBLIC HEALTH****▶HOME**

L. N. Borrell

Race, Ethnicity, and Self-Reported Hypertension: Analysis of Data From the National Health Interview Survey, 1997-2005

Am J Public Health, February 1, 2009; 99(2): 313 - 319.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Endocrinology****▶HOME**U. E. A. Martensson, S. A. Salehi, S. Windahl, M. F. Gomez, K. Sward, J. Daszkiewicz-Nilsson, A. Wendt, N. Andersson, P. Hellstrand, P.-O. Grande, *et al.***Deletion of the G Protein-Coupled Receptor 30 Impairs Glucose Tolerance, Reduces Bone Growth, Increases Blood Pressure, and Eliminates Estradiol-Stimulated Insulin Release in Female Mice**

Endocrinology, February 1, 2009; 150(2): 687 - 698.

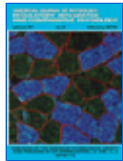
[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Circulation****▶HOME**

G. Schillaci, M. Pirro, and E. Mannarino

Assessing Cardiovascular Risk: Should We Discard Diastolic Blood Pressure?

Circulation, January 20, 2009; 119(2): 210 - 212.

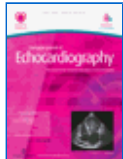
[\[Full Text\]](#) [\[PDF\]](#)

**Am. J. Physiol: Regulatory, Integrative and Comparative Physiology** [▶HOME](#)

J. S. Gilbert and M. J. Nijland

Sex differences in the developmental origins of hypertension and cardiorenal disease

Am J Physiol Regulatory Integrative Comp Physiol, December 1, 2008; 295(6): R1941 - R1952.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**European Journal of Echocardiography** [▶HOME](#)

H. Pavlopoulos, J. Grapsa, E. Stefanadi, E. Philippou, D. Dawson, and P. Nihoyannopoulos

Is it only diastolic dysfunction? Segmental relaxation patterns and longitudinal systolic deformation in systemic hypertension

Eur J Echocardiogr, November 1, 2008; 9(6): 741 - 747.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Hypertension** [▶HOME](#)

R. Rossi, A. Nuzzo, G. Origliani, and M. G. Modena

Metabolic Syndrome Affects Cardiovascular Risk Profile and Response to Treatment in Hypertensive Postmenopausal Women

Hypertension, November 1, 2008; 52(5): 865 - 872.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Hypertension** [▶HOME](#)**Trends in Hypertension Prevalence, Awareness, Treatment, and Control Rates in United States Adults Between 1988-1994 and 1999-2004**

Hypertension, November 1, 2008; 52(5): 818 - 827.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Hypertension** [▶HOME](#)

Q. Fu, W. Vongpatanasin, and B. D. Levine

Neural and Nonneural Mechanisms for Sex Differences in Elderly Hypertension: Can Exercise Training Help?

Hypertension, November 1, 2008; 52(5): 787 - 794.

[\[Full Text\]](#) [\[PDF\]](#)**JOURNAL OF THE AMERICAN COLLEGE OF NUTRITION** [▶HOME](#)

Y. Papanikolaou and V. L. Fulgoni III

Bean Consumption Is Associated with Greater Nutrient Intake, Reduced Systolic Blood Pressure, Lower Body Weight, and a Smaller Waist Circumference in Adults: Results from the National Health and Nutrition Examination Survey 1999-2002

J. Am. Coll. Nutr., October 1, 2008; 27(5): 569 - 576.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Hypertension** [▶HOME](#)



Y. Kokubo, K. Kamide, T. Okamura, M. Watanabe, A. Higashiyama, K. Kawanishi, A. Okayama, and Y. Kawano

Impact of High-Normal Blood Pressure on the Risk of Cardiovascular Disease in a Japanese Urban Cohort: The Suita Study

Hypertension, October 1, 2008; 52(4): 652 - 659.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Journal of Holistic Nursing

▶HOME

D. M. Boutain and C. Spigner

How Family, Community, and Work Structured High Blood Pressure Accounts: From African Americans in Washington State

J Holist Nurs, September 1, 2008; 26(3): 173 - 182.

[\[Abstract\]](#) [\[PDF\]](#)



Clinical Journal of the American Society of Nephrology

▶HOME

M. R. Rohrscheib, O. B. Myers, K. S. Servilla, C. D. Adams, D. Miskulin, E. J. Bedrick, W. C. Hunt, D. E. Lindsey, D. Gabaldon, P. G. Zager, *et al.*

Age-related Blood Pressure Patterns and Blood Pressure Variability among Hemodialysis Patients

Clin. J. Am. Soc. Nephrol., September 1, 2008; 3(5): 1407 - 1414.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Hypertension

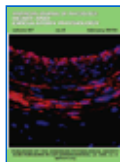
▶HOME

Y. Suwazono, M. Dochi, K. Sakata, Y. Okubo, M. Oishi, K. Tanaka, E. Kobayashi, and K. Nogawa

Shift Work Is a Risk Factor for Increased Blood Pressure in Japanese Men: A 14-Year Historical Cohort Study

Hypertension, September 1, 2008; 52(3): 581 - 586.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Am. J. Physiol: Heart and Circulatory Physiology

▶HOME

A. Lopez-Ruiz, J. Sartori-Valinotti, L. L. Yanes, R. Iliescu, and J. F. Reckelhoff

Sex differences in control of blood pressure: role of oxidative stress in hypertension in females

Am J Physiol Heart Circ Physiol, August 1, 2008; 295(2): H466 - H474.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Health Promotion Practice

▶HOME

K. L. Funk, P. J. Elmer, V. J. Stevens, D. W. Harsha, S. R. Craddick, P.-H. Lin, D. R. Young, C. M. Champagne, P. J. Brantley, P. B. McCarron, *et al.*

PREMIER--A Trial of Lifestyle Interventions for Blood Pressure Control: Intervention Design and Rationale

Health Promot Pract, July 1, 2008; 9(3): 271 - 280.

[\[Abstract\]](#) [\[PDF\]](#)

Stroke

▶HOME



J. H. Voeks, L. A. McClure, R. C. Go, R. J. Prineas, M. Cushman, B. M. Kissela, and J. M. Roseman

Regional Differences in Diabetes as a Possible Contributor to the Geographic Disparity in Stroke Mortality: The REasons for Geographic And Racial Differences in Stroke Study

Stroke, June 1, 2008; 39(6): 1675 - 1680.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



CMAJ

HOME

F. H.H. Leenen MD PhD, J. Dumais MSc, N. H. McInnis MSc, P. Turton BSc, L. Stratyckuk MA, K. Nemeth MSc, M. Moy Lum-Kwong MBA, and G. Fodor MD PhD

Results of the Ontario Survey on the Prevalence and Control of Hypertension

Can. Med. Assoc. J., May 20, 2008; 178(11): 1441 - 1449.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



The NEW ENGLAND JOURNAL of MEDICINE

HOME

J. B. Kostis

Treating Hypertension in the Very Old

N. Engl. J. Med., May 1, 2008; 358(18): 1958 - 1960.

[\[Full Text\]](#) [\[PDF\]](#)



Journal of the American College of Cardiology

HOME

S. S. Najjar, A. Scuteri, V. Shetty, J. G. Wright, D. C. Muller, J. L. Fleg, H. P. Spurgeon, L. Ferrucci, and E. G. Lakatta

Pulse Wave Velocity Is an Independent Predictor of the Longitudinal Increase in Systolic Blood Pressure and of Incident Hypertension in the Baltimore Longitudinal Study of Aging

J. Am. Coll. Cardiol., April 8, 2008; 51(14): 1377 - 1383.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Nephrology Dialysis Transplantation

HOME

P. E. de Jong and R. T. Gansevoort

Fact or fiction of the epidemic of chronic kidney disease--let us not squabble about estimated GFR only, but also focus on albuminuria

Nephrol. Dial. Transplant., April 1, 2008; 23(4): 1092 - 1095.

[\[Full Text\]](#) [\[PDF\]](#)



Hypertension

HOME

L. L. Yanes, J. C. Sartori-Valinotti, and J. F. Reckelhoff

Sex Steroids and Renal Disease: Lessons From Animal Studies

Hypertension, April 1, 2008; 51(4): 976 - 981.

[\[Full Text\]](#) [\[PDF\]](#)

Hypertension

HOME

I. Os, V. Franco, S. E. Kjeldsen, K. Manhem, R. B. Devereux, E. Gerds,



D. A. Hille, P. A. Lyle, P. M. Okin, B. Dahlöf, *et al.*

Effects of Losartan in Women With Hypertension and Left Ventricular Hypertrophy: Results From the Losartan Intervention For Endpoint Reduction in Hypertension Study

Hypertension, April 1, 2008; 51(4): 1103 - 1108.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



ARCHIVES OF OPHTHALMOLOGY

[▶HOME](#)

S.-Y. Wu, B. Nemesure, A. Hennis, A. P. Schachat, L. Hyman, M. C. Leske, and for the Barbados Eye Studies Group

Open-angle Glaucoma and Mortality: The Barbados Eye Studies

Arch Ophthalmol, March 1, 2008; 126(3): 365 - 370.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Clinical Journal of the American Society of Nephrology

[▶HOME](#)

P. E. de Jong, M. van der Velde, R. T. Gansevoort, and C. Zoccali

Screening for Chronic Kidney Disease: Where Does Europe Go?

Clin. J. Am. Soc. Nephrol., March 1, 2008; 3(2): 616 - 623.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Circulation

[▶HOME](#)

M. Ezzati, S. Oza, G. Danaei, and C. J.L. Murray

Trends and Cardiovascular Mortality Effects of State-Level Blood Pressure and Uncontrolled Hypertension in the United States

Circulation, February 19, 2008; 117(7): 905 - 914.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



The Journal of Gerontology Series A: Biomedical Sciences and Medical Sciences

[▶HOME](#)

R. Rodriguez-Calvo, L. Serrano, E. Barroso, T. Coll, X. Palomer, A. Camins, R. M. Sanchez, M. Alegret, M. Merlos, M. Pallas, *et al.*

Peroxisome Proliferator-Activated Receptor {alpha} Down-Regulation Is Associated With Enhanced Ceramide Levels in Age-Associated Cardiac Hypertrophy

J Gerontol A Biol Sci Med Sci, December 1, 2007; 62(12): 1326 - 1336.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Family Practice

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C. Bebb, C. Coupland, J. Stewart, D. Kendrick, R. Madeley, N. Sturrock, R. Burden, and for the Nottingham Diabetes Blood Pressure Study

Practice and patient characteristics related to blood pressure in patients with type 2 diabetes in primary care: a cross-sectional study

Fam. Pract., December 1, 2007; 24(6): 547 - 554.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)

The NEW ENGLAND JOURNAL of MEDICINE

[▶HOME](#)

C. Rosenberger, S. Rosen, S. N. Heyman, R. Bellomo, J. A. Kellum, S. M. Bagshaw, and J. G. Abuelo

**Normotensive Ischemic Acute Renal Failure**

N. Engl. J. Med., November 22, 2007; 357(21): 2204 - 2206.

[\[Full Text\]](#) [\[PDF\]](#)**Hypertension****HOME**R. Ramirez-Lorca, A. Grilo, M. T. Martinez-Larrad, L. Manzano, F. J. Serrano-Hernando, F. J. Moron, V. Perez-Gonzalez, J. L. Gonzalez-Sanchez, J. Fresneda, R. Fernandez-Parrilla, *et al.***Sex and Body Mass Index Specific Regulation of Blood Pressure by CYP19A1 Gene Variants**

Hypertension, November 1, 2007; 50(5): 884 - 890.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**The American Journal of CLINICAL NUTRITION****HOME**

R. J Johnson, M. S Segal, Y. Sautin, T. Nakagawa, D. I Feig, D.-H. Kang, M. S Gersch, S. Benner, and L. G Sanchez-Lozada

Potential role of sugar (fructose) in the epidemic of hypertension, obesity and the metabolic syndrome, diabetes, kidney disease, and cardiovascular disease

Am. J. Clinical Nutrition, October 1, 2007; 86(4): 899 - 906.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**The NEW ENGLAND JOURNAL of MEDICINE****HOME**

A. V. Chobanian

Isolated Systolic Hypertension in the Elderly

N. Engl. J. Med., August 23, 2007; 357(8): 789 - 796.

[\[Full Text\]](#) [\[PDF\]](#)**Journal of the American College of Cardiology****HOME**

M. F. O'Rourke and J. Hashimoto

Mechanical Factors in Arterial Aging: A Clinical Perspective

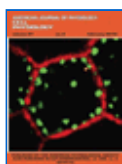
J. Am. Coll. Cardiol., July 3, 2007; 50(1): 1 - 13.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**American Journal of PUBLIC HEALTH****HOME**

E. M. Crimmins, J. K. Kim, D. E. Alley, A. Karlamangla, and T. Seeman

Hispanic Paradox in Biological Risk Profiles

Am J Public Health, July 1, 2007; 97(7): 1305 - 1310.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Am. J. Physiol: Cell Physiology****HOME**

S. Jain, Y. Li, S. Patil, and A. Kumar

HNF-1{alpha} plays an important role in IL-6-induced expression of the human angiotensinogen gene

Am J Physiol Cell Physiol, July 1, 2007; 293(1): C401 - C410.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)

**Asia-Pacific Journal of Public Health****HOME**

V. Joshi, J. Lim, and M. Nandkumar

Prevalence and Risk Factors of Undetected Elevated Blood Pressure in an Elderly Southeast Asian Population

Asia Pac J Public Health, June 1, 2007; 19(2): 3 - 9.

[\[Abstract\]](#) [\[PDF\]](#)**Hypertension****HOME**

J. F. Reckelhoff

Polycystic Ovary Syndrome: Androgens and Hypertension

Hypertension, June 1, 2007; 49(6): 1220 - 1221.

[\[Full Text\]](#) [\[PDF\]](#)**American Journal of Lifestyle Medicine****HOME**

R. F. Zoeller JR

Physical Activity: Depression, Anxiety, Physical Activity, and Cardiovascular Disease: What's the Connection?

American Journal of Lifestyle Medicine, May 1, 2007; 1(3): 175 - 180.

[\[Abstract\]](#) [\[PDF\]](#)**American Journal of PUBLIC HEALTH****HOME**

Y. C. Cozier, J. R. Palmer, N. J. Horton, L. Fredman, L. A. Wise, and L. Rosenberg

Relation Between Neighborhood Median Housing Value and Hypertension Risk Among Black Women in the United States

Am J Public Health, April 1, 2007; 97(4): 718 - 724.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**CMAJ****HOME**L. Pilote, K. Dasgupta, V. Guru, K. H. Humphries, J. McGrath, C. Norris, D. Rabi, J. Tremblay, A. Alamian, T. Barnett, *et al.***A comprehensive view of sex-specific issues related to cardiovascular disease**

Can. Med. Assoc. J., March 13, 2007; 176(6): S1 - S44.

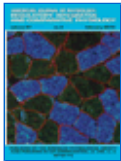
[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**American Journal of Lifestyle Medicine****HOME**

J. M. Rippe, T. J. Angelopoulos, and L. Zukley

Lifestyle Medicine Strategies for Risk Factor Reduction, Prevention, and Treatment of Coronary Heart Disease: Part II

American Journal of Lifestyle Medicine, March 1, 2007; 1(2): 79 - 90.

[\[Abstract\]](#) [\[PDF\]](#)**Am. J. Physiol: Regulatory, Integrative and Comparative Physiology****HOME**R. Iliescu, V. E. Cucchiarelli, L. L. Yanes, J. W. Iles, and J. F. Reckelhoff
Impact of androgen-induced oxidative stress on hypertension in male SHR



Am J Physiol Regulatory Integrative Comp Physiol, February 1, 2007; 292(2): R731 - R735.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Hypertension

[▶HOME](#)

E. Krishnan, C. K. Kwoh, H. R. Schumacher, and L. Kuller
Hyperuricemia and Incidence of Hypertension Among Men Without Metabolic Syndrome

Hypertension, February 1, 2007; 49(2): 298 - 303.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



American Journal of Lifestyle Medicine

[▶HOME](#)

R. F. Zoeller Jr

Physical Activity and Fitness in the Prevention of Coronary Heart Disease and Associated Risk Factors

American Journal of Lifestyle Medicine, January 1, 2007; 1(1): 29 - 33.

[\[Abstract\]](#) [\[PDF\]](#)



Circulation

[▶HOME](#)

L. M. Brewster, G. Mairuhu, N. R. Bindraban, R. P. Koopmans, J. F. Clark, and G. A. van Montfrans

Creatine Kinase Activity Is Associated With Blood Pressure

Circulation, November 7, 2006; 114(19): 2034 - 2039.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Stroke

[▶HOME](#)

D. Kleindorfer, J. Broderick, J. Khoury, M. Flaherty, D. Woo, K. Alwell, C. J. Moomaw, A. Schneider, R. Miller, R. Shukla, *et al.*

The Unchanging Incidence and Case-Fatality of Stroke in the 1990s: A Population-Based Study

Stroke, October 1, 2006; 37(10): 2473 - 2478.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Hypertension

[▶HOME](#)

H. Yang, P. L. Schnall, M. Jauregui, T.-C. Su, and D. Baker

Work Hours and Self-Reported Hypertension Among Working People in California

Hypertension, October 1, 2006; 48(4): 744 - 750.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Hypertension

[▶HOME](#)

V. Jazbutyte, K. Hu, P. Kruchten, E. Bey, S. K.G. Maier, K.-H. Fritzemeier, K. Prella, C. Hegele-Hartung, R. W. Hartmann, L. Neyses, *et al.*

Ageing Reduces the Efficacy of Estrogen Substitution to Attenuate Cardiac Hypertrophy in Female Spontaneously Hypertensive Rats

Hypertension, October 1, 2006; 48(4): 579 - 586.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)

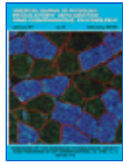

Nephrology Dialysis Transplantation
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N. Volkova, W. McClellan, J. M. Soucie, and A. Schoolwerth

Racial disparities in the prevalence of cardiovascular disease among incident end-stage renal disease patients

Nephrol. Dial. Transplant., August 1, 2006; 21(8): 2202 - 2209.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)


Am. J. Physiol: Regulatory, Integrative and Comparative Physiology
[▶ HOME](#)

L. L. Yanes, D. G. Romero, J. W. Iles, R. Iliescu, C. Gomez-Sanchez, and J. F. Reckelhoff

Sexual dimorphism in the renin-angiotensin system in aging spontaneously hypertensive rats

Am J Physiol Regulatory Integrative Comp Physiol, August 1, 2006; 291(2): R383 - R390.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)


Mayo Clinic Proceedings
[▶ HOME](#)

M. F. O'Rourke and J. B. Seward

Central Arterial Pressure and Arterial Pressure Pulse: New Views Entering the Second Century After Korotkov

Mayo Clin. Proc., August 1, 2006; 81(8): 1057 - 1068.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)


Hypertension
[▶ HOME](#)

N. Franceschini, J. W. MacCluer, H. H.H. Goring, S. A. Cole, K. M. Rose, L. Almasy, V. Diego, S. Laston, E. T. Lee, B. V. Howard, *et al.*

A Quantitative Trait Loci-Specific Gene-by-Sex Interaction on Systolic Blood Pressure Among American Indians: The Strong Heart Family Study

Hypertension, August 1, 2006; 48(2): 266 - 270.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)


Circulation
[▶ HOME](#)

L. B. Goldstein, R. Adams, M. J. Alberts, L. J. Appel, L. M. Brass, C. D. Bushnell, A. Culebras, T. J. DeGraba, P. B. Gorelick, J. R. Guyton, *et al.*

Primary Prevention of Ischemic Stroke: A Guideline From the American Heart Association/American Stroke Association Stroke Council: Cosponsored by the Atherosclerotic Peripheral Vascular Disease Interdisciplinary Working Group; Cardiovascular Nursing Council; Clinical Cardiology Council; Nutrition, Physical Activity, and Metabolism Council; and the Quality of Care and Outcomes Research Interdisciplinary Working Group: The American Academy of Neurology affirms the value of this guideline.

Circulation, June 20, 2006; 113(24): e873 - e923.

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AMERICAN JOURNAL OF HEALTH-SYSTEM PHARMACY
[▶ HOME](#)



A. J. Zillich and S. T. Haines

ASHP Therapeutic Position Statement on the Treatment of Hypertension.

Am. J. Health Syst. Pharm., June 1, 2006; 63(11): 1074 - 1080.

[\[Full Text\]](#) [\[PDF\]](#)



Stroke

HOME

L. B. Goldstein, R. Adams, M. J. Alberts, L. J. Appel, L. M. Brass, C. D. Bushnell, A. Culebras, T. J. DeGraba, P. B. Gorelick, J. R. Guyton, *et al.*

Primary Prevention of Ischemic Stroke: A Guideline From the American Heart Association/American Stroke Association Stroke Council: Cosponsored by the Atherosclerotic Peripheral Vascular Disease Interdisciplinary Working Group; Cardiovascular Nursing Council; Clinical Cardiology Council; Nutrition, Physical Activity, and Metabolism Council; and the Quality of Care and Outcomes Research Interdisciplinary Working Group: The American Academy of Neurology affirms the value of this guideline.

Stroke, June 1, 2006; 37(6): 1583 - 1633.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Hypertension

HOME

I. H. Schulman, P. Aranda, L. Raij, M. Veronesi, F. J. Aranda, and R. Martin

Surgical Menopause Increases Salt Sensitivity of Blood Pressure

Hypertension, June 1, 2006; 47(6): 1168 - 1174.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Vascular and Endovascular Surgery

HOME

P. S. Mullenix, M. J. Martin, S. R. Steele, G. S. Lavenson Jr, B. W. Starnes, N. C. Hadro, R. P. Peterson, and C. A. Andersen

Rapid High-Volume Population Screening for Three Major Risk Factors of Future Stroke: Phase I Results

Vascular and Endovascular Surgery, May 1, 2006; 40(3): 177 - 187.

[\[Abstract\]](#) [\[PDF\]](#)



PSYCHOSOMATIC MEDICINE

HOME

R. F. Gillum and D. D. Ingram

Frequency of Attendance at Religious Services, Hypertension, and Blood Pressure: The Third National Health and Nutrition Examination Survey

Psychosom Med, May 1, 2006; 68(3): 382 - 385.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



PSYCHOSOMATIC MEDICINE

HOME

J.-B. Choi, S. Hong, R. Nelesen, W. A. Bardwell, L. Natarajan, C. Schubert, and J. E. Dimsdale

Age and Ethnicity Differences in Short-Term Heart-Rate Variability

Psychosom Med, May 1, 2006; 68(3): 421 - 426.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)

**Hypertension****▶HOME**

N. Kupper, D. Ge, F. A. Treiber, and H. Snieder

Emergence of Novel Genetic Effects on Blood Pressure and Hemodynamics in Adolescence: The Georgia Cardiovascular Twin Study

Hypertension, May 1, 2006; 47(5): 948 - 954.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Western Journal of Nursing Research****▶HOME**

M. J. Johnson and S. Rogers

Development of the Purposeful Action Medication-Taking Questionnaire

West J Nurs Res, April 1, 2006; 28(3): 335 - 351.

[\[Abstract\]](#) [\[PDF\]](#)**Hypertension****▶HOME**

W. Wang, E. T. Lee, R. R. Fabsitz, R. Devereux, L. Best, T. K. Welty, and B. V. Howard

A Longitudinal Study of Hypertension Risk Factors and Their Relation to Cardiovascular Disease: The Strong Heart Study

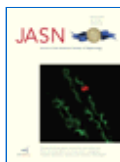
Hypertension, March 1, 2006; 47(3): 403 - 409.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Journal of the American College of Cardiology****▶HOME**G. L. Gierach, B. D. Johnson, C. N. Bairey Merz, S. F. Kelsey, V. Bittner, M. B. Olson, L. J. Shaw, S. Mankad, C. J. Pepine, S. E. Reis, *et al.***Hypertension, Menopause, and Coronary Artery Disease Risk in the Women's Ischemia Syndrome Evaluation (WISE) Study**

J. Am. Coll. Cardiol., February 7, 2006; 47(3_Suppl_S): S50 - S58.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Journal of Applied Physiology****▶HOME**S. L. Sommer, T. J. Berndt, E. Frank, J. B. Patel, M. M. Redfield, X. Dong, M. D. Griffin, J. P. Grande, J. M. A. van Deursen, G. C. Sieck, *et al.***Elevated blood pressure and cardiac hypertrophy after ablation of the gly96/1EX-1 gene**

J Appl Physiol, February 1, 2006; 100(2): 707 - 716.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Journal of the American Society of Nephrology****▶HOME**C. A. Stidley, W. C. Hunt, F. Tentori, D. Schmidt, M. Rohrscheib, S. Paine, E. J. Bedrick, K. B. Meyer, H. K. Johnson, P. G. Zager, *et al.***Changing Relationship of Blood Pressure with Mortality over Time among Hemodialysis Patients**

J. Am. Soc. Nephrol., February 1, 2006; 17(2): 513 - 520.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)

**Circulation****▶HOME**

Q. Gu, R. Paulose-Ram, C. Dillon, and V. Burt

Antihypertensive Medication Use Among US Adults With Hypertension

Circulation, January 17, 2006; 113(2): 213 - 221.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Health Promotion Practice****▶HOME**G. N. Graham, B. Leath, K. Payne, M. Guendelman, G. Reynolds, S. Kim, B. James, D. Ware, M. Hunter, A. Burwell, *et al.***Perceived Versus Actual Risk for Hypertension and Diabetes in the African American Community**

Health Promot Pract, January 1, 2006; 7(1): 34 - 46.

[\[Abstract\]](#) [\[PDF\]](#)**ARCHIVES OF NEUROLOGY****▶HOME**

C. H. Wilkins, E. A. Grant, S. E. Schmitt, D. W. McKeel, and J. C. Morris

The Neuropathology of Alzheimer Disease in African American and White Individuals

Arch Neurol, January 1, 2006; 63(1): 87 - 90.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Stroke****▶HOME**

M. H. Freitag, R. Peila, K. Masaki, H. Petrovitch, G. W. Ross, L. R. White, and L. J. Launer

Midlife Pulse Pressure and Incidence of Dementia: The Honolulu-Asia Aging Study

Stroke, January 1, 2006; 37(1): 33 - 37.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Circulation****▶HOME**

R. P. Mason, L. Kalinowski, R. F. Jacob, A. M. Jacoby, and T. Malinski

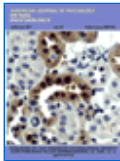
Nebivolol Reduces Nitroxidative Stress and Restores Nitric Oxide Bioavailability in Endothelium of Black Americans

Circulation, December 13, 2005; 112(24): 3795 - 3801.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)**Clinical Trials****▶HOME**V. J. Carey, L. Bishop, J. Charleston, P. Conlin, T. Erlinger, N. Laranjo, P. McCarron, E. Miller, B. Rosner, J. Swain, *et al.***Rationale and design of the Optimal Macro-Nutrient Intake Heart Trial to Prevent Heart Disease (OMNI-Heart)**

Clinical Trials, December 1, 2005; 2(6): 529 - 537.

[\[Abstract\]](#) [\[PDF\]](#)**Am. J. Physiol: Renal Physiology****▶HOME**J. F. Reckelhoff, L. L. Yanes, R. Iliescu, L. A. Fortepiani, and J. P. Granger
Testosterone supplementation in aging men and women: possible



impact on cardiovascular-renal disease

Am J Physiol Renal Physiol, November 1, 2005; 289(5): F941 - F948.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Physical Therapy

[▶HOME](#)

N. F Taylor, K. J Dodd, and D. L Damiano

Progressive Resistance Exercise in Physical Therapy: A Summary of Systematic Reviews

Physical Therapy, November 1, 2005; 85(11): 1208 - 1223.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



ARCHIVES OF INTERNAL MEDICINE

[▶HOME](#)

D. B. Panagiotakos, D. Kromhout, A. Menotti, C. Chrysohoou, A. Dontas, C. Pitsavos, H. Adachi, H. Blackburn, S. Nedeljkovic, and A. Nissinen

The Relation Between Pulse Pressure and Cardiovascular Mortality in 12 763 Middle-aged Men From Various Parts of the World: A 25-Year Follow-up of the Seven Countries Study

Arch Intern Med, October 10, 2005; 165(18): 2142 - 2147.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Journal of Aging and Health

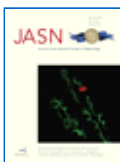
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T. B. Hong, E. Z. Oddone, T. K. Dudley, and H. B. Bosworth

Subjective and Objective Evaluations of Health Among Middle-Aged and Older Veterans with Hypertension

J Aging Health, October 1, 2005; 17(5): 592 - 608.

[\[Abstract\]](#) [\[PDF\]](#)



Journal of the American Society of Nephrology

[▶HOME](#)

A. Page, H. Reich, J. Zhou, V. Lai, D. C. Cattran, J. W. Scholey, and J. A. Miller

Endothelial Nitric Oxide Synthase Gene/Gender Interactions and the Renal Hemodynamic Response to Angiotensin II

J. Am. Soc. Nephrol., October 1, 2005; 16(10): 3053 - 3060.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Hypertension

[▶HOME](#)

D. M. Lloyd-Jones, K. Sutton-Tyrrell, A. S. Patel, K. A. Matthews, R. C. Pasternak, S. A. Everson-Rose, A. Scuteri, and C. U. Chae

Ethnic Variation in Hypertension Among Premenopausal and Perimenopausal Women: Study of Women's Health Across the Nation

Hypertension, October 1, 2005; 46(4): 689 - 695.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)

Hypertension

[▶HOME](#)

M. Quinkler, I. J. Bujalska, K. Kaur, C. U. Onyimba, S. Buhner, B. Allolio, S. V. Hughes, M. Hewison, and P. M. Stewart



Androgen Receptor-Mediated Regulation of the α -Subunit of the Epithelial Sodium Channel in Human Kidney

Hypertension, October 1, 2005; 46(4): 787 - 798.

[\[Abstract\]](#) [\[Full Text\]](#) [\[PDF\]](#)



Circulation

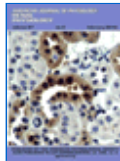
HOME

T. J. Wang and R. S. Vasan

Epidemiology of Uncontrolled Hypertension in the United States

Circulation, September 13, 2005; 112(11): 1651 - 1662.

[\[Full Text\]](#) [\[PDF\]](#)



Am. J. Physiol: Renal Physiology

HOME

J. D. Imig

Epoxide hydrolase and epoxygenase metabolites as therapeutic targets for renal diseases

Am J Physiol Renal Physiol, September 1, 2005; 289(3): F496 - F503.

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