

**Chronic Dyspnea—Suspected Pulmonary Origin
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
1. Dyspnea. Mechanisms, assessment, and management: a consensus statement. American Thoracic Society. <i>Am J Respir Crit Care Med</i> 1999; 159(1):321-340.	15	N/A	Consensus statement. To provide an overview of dyspnea that is clinically relevant to physicians, nurses, and therapists engaged in the care of patients with shortness of breath.	The current understanding of the pathophysiologic mechanisms of dyspnea, the tools used to assess this symptom and its impact on patients' lives and therapeutic approaches are reviewed.	4
2. Michelson E, Hollrah S. Evaluation of the patient with shortness of breath: an evidence based approach. <i>Emerg Med Clin North Am</i> 1999; 17(1):221-237, x.	12	N/A	Evidence-based medicine approach to the evaluation of patients with shortness of breath.	Evaluation of patients includes a thorough history and physical examination, and chest radiograph. Further researched needed.	4
3. Butcher BL, Nichol KL, Parent CM. High yield of chest radiography in walk-in clinic patients with chest symptoms. <i>J Gen Intern Med</i> 1993; 8(3):115-119.	10	221	Prospective study to determine yield of chest radiograph in adult outpatients with cough, dyspnea, and pain.	New (unpredicted) clinically important radiographic abnormalities were identified in 77 (35%) of patients.	2
4. Pratter MR, Curley FJ, Dubois J, Irwin RS. Cause and evaluation of chronic dyspnea in a pulmonary disease clinic. <i>Arch Intern Med</i> 1989; 149(10):2277-2282.	9	85	Prospectively study patients with chronic dyspnea to determine whether findings based on objective testing (including chest radiograph) were superior to clinical impression alone.	Objective testing was more accurate than clinical impression alone (cause of dyspnea identified in 100% vs 66%). Chest radiograph most useful for identification of interstitial lung disease.	2
5. Benacerraf BR, McCloud TC, Rhea JT, Tritschler V, Libby P. An assessment of the contribution of chest radiography in outpatients with acute chest complaints: a prospective study. <i>Radiology</i> 1981; 138(2):293-299.	13	1,102 consecutive patients	Prospective study to identify indications for chest radiography in patients with acute chest complaints.	Patients with dyspnea showed acute radiographic changes in 56% (≥ 40 years) and 13% (< 40 years) and chronic radiographic changes in 31% (≥ 40 years) and 18% (< 40 years).	1
6. Morgan WC, Hodge HL. Diagnostic evaluation of dyspnea. <i>Am Fam Physician</i> 1998; 57(4):711-716.	12	N/A	To review the causes and appropriate diagnostic steps and tests for the evaluation of patients with dyspnea.	The most useful methods for evaluating dyspnea are the electrocardiograph and chest radiograph.	4
7. Mukhopadhyay A, Lim TK. A prospective audit of referrals for breathlessness in patients hospitalized for other reasons. <i>Singapore Med J</i> 2005; 46(1):21-24.	13	105	Prospective audit to evaluate the referrals for breathlessness in consecutive adult patients hospitalized for other reasons. Clinical features and value of routine investigations were evaluated.	Respiratory infections were the most common diagnosis and chest radiograph was the most useful initial investigation.	2
8. Soto FJ, Varkey B. Evidence-based approach to acute exacerbations of COPD. <i>Curr Opin Pulm Med</i> 2003; 9(2):117-124.	12	N/A	To review evidence based approach to patients with acute exacerbations of chronic obstructive pulmonary disease (COPD).	Chest radiography is recommended in the initial assessment of patients with acute COPD exacerbation.	3
9. Aziz ZA, Wells AU, Bateman ED, et al. Interstitial lung disease: effects of thin-section CT on clinical decision making. <i>Radiology</i> 2006; 238(2):725-733.	10	168 consecutive patients 6 reviewers	To retrospectively quantify the change in diagnosis and management of suspected interstitial lung disease when thin-section CT is performed.	Thin-section CT resulted in a change in first choice diagnosis in 51% of cases. Diagnostic confidence improved and CT findings increased agreement between pulmonologists on diagnostic probabilities across a range of interstitial lung diseases.	2

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10. Karnani NG, Reisfield GM, Wilson GR. Evaluation of chronic dyspnea. <i>Am Fam Physician</i> 2005; 71(8):1529-1537.	12	N/A	To review the clinical features and recommended imaging of patients with chronic dyspnea.	Initial diagnostic testing should include chest radiography. If etiology remains unclear, high-resolution CT (HRCT) should be considered.	3
11. Gotway MB, Freemer MM, King TE, Jr. Challenges in pulmonary fibrosis. 1: Use of high resolution CT scanning of the lung for the evaluation of patients with idiopathic interstitial pneumonias. <i>Thorax</i> 2007; 62(6):546-553.	12	N/A	Review the role of HRCT and surgical lung biopsy in the assessment of patients with idiopathic interstitial pneumonias (IIP).	HRCT has become a valuable tool allowing identification of the presence, extent and severity of IIP.	3
12. Zompatori M, Bna C, Poletti V, et al. Diagnostic imaging of diffuse infiltrative disease of the lung. <i>Respiration</i> 2004; 71(1):4-19.	12	N/A	Review the role of chest radiography and HRCT in the diagnosis and assessment of diffuse infiltrative lung disease.	The initial diagnostic approach to imaging of diffuse lung disease is the chest radiograph. However, because of chest radiography's limitations in sensitivity, specificity and diagnostic accuracy, HRCT is required especially for symptomatic patients with normal or nonspecific chest radiographic findings. HRCT is considered the best imaging tool for diffuse lung disease.	3
13. Desai SR, Hansell DM. Small airways disease: expiratory computed tomography comes of age. <i>Clin Radiol</i> 1997; 52(5):332-337.	12	N/A	To review the role of HRCT (particularly expiratory CT) for diagnosis of small airways disease.	HRCT is the best method for diagnosis of small airways disease and is useful for diagnosis of hypersensitivity pneumonitis, bronchiolitis obliterans and interstitial disease.	3
14. Grenier P, Chevret S, Beigelman C, Brauner MW, Chastang C, Valeyre D. Chronic diffuse infiltrative lung disease: determination of the diagnostic value of clinical data, chest radiography, and CT and Bayesian analysis. <i>Radiology</i> 1994; 191(2):383-390.	9	Training set 208 retrospective observations Test set – 100 consecutive patients	To evaluate the value of clinical, chest radiography, and CT findings in classifying chronic diffuse infiltrative lung disease.	The frequency of correct diagnosis in test group (100 cases) was 27% with clinical data, which increased to 53% (P<.0001) with radiographic findings and 61% when clinical, radiographic and CT findings were combined (P=.07). CT provides supplementary information to radiographic findings and can help determine the specific diagnosis in patients with chronic diffuse infiltrative lung disease.	2
15. Kang EY, Miller RR, Muller NL. Bronchiectasis: comparison of preoperative thin-section CT and pathologic findings in resected specimens. <i>Radiology</i> 1995; 195(3):649-654.	9	22 consecutive patients 2 observers	Retrospective study to compare diagnostic accuracy of thin-section CT for diagnosis of bronchiectasis using pathologic examination of resected lobes or lungs as the standard.	CT was 87% accurate in detecting pathologically proven bronchiectasis. Thin-section CT showed bronchiectasis in most of the resected bronchiectatic lobes.	2

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16. Koyama M, Johkoh T, Honda O, et al. Chronic cystic lung disease: diagnostic accuracy of high-resolution CT in 92 patients. <i>AJR</i> 2003; 180(3):827-835.	10	92 patients 2 observers	Retrospective study to determine the diagnostic accuracy of HRCT in various chronic cystic lung diseases on the basis of pattern and distribution of abnormalities seen.	Various chronic cystic lung diseases often can be diagnosed with a high degree of confidence [105 (57%) of 184 interpretations with the confident diagnosis correct in 98 (93%) of 105 interpretations]. However, considerable overlap exists among CT findings and lung biopsy is often required for definitive diagnosis.	2
17. Lynch DA, Travis WD, Muller NL, et al. Idiopathic interstitial pneumonias: CT features. <i>Radiology</i> 2005; 236(1):10-21.	12	N/A	To review the CT features of IIP.	The typical CT features of each IIP are distinct, although with some overlap.	3
18. Roberts HR, Wells AU, Milne DG, et al. Airflow obstruction in bronchiectasis: correlation between computed tomography features and pulmonary function tests. <i>Thorax</i> 2000; 55(3):198-204.	13	100 patients 3 observers	To determine the inspiratory and expiratory findings on CT scans, which are associated with airflow obstruction in bronchiectasis.	Airflow obstruction in bronchiectasis is largely secondary to bronchial wall thickness and the extent of decreased attenuation on expiratory CT scan and not due to bronchiectatic abnormalities in large airways, emphysema or retained endobronchial secretions.	2
19. Swensen SJ, Aughenbaugh GL, Myers JL. Diffuse lung disease: diagnostic accuracy of CT in patients undergoing surgical biopsy of the lung. <i>Radiology</i> 1997; 205(1):229-234.	10	85 patients 2 reviewers	Retrospective study to determine the diagnostic accuracy of CT for diffuse lung disease in patients undergoing surgical biopsy of lung.	In 79 (93%) of the 85 cases, the correct diagnosis was included in the three choices of the radiologists. An accurate diagnosis of diffuse lung disease can be made with a high level of confidence with the use of only the CT findings, in this subset of patients.	2
20. Waitches GM, Stern EJ. High-resolution CT of peripheral airways diseases. <i>Radiol Clin North Am</i> 2002; 40(1):21-29.	12	N/A	To review the role of HRCT to evaluate peripheral airways diseases.	HRCT often shows characteristic imaging features of diseases of peripheral airways.	4
21. Zompatori M, Sverzellati N, Poletti V, et al. High-resolution CT in diagnosis of diffuse infiltrative lung disease. <i>Semin Ultrasound CT MR</i> 2005; 26(5):332-347.	12	N/A	Review of HRCT in diagnosis of infiltrative lung disease.	The chest radiograph is the first imaging modality for the approach to diffuse infiltrative lung disease. HRCT is the best imaging tool to evaluate and diagnose diffuse interstitial lung disease.	4
22. Elliot TL, Lynch DA, Newell JD, Jr., et al. High-resolution computed tomography features of nonspecific interstitial pneumonia and usual interstitial pneumonia. <i>J Comput Assist Tomogr</i> 2005; 29(3):339-345.	10	47 (NSIP = 25 and UIP = 22) 2 reviewers	Retrospective study to assess the accuracy of HRCT in the diagnosis of nonspecific interstitial pneumonia (NSIP). Hypothesized that HRCT features of NSIP could be distinguished from usual interstitial pneumonia (UIP).	Confident CT diagnosis of NSIP and UIP was correct in 73% and 88% of cases, respectively. The correctness of a CT diagnosis made at intermediate or high confidence was 68% and 88%, respectively. NSIP can be separated from UIP in most cases.	2

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23. Sundaram B, Gross BH, Martinez FJ, et al. Accuracy of high-resolution CT in the diagnosis of diffuse lung disease: effect of predominance and distribution of findings. <i>AJR</i> 2008; 191(4):1032-1039.	10	100 patients 3 reviewers	Retrospective, blinded review to determine whether the predominant findings on HRCT influence the accuracy of diagnosis of diffuse lung disease.	The predominant findings of honeycombing and bronchovascular thickening are associated with more than 90% accuracy in the first choice diagnosis of diffuse lung disease. The finding of lung cysts has 80%-89% accuracy. Ground glass opacification is less reliable but the accuracy is improved when combined with honeycombing or lower lung distribution.	2
24. Flaherty KR, Toews GB, Travis WD, et al. Clinical significance of histological classification of idiopathic interstitial pneumonia. <i>Eur Respir J</i> 2002; 19(2):275-283.	10	168	To evaluate the predictive value of honeycombing on HRCT as a surrogate maker for UIP. Also evaluated the response to therapy and survival of 39 patients treated prospectively with high-dose prednisone.	Honeycombing on the HRCT is 90% sensitive and 86% specific on the presence of UIP. HRCT is a good surrogate for UIP and can be utilized in patients unable to undergo surgical lung biopsy.	2
25. Sharma S, Maycher B. Is HRCT the best way to diagnose idiopathic interstitial fibrosis? <i>Curr Opin Pulm Med</i> 2006; 12(5):323-330.	12	N/A	Review the role of HRCT in the diagnostic evaluation of diffuse lung disease.	When HRCT and clinical findings are both typical of an individual diffuse lung disease, it is generally appropriate to institute management based on a confident noninvasive diagnosis. When clinical and HRCT data are divergent or when HRCT features are indeterminate, histological evaluation plays an essential role. Integration of histology, radiology and clinical data is the best way to formulate the final diagnosis in these cases.	3
26. Papiris SA, Daniil ZD, Malagari K, et al. The Medical Research Council dyspnea scale in the estimation of disease severity in idiopathic pulmonary fibrosis. <i>Respir Med</i> 2005; 99(6):755-761.	13	26	To evaluate the association of Medical Research Council (MRC) chronic dyspnea scale with lung function indices and HRCT scores such as the total interstitial disease score and the fibrosis score.	There is good correlation between fibrosis score on HRCT and level of dyspnea in patients with idiopathic pulmonary fibrosis. Observations suggest MRC dyspnea scale could offer useful information about the estimation of severity in patients with idiopathic pulmonary fibrosis.	3
27. Dowson LJ, Guest PJ, Hill SL, Holder RL, Stockley RA. High-resolution computed tomography scanning in alpha1-antitrypsin deficiency: relationship to lung function and health status. <i>Eur Respir J</i> 2001; 17(6):1097-1104.	10	111	To determine the clinical impact of change seen on HRCT, lung function and health status in patients with alpha1-antitrypsin deficiency.	HRCT is a sensitive indicator of disease progression. HRCT showed a high correlation with health status (patient disability, respiratory impairment, etc). HRCT should be considered as an alternative outcome measure in alpha1-antitrypsin deficiency.	2
28. Arakawa H, Niimi H, Kurihara Y, Nakajima Y, Webb WR. Expiratory high-resolution CT: diagnostic value in diffuse lung diseases. <i>AJR</i> 2000; 175(6):1537-1543.	12	N/A	To review the technique, features and utility of expiratory HRCT in the chest.	Expiratory HRCT is useful in the differentiation of causes of inhomogeneous lung attenuation. Routine use of paired inspiratory and expiratory HRCT is recommended.	4

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29. Camiciottoli G, Bartolucci M, Maluccio NM, et al. Spirometrically gated high-resolution CT findings in COPD: lung attenuation vs lung function and dyspnea severity. <i>Chest</i> 2006; 129(3):558-564.	13	51	To examine the relationship between HRCT lung attenuation measurements acquired under spirometric control of inspiratory and expiratory lung volume and pulmonary dysfunction as well as dyspnea severity in patients with COPD.	Inspiratory measurements assess the extent of emphysematous tissue loss. Expiratory measurements reflect airflow limitation and lung hyperinflation and correlate better with dyspnea perception. Both modalities should be utilized in HRCT.	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.