

**Routine Chest Radiographs in Uncomplicated Hypertension
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
1. Chobanian AV, Bakris GL, Black HR, et al. Seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. <i>Hypertension</i> 2003; 42(6):1206-1252.	15	N/A	Seventh report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure. Purpose is to provide an evidence-based approach to the prevention and management of hypertension.	Routine chest radiographs (CXR) not indicated in the evaluation of uncomplicated hypertension (HTN).	3
2. Five-year findings of the Hypertension Detection and Follow-up Program. Prevention and reversal of left ventricular hypertrophy with antihypertensive drug therapy. Hypertension Detection and Follow-up Program Cooperative Group. <i>Hypertension</i> 1985; 7(1):105-112.	15	10,940	Report on Hypertension Detection and Follow-up Program Cooperative Group findings on the rates of development and regression of electrocardiographic evidence of left ventricular hypertrophy (LVH) and CXR evidence of cardiac enlargement.	Reversal of enlarged cardiac silhouette on CXR occurred in 47% of the stepped care group and in 38% of the referred care group (P<0.01). Results indicate that the use of systematic antihypertensive therapy to achieve goal blood pressure reduces the incidence of LVH enlarged cardiac silhouette in adults with hypertension. Also, antihypertensive treatment tends to reverse previous LVH or high cardiothoracic ratios toward a normal electrocardiograms and CXR film pattern among hypertensive subjects.	2
3. Frohlich ED. Hypertension 1986. Evaluation and treatment--why and how. <i>Postgrad Med</i> 1986; 80(7):28-36, 41-26.	12	N/A	Review major findings on hypertension research and evaluation of patients with elevated blood pressure.	In patients with LVH, degree of cardiac enlargement can be easily quantified by CXR and electrocardiography. Routine CXR are worthwhile for any chronic illness.	3
4. Stokes J, 3rd, Kannel WB, Wolf PA, D'Agostino RB, Cupples LA. Blood pressure as a risk factor for cardiovascular disease. The Framingham Study--30 years of follow-up. <i>Hypertension</i> 1989; 13(5 Suppl):I13-18.	13	5,070	Framingham study- 30-years follow-up of patients for blood pressure and cardiovascular disease.	Blood pressure is predictor of development of coronary heart disease, transient ischemia attack, stroke and congestive heart failure (CHF). Cardiomegaly on CXR good predictor of CHF.	2
5. Samuelsson O, Hartford M, Wilhelmsen L, Berglund G, Wikstrand J. Radiological heart enlargement in treated hypertensive men: a comparative study of chest X-ray examination and M-mode echocardiography. <i>J Intern Med</i> 1989; 225(2):77-83.	9	25 hypertensives 41 controls	Echocardiography (ECHO) evaluation of treated hypertensive men who have enlarged heart on CXR.	An enlarged heart on CXR in treated hypertensive patients does not always imply impaired cardiac function.	3
6. Sokolow M, Perloff D. The prognosis of hypertension treated conservatively. <i>Circulation</i> 1961; 23(5):697-713.	15	439 consecutive patients	Study on prognosis. To obtain prospective data on factors influencing mortality in hypertensive patients over 5-years of observation.	Cardiomegaly, LVH, initial blood pressure evaluation, and male sex were all associated with increased mortality.	2

Routine Chest Radiographs in Uncomplicated Hypertension
EVIDENCE TABLE

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
7. Dunn FG. Hypertensive heart disease in the patient with a normal electrocardiogram and chest radiograph. <i>J Cardiovasc Pharmacol</i> 1984; 6 Suppl 6:S870-874.	12	N/A	Review comparing ECHO to CXR and electrocardiogram in evaluation for LVH.	ECHO is more sensitive than electrocardiogram or CXR and can also provide information on altered cardiac function even before LVH is present.	3
8. Hartford M, Wikstrand J, Wallentin I, Ljungman S, Wilhelmson L, Berglund G. Non-invasive signs of cardiac involvement in essential hypertension. <i>Eur Heart J</i> 1982; 3(1):75-87.	9	120	Relationships between hypertensive cardiac involvement and blood pressure were evaluated using five noninvasive methods.	Signs of cardiac involvement can be revealed by sensitive noninvasive methods in many hypertensives. Single signs can be revealed in mild hypertension but the number and severity of the different abnormalities increases with increasing blood pressure.	2
9. Rayner BL, Goodman H, Opie LH. The chest radiograph. A useful investigation in the evaluation of hypertensive patients. <i>Am J Hypertens</i> 2004; 17(6):507-510.	13	77	To determine the usefulness of CXR in the assessment of target organ damage in hypertensive patients.	The CXR provides important predictive information of associated target organ damage in hypertensive patients.	2
10. Tsakiris A, Doulmas M, Nearchos N, Mavrokefalos A, Mpatakis N, Skoufas P. Aortic calcification is associated with age and sex but not left ventricular mass in essential hypertension. <i>J Clin Hypertens (Greenwich)</i> 2004; 6(2):65-70.	13	290 consecutive patients	CXR and ECHO were performed to investigate the prevalence of aortic calcification in patients with essential hypertension and its relationship with age, sex and LVH.	Aortic calcification was observed in 74/290 (25.5%) patients. Prevalence of aortic calcification in essential hypertension is considerably higher compared to the general population. Essential hypertension and age seem to contribute to the concurrent appearance of aortic calcification and increased left ventricular mass.	2
11. Bartha GW, Nugent CA. Routine chest roentgenograms and electrocardiograms. Usefulness in the hypertensive workup. <i>Arch Intern Med</i> 1978; 138(8):1211-1213.	13	116	Chart record review to determine value of CXR and electrocardiograms in baseline evaluation of hypertensive patients.	Routine CXR and electrocardiograms led to therapeutic or diagnostic interventions in only two instances and were not useful as baseline exams.	2
12. Dimmitt SB, West JN, Littler WA. Limited value of chest radiography in uncomplicated hypertension. <i>Lancet</i> 1989; 2(8654):104.	13	25	Letter evaluating the value of CXR in hypertensive patients.	Routine CXR is not appropriate in the evaluation of uncomplicated hypertensive patients and should be reserved for selected indications.	3
13. Karras DJ, Kruus LK, Cienki JJ, et al. Utility of routine testing for patients with asymptomatic severe blood pressure elevation in the emergency department. <i>Ann Emerg Med</i> 2008; 51(3):231-239.	13	109	Prospective observational study at 3 urban academic ED to determine utility of routine testing for patients with asymptomatic severe blood pressure elevation in the ED.	Screening tests infrequently detect unanticipated hypertension-related abnormalities that alter ED management.	2
14. Kristensen BO. Assessment of left ventricular hypertrophy by electrocardiography, chest roentgenography and echocardiography, a review. <i>Scand J Clin Lab Invest Suppl</i> 1989; 196:42-47.	12	N/A	Autopsy review of LVH comparing sensitivity, specificity and accuracy to CXR, electrocardiography and ECHO.	<ul style="list-style-type: none"> • Electrocardiography: sensitivity 25%-50%, specificity 69%-94%, accuracy 30%-69%. • ECGO: sensitivity 88%-100%, specificity 84%-86%. • CXR: sensitivity 7%, specificity 67%. 	3

**Routine Chest Radiographs in Uncomplicated Hypertension
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
15. Laird WP, Fixler DE. Left ventricular hypertrophy in adolescents with elevated blood pressure: assessment by chest roentgenography, electrocardiography, and echocardiography. <i>Pediatrics</i> 1981; 67(2):255-259.	9	50 adolescents with elevated blood pressure and 50 controls	Compare CXR, electrocardiography and ECHO in detecting LVH in adolescents.	Hypertensive adolescents have an increased prevalence of LVH and ECHO is the most useful noninvasive method to detect these changes.	2

Evidence Table Key

Study Type Key

Numbers 1-7 are for studies of therapies while numbers 8-15 are used to describe studies of diagnostics.

1. Randomized Controlled Trial — Treatment
2. Controlled Trial
3. Observation Study
 - a. Cohort
 - b. Cross-sectional
 - c. Case-control
4. Clinical Series
5. Case reviews
6. Anecdotes
7. Reviews
8. Randomized Controlled Trial — Diagnostic
9. Comparative Assessment
10. Clinical Assessment
11. Quantitative Review
12. Qualitative Review
13. Descriptive Study
14. Case Report
15. Other (Described in text)

Strength of Evidence Key

- Category 1 - The conclusions of the study are valid and strongly supported by study design, analysis and results.
- Category 2 - The conclusions of the study are likely valid, but study design does not permit certainty.
- Category 3 - The conclusions of the study may be valid but the evidence supporting the conclusions is inconclusive or equivocal.
- Category 4 - The conclusions of the study may not be valid because the evidence may not be reliable given the study design or analysis.