

**Screening for Lung Cancer:
Systematic Review and Meta-analyses**

EXCLUDED STUDIES LIST

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Lung Cancer Screening Excluded Studies List

Level 2: Population

1. Xie X, Heuvelmans MA, van Ooijen PMA, Oudkerk M, Vliegenthart R. A practical approach to radiological evaluation of CT lung cancer screening examinations. *Cancer Imaging*. 2013;13(3):391-9.
2. Strauss GM, Dominioni L. Chest X-ray screening for lung cancer: overdiagnosis, endpoints, and randomized population trials. *J Surg Oncol*. 2013;108(5):294-300.
3. de-Torres JP, Casanova C, Marin JM, Zagaceta J, Alcaide AB, Seijo LM, et al. Exploring the impact of screening with low-dose CT on lung cancer mortality in mild to moderate COPD patients: a pilot study. *Respir Med*. 2013;107(5):702-7.
4. Sagawa M, Nakayama T, Tanaka M, Sakuma T, Sobue T, Group JS. A randomized controlled trial on the efficacy of thoracic CT screening for lung cancer in non-smokers and smokers of <30 pack-years aged 50-64 years (JECS study): research design. *Jpn J Clin Oncol*. 2012;42(12):1219-21.
5. Van't Westeinde SC, Horeweg N, De Leyn P, Groen HJM, Lammers J-WJ, Weenink C, et al. Complications following lung surgery in the Dutch-Belgian randomized lung cancer screening trial. *Eur J Cardiothorac Surg*. 2012;42(3):420-9.
6. Marcus PM, Lenz S, Sammons D, Black W, Garg K. Recruitment methods employed in the National Lung Screening Trial. *J Med Screen*. 2012;19(2):94-102.
7. Ehmann R, Boedeker E, Friedrich U, Sagert J, Dippon J, Friedel G, et al. Canine scent detection in the diagnosis of lung cancer: revisiting a puzzling phenomenon. *Eur Respir J*. 2012;39(3):669-76.
8. Anonymous. Summaries for patients. Screening for lung cancer: recommendations from the U.S. Preventive Services Task Force. *Ann Intern Med*. 2014;160(5):I-40.
9. Harris RP, Sheridan SL, Lewis CL, Barclay C, Vu MB, Kistler CE, et al. The harms of screening: a proposed taxonomy and application to lung cancer screening. *JAMA Intern Med*. 2014;174(2):281-5.
10. Kussman RS. The overdiagnosis theory in lung cancer screening: does it make any sense? *J Surg Oncol*. 2014;109(3):177-8.
11. Lathan C, Frank DA. Review: low-dose CT screening reduces lung cancer and mortality in current or former smokers. *Ann Intern Med*. 2013;159(10):JC3.
12. Young RP, Hopkins RJ. Stage shift in computed tomography screening: possible role of indolent cancers, "histology shift," and overdiagnosis. *Am J Respir Crit Care Med*. 2013;188(8):1034-5.
13. Grannis FW, Jr. Minimizing over-diagnosis in lung cancer screening. *J Surg Oncol*. 2013;108(5):289-93.
14. Young RP, Hopkins RJ. Estimating overdiagnosis of lung cancer. *Ann Intern Med*. 2013;158(8):635.

15. Heuvers ME, Wisnivesky J, Stricker BH, Aerts JG. Generalizability of results from the National Lung Screening Trial. *Eur J Epidemiol.* 2012;27(9):669-72.
16. Raji OY, Duffy SW, Agbaje OF, Baker SG, Christiani DC, Cassidy A, et al. Predictive accuracy of the Liverpool Lung Project risk model for stratifying patients for computed tomography screening for lung cancer: a case-control and cohort validation study. *Ann Intern Med.* 2012;157(4):242-50.
17. Diederich S. Lung cancer screening: rationale and background. *Cancer Imaging.* 2011;11 Spec No A:S75-8.
18. Klabunde CN, Marcus PM, Han PKJ, Richards TB, Vernon SW, Yuan G, et al. Lung cancer screening practices of primary care physicians: results from a national survey. *Ann Fam Med.* 2012;10(2):102-10.
19. Jett JR, Midthun DE. Screening for lung cancer: for patients at increased risk for lung cancer, it works. *Ann Intern Med.* 2011;155(8):540-2.
20. Silvestri GA. Screening for lung cancer: it works, but does it really work? *Ann Intern Med.* 2011;155(8):537-9.
21. Barba M, Felsani A, Rinaldi M, Giunta S, Malorni W, Paggi MG. Reducing the risk of overdiagnosis in lung cancer: a support from molecular biology. *J Cell Physiol.* 2011;226(9):2213-4.
22. Coche E, Lonneux M, Geets X. Lung cancer: Morphological and functional approach to screening, staging and treatment planning. *Future Oncol.* 2010;6(3):367-80.
23. Goldwasser DL, Kimmel M. Modeling excess lung cancer risk among screened arm participants in the Mayo Lung Project. *Cancer.* 2010;116(1):122-31.
24. Pastorino U, Landoni C, Marchiano A, Calabro E, Sozzi G, Miceli R, et al. Fluorodeoxyglucose uptake measured by positron emission tomography and standardized uptake value predicts long-term survival of CT screening detected lung cancer in heavy smokers. *J Thorac Oncol.* 2009;4(11):1352-6.
25. Miller YE. Minimizing unintended consequences of detecting lung nodules by computed tomography. *Am J Respir Crit Care Med.* 2008;178(9):891-2.
26. Chien C-R, Chen TH-H. Mean sojourn time and effectiveness of mortality reduction for lung cancer screening with computed tomography. *Int J Cancer.* 2008;122(11):2594-9.
27. Yankelevitz DF. Quantifying "overdiagnosis" in lung cancer screening. *Radiology.* 2008;246(1):332-3.
28. Lee P, Sutedja TG. Lung cancer screening: has there been any progress? Computed tomography and autofluorescence bronchoscopy. *Curr Opin Pulm Med.* 2007;13(4):243-8.
29. Morabia A, Markowitz S. Re: Extended lung cancer incidence follow-up in the Mayo Lung Project and overdiagnosis. *J Natl Cancer Inst.* 2007;99(11):898-9.
30. Patz EF, Jr. Lung cancer screening, overdiagnosis bias, and reevaluation of the Mayo Lung Project. *J Natl Cancer Inst.* 2006;98(11):724-5.

31. Pajares MJ, Zudaire I, Lozano MD, Agorreta J, Bastarrika G, Torre W, et al. Molecular profiling of computed tomography screen-detected lung nodules shows multiple malignant features. *Cancer Epidemiol Biomarkers Prev*. 2006;15(2):373-80.
32. Henschke CI, Shaham D, Yankelevitz DF, Kramer A, Kostis WJ, Reeves AP, et al. CT screening for lung cancer: significance of diagnoses in its baseline cycle. *Clin Imaging*. 2006;30(1):11-5.
33. Shepherd FA. A targeted approach to reducing lung cancer mortality. *J Clin Oncol*. 2005;23(14):3173-4.
34. Grannis FW. Overestimation of lung cancer mortality in a computed tomography-screened population. *J Surg Oncol*. 2005;23(10):2439-1.
35. Pasic A, Postmus PE, Sutedja TG. What is early lung cancer? A review of the literature. *Lung Cancer*. 2004;45(3):267-77.
36. Kawahara M. Screening for lung cancer. *Curr Opin Oncol*. 2004;16(2):141-5.
37. Mahadevia PJ, Fleisher LA, Frick KD, Eng J, Goodman SN, Powe NR. Lung cancer screening with helical computed tomography in older adult smokers: a decision and cost-effectiveness analysis. *JAMA*. 2003;289(3):313-22.
38. Colby TV, Tazelaar HD, Travis WD, Bergstralh EJ, Jett JR. Pathologic review of the Mayo Lung Project cancers [corrected]. Is there a case for misdiagnosis or overdiagnosis of lung carcinoma in the screened group? *Cancer*. 2002;95(11):2361-5.
39. Ellis JRC, Gleeson FV. New concepts in lung cancer screening. *Curr Opin Pulm Med*. 2002;8(4):270-4.
40. Dammas S, Patz EF, Jr., Goodman PC. Identification of small lung nodules at autopsy: implications for lung cancer screening and overdiagnosis bias. *Lung Cancer*. 2001;33(1):11-6.
41. Detterbeck FC. Overdiagnosis during lung cancer screening: is it an overemphasised, underappreciated, or tangential issue? *Thorax*. 2014;69(5):408-9.
42. Tota JE, Ramanakumar AV, Franco EL. Lung cancer screening: review and performance comparison under different risk scenarios. *Lung*. 2014;192(1):55-63.
43. Gill RR, Jaklitsch MT, Jacobson FL. Controversies in lung cancer screening. *J Am Coll Radiol*. 2013;10(12):931-6.
44. Revel M-P. Avoiding overdiagnosis in lung cancer screening: the volume doubling time strategy. *Eur Respir J*. 2013;42(6):1459-63.
45. Shoji F, Morodomi Y, Kyuragi R, Okamoto T, Matsumoto T, Yano T, et al. Clinicopathological features and management of lung cancer patients with atherosclerotic vascular diseases. *Ann Thorac Cardiovasc Surg*. 2013;19(5):345-50.
46. Takiguchi Y, Sekine I, Iwasawa S. Overdiagnosis in lung cancer screening with low-dose computed tomography. *J Thorac Oncol*. 2013;8(11):e101-2.
47. Trudgen K, Khattar NH, Bensadoun E, Arnold S, Stromberg AJ, Hirschowitz EA. Autoantibody profiling for lung cancer screening longitudinal retrospective analysis of CT screening cohorts. *PLoS One*. 2014;9(2).

48. Healey GF, Lam S, Boyle P, Hamilton-Fairley G, Peek LJ, Robertson JFR. Signal stratification of autoantibody levels in serum samples and its application to the early detection of lung cancer. *J Thorac Dis.* 2013;5(5):618-25.
49. Yip R, Islami F, Zhao S, Tao M, Yankelevitz DF, Boffetta P. Errors in systematic reviews: an example of computed tomography screening for lung cancer. *Eur J Cancer Prev.* 2014;23(1):43-8.
50. Hurt CN, Roberts K, Rogers TK, Griffiths GO, Hood K, Prout H, et al. A feasibility study examining the effect on lung cancer diagnosis of offering a chest X-ray to higher-risk patients with chest symptoms: protocol for a randomized controlled trial. *Trials.* 2013;14(1).
51. Chen L, Grant J, Cheung WY, Kennecke HF. Screening intervention to identify eligible patients and improve accrual to phase II-IV oncology clinical trials. *J Oncol Pract.* 2013;9(4):e174-e81.
52. Zhou J, He E, Skog S. The proliferation marker thymidine kinase 1 in clinical use (Review). *Mol Clin Oncol.* 2013;1(1):18-28.
53. Couraud S, Girard N, Erpeldinger S, Gueyffier F, Devouassoux G, Llorca G, et al. Physicians' knowledge and practice of lung cancer screening: a cross-sectional survey comparing general practitioners, thoracic oncologists, and pulmonologists in France. *Clin Lung Cancer.* 2013;14(5):574-80.
54. Pallin M, Walsh S, O'Driscoll MF, Murray C, Cahalane A, Brown L, et al. Overwhelming support among urban Irish COPD patients for lung cancer screening by low-dose CT scan. *Lung.* 2012;190(6):621-8.
55. Taiwo EO, Yorio JT, Yan J, Gerber DE. How have we diagnosed early-stage lung cancer without radiographic screening? A contemporary single-center experience. *PLoS One.* 2012;7(12):e52313.
56. Serracino HS, Franklin WA, Aisner DL. Molecular pathology of non-small cell lung cancer. *Surg Pathol Clin.* 2012;5(4):903-18.
57. Latshang TD, Lo Cascio CM, Russi EW. [Is lung cancer screening reasonable?][German]. *Ther Umsch.* 2012;69(7):389-93.
58. Zhang H, Chen S, Huang L. Proteomics-based identification of proapoptotic caspase adapter protein as a novel serum marker of non-small cell lung cancer. *Zhongguo Fei Ai Za Zhi.* 2012;15(5):287-93.
59. Black WC. Randomized clinical trials for cancer screening: rationale and design considerations for imaging tests. *J Clin Oncol.* 2006;24(20):3252-60.
60. Reich JM. Assessing the efficacy of lung cancer screening. *Radiology.* 2006;238(2):398-401.
61. Truong MT, Munden RF. Lung cancer screening. *JWI.* 2003;5(3):99-110.
62. Spiro S. The results of the prevalence screen in Lung SEARCH: a UK based screening trial for lung cancer based on sputum cytology and cytometry, by the Lung SEARCH screening group [Abstract]. *Eur Respir J.* 2012;40(Suppl 56):276s.
63. Fenton JJ. Lung cancer screening with chest radiography has no effect on lung cancer incidence or mortality. *Evid Based Med.* 2012;17(5):149.

Level 2: Intervention

1. Daly S, Rinewalt D, Fhied C, Basu S, Mahon B, Liptay MJ, et al. Development and validation of a plasma biomarker panel for discerning clinical significance of indeterminate pulmonary nodules. *Journal of Thoracic Oncology*. 2013;8(1):31-6.
2. Scheibler F, Zumbe P, Janssen I, Viebahn M, Schroer-Gunther M, Grosselfinger R, et al. Randomized controlled trials on PET: a systematic review of topics, design, and quality. *Journal of Nuclear Medicine*. 2012;53(7):1016-25.
3. Yoshida M, Kondo K, Nakanishi C, Tada T. Interventional study for improvement of lung cancer screening rate. *JMI*. 2012;59(1-2):127-35.
4. Brodersen J, Thorsen H, Kreiner S. Consequences of screening in lung cancer: development and dimensionality of a questionnaire. *Value in Health: The Journal of the International Society for Pharmacoeconomics and Outcomes Research*. 2010;13(5):601-12.
5. Volk RJ, Linder SK, Leal VB, Rabius V, Cinciripini PM, Kamath GR, et al. Feasibility of a patient decision aid about lung cancer screening with low-dose computed tomography. *Prev Med*. 2014;62:60-3.
6. Zaric B, Perin B, Carapic V, Stojsic V, Matijasevic J, Andrijevic I, et al. Diagnostic value of autofluorescence bronchoscopy in lung cancer. *Thoracic Cancer*. 2013;4(1):1-8.
7. Macdonald IK, Murray A, Healey GF, Parsy-Kowalska CB, Allen J, McElveen J, et al. Application of a high throughput method of biomarker discovery to improvement of the early CDT-lung test. *PLoS One*. 2012;7(12):e51002.
8. Nikolaidis G, Raji OY, Markopoulou S, Gosney JR, Bryan J, Warburton C, et al. DNA methylation biomarkers offer improved diagnostic efficiency in lung cancer. *Cancer Res*. 2012;72(22):5692-701.
9. Murray S, Linardou H, Bafaloukos D, Papadimitriou C, Nasioulas G, Kosmidis P. Technical considerations for somatic EGFR mutational analysis in non-small-cell lung cancer: recommendations from a systematic review. *Forum of Clinical Oncology*. 2012;3(2):15-30.
10. Jantus-Lewintre E, Uso M, Sanmartin E, Camps C. Update on biomarkers for the detection of lung cancer. *Lung Cancer: Targets and Therapy*. 2012;3:21-9.
11. Christian C, Erica S, Morandi U. The prognostic impact of tumor size in resected stage I non-small cell lung cancer: evidence for a two thresholds tumor diameters classification. *Lung Cancer*. 2006;54(2):185-91.
12. Okada M, Nishio W, Sakamoto T, Uchino K, Yuki T, Nakagawa A, et al. Evolution of surgical outcomes for non-small cell lung cancer: time trends in 1465 consecutive patients undergoing complete resection. *Ann Thorac Surg*. 2004;77(6):1926-30; discussion 31.
13. Okada M, Koike T, Higashiyama M, Yamato Y, Kodama K, Tsubota N. Radical sublobar resection for small-sized non-small cell lung cancer: a multicenter study. *J Thorac Cardiovasc Surg*. 2006;132(4):769-75.
14. Sawabata N, Miyaoka E, Asamura H, Nakanishi Y, Eguchi K, Mori M, et al. Japanese lung cancer registry study of 11,663 surgical cases in 2004: demographic and prognosis changes over decade. *J Thorac Oncol*. 2011;6(7):1229-35.

15. Handy JR, Jr., Asaph JW, Skokan L, Reed CE, Koh S, Brooks G, et al. What happens to patients undergoing lung cancer surgery? Outcomes and quality of life before and after surgery. *Chest*. 2002;122(1):21-30.
16. Gelbman BD, Cham MD, Kim W, Libby DM, Smith JP, Port JL, et al. Radiographic and clinical characterization of false negative results from CT-guided needle biopsies of lung nodules. *J Thorac Oncol*. 2012;7(5):815-20.
17. Bastarrika G, García-Velloso MJ, Lozano MD, Montes U, Torre W, Spiteri N, et al. Early lung cancer detection using spiral computed tomography and positron emission tomography. *Am J Respir Crit Care Med*. 2005;171(12):1378-83.

Level 2: Comparison Group

1. Mets OM, Vliegenthart R, Gondrie MJ, Viergever MA, Oudkerk M, de Koning HJ, et al. Lung cancer screening CT-based prediction of cardiovascular events. *JACC Cardiovascular Imaging*. 2013;6(8):899-907.
2. Jairam PM, de Jong PA, Mali WPTHM, Isgum I, de Koning HJ, van der Aalst C, et al. Impact of cardiovascular calcifications on the detrimental effect of continued smoking on cardiovascular risk in male lung cancer screening participants. *PLoS One*. 2013;8(6):e66484.
3. Pinsky PF, Gierada DS, Nath PH, Kazerooni E, Amorosa J. National Lung Screening Trial: variability in nodule detection rates in chest CT studies. *Radiology*. 2013;268(3):865-73.
4. Jin GY, Lynch D, Chawla A, Garg K, Tammemagi MC, Sahin H, et al. Interstitial lung abnormalities in a CT lung cancer screening population: prevalence and progression rate. *Radiology*. 2013;268(2):563-71.
5. Kelly JL, Elkin SL, Fluxman J, Polkey MI, Soljak MA, Hopkinson NS. Breathlessness and skeletal muscle weakness in patients undergoing lung health screening in primary care. *COPD*. 2013;10(1):40-54.
6. Ono K, Hiraoka T, Ono A, Komatsu E, Shigenaga T, Takaki H, et al. Low-dose CT scan screening for lung cancer: comparison of images and radiation doses between low-dose CT and follow-up standard diagnostic CT. *Springerplus*. 2013;2:393.
7. de Hoop B, van Ginneken B, Gietema H, Prokop M. Pulmonary perifissural nodules on CT scans: rapid growth is not a predictor of malignancy. *Radiology*. 2012;265(2):611-6.
8. Singh SP, Gierada DS, Pinsky P, Sanders C, Fineberg N, Sun Y, et al. Reader variability in identifying pulmonary nodules on chest radiographs from the National Lung Screening Trial. *J Thorac Imaging*. 2012;27(4):249-54.
9. Doria-Rose VP, White MC, Klabunde CN, Nadel MR, Richards TB, McNeel TS, et al. Use of lung cancer screening tests in the United States: results from the 2010 National Health Interview Survey. *Cancer Epidemiol Biomarkers Prev*. 2012;21(7):1049-59.
10. Pyenson BS, Sander MS, Jiang Y, Kahn H, Mulshine JL. An actuarial analysis shows that offering lung cancer screening as an insurance benefit would save lives at relatively low cost. *Health Aff (Project Hope)*. 2012;31(4):770-9.

11. Greenberg AK, Lu F, Goldberg JD, Eylers E, Tsay J-C, Yie T-A, et al. CT scan screening for lung cancer: risk factors for nodules and malignancy in a high-risk urban cohort. *PLoS One*. 2012;7(7):e39403.
12. Mascalchi M, Mazzone LN, Falchini M, Belli G, Picozzi G, Merlini V, et al. Dose exposure in the ITALUNG trial of lung cancer screening with low-dose CT. *Brit J Radiol*. 2012;85(1016):1134-9.
13. Ferketich AK, Otterson GA, King M, Hall N, Browning KK, Wewers ME. A pilot test of a combined tobacco dependence treatment and lung cancer screening program. *Lung Cancer*. 2012;76(2):211-5.
14. Goulart BHL, Bensink ME, Mummy DG, Ramsey SD. Lung cancer screening with low-dose computed tomography: costs, national expenditures, and cost-effectiveness. *J Natl Compr Cancer Netw*. 2012;10(2):267-75.
15. Field JK, Chen Y, Marcus MW, McRonald FE, Raji OY, Duffy SW. The contribution of risk prediction models to early detection of lung cancer. *J Surg Oncol*. 2013;108(5):304-11.
16. Field JK, Raji OY. The potential for using risk models in future lung cancer screening trials. *F1000 Med Rep*. 2010;2:pii38.
17. Toyoda Y, Nakayama T, Kusunoki Y, Iso H, Suzuki T. Sensitivity and specificity of lung cancer screening using chest low-dose computed tomography. *Br J Cancer*. 2008;98(10):1602-7.
18. Welch HG, Woloshin S, Schwartz LM, Gordis L, Gotzsche PC, Harris R, et al. Overstating the evidence for lung cancer screening: the International Early Lung Cancer Action Program (I-ELCAP) study. *Arch Intern Med*. 2007;167(21):2289-95.
19. Buls N, de Mey J, Covens P, Stadnik T. Health screening with CT: prospective assessment of radiation dose and associated detriment. *JBR-BTR*. 2005;88(1):12-6.
20. Miettinen OS, Henschke CI. CT screening for lung cancer: coping with nihilistic recommendations. *Radiology*. 2001;221(3):592-7.
21. Veronesi G, Maisonneuve P, Rampinelli C, Bertolotti R, Petrella F, Spaggiari L, et al. Computed tomography screening for lung cancer: results of ten years of annual screening and validation of cosmos prediction model. *Lung Cancer*. 2013;82(3):426-30.
22. Ju SM, Park HB, Kang H, Park CW, Kim W, Seon HJ, et al. Prevalence of non-calcified pulmonary nodules in screening chest computed tomography. *Thoracic Cancer*. 2013;4(4):405-9.
23. Jacobson FL, Jaklitsch MT. Low-dose CT screening for lung cancer: The time is now. *J Surg Oncol*. 2013;108(5):265-9.
24. Munden RF, Godoy MCB. Lung cancer screening: state of the art. *J Surg Oncol*. 2013;108(5):270-4.
25. Finigan JH, Kern JA. Lung cancer screening. Past, present and future. *Clin Chest Med*. 2013;34(3):365-71.

26. Goulart BHL, Ramsey SD. Moving beyond the National Lung Screening Trial: discussing strategies for implementation of lung cancer screening programs. *The Oncologist*. 2013;18(8):941-6.
27. McKee BJ, McKee AB, Flacke S, Lamb CR, Hesketh PJ, Wald C. Initial experience with a free, high-volume, low-dose CT lung cancer screening program. *JACR*. 2013;10(8):586-92.
28. Jaklitsch MT, Armstrong K, Jacobson FL. Lung cancer screening in the elderly. *Aging Health*. 2013;9(3):321-9.
29. D'Urso V, Doneddu V, Marchesi I, Collodoro A, Pirina P, Giordano A, et al. Sputum analysis: non-invasive early lung cancer detection. *J Cell Physiol*. 2013;228(5):945-51.
30. Nawa T, Nakagawa T, Mizoue T, Kusano S, Chonan T, Hayashihara K, et al. A decrease in lung cancer mortality following the introduction of low-dose chest CT screening in Hitachi, Japan. *Lung Cancer*. 2012;78(3):225-8.
31. Schmidlin EJ, Sundaram B, Kazerooni EA. Computed tomography screening for lung cancer. *Radiol Clin North Am*. 2012;50(5):877-94.
32. Mazzone P. The rationale for, and design of, a lung cancer screening program. *Cleve Clin J Med*. 2012;79(5):337-45.
33. Hazelton WD, Goodman G, Rom WN, Tockman M, Thornquist M, Moolgavkar S, et al. Longitudinal multistage model for lung cancer incidence, mortality, and CT detected indolent and aggressive cancers. *Math Biosci*. 2012;240(1):20-34.
34. Jeon KN, Goo JM, Lee CH, Lee Y, Choo JY, Lee NK, et al. Computer-aided nodule detection and volumetry to reduce variability between radiologists in the interpretation of lung nodules at low-dose screening computed tomography. *Invest Radiol*. 2012;47(8):457-61.
35. Sozzi G, Boeri M, Rossi M, Verri C, Suatoni P, Bravi F, et al. Clinical utility of a plasma-based miRNA signature classifier within computed tomography lung cancer screening: a correlative MILD trial study. *JCO*. 2014;32(8):768-73.
36. Jacobs PC, Gondrie MJ; van der Graaf Y; de Koning HJ; Isgum I; van Ginneken B; Mali WP. Coronary artery calcium can predict all-cause mortality and cardiovascular events on low-dose CT screening for lung cancer. *Am J Roentgenol*. 2012;198(3):505.
37. Anderson CM, Yip R, Henschke CI, Yankelevitz DF, Ostroff JS, Burns DM. Smoking cessation and relapse during a lung cancer screening program. *Cancer Epidemiol Biomarkers Prev*. 2009;18(12):3476-83.
38. MacRedmond R, Logan PM, Lee M, Kenny D, Foley C, Costello RW. Screening for lung cancer using low dose CT scanning. *Thorax*. 2004;59(3):237-41.
39. Cox LS, Clark MM, Jett JR, Patten CA, Schroeder DR, Nirelli LM, et al. Change in smoking status after spiral chest computed tomography scan screening. *Cancer*. 2003;98(11):2495-501.
40. Styn MA, Land SR, Perkins KA, Wilson DO, Romkes M, Weissfeld JL. Smoking behavior 1 year after computed tomography screening for lung cancer: Effect of physician referral for abnormal CT findings. *Cancer Epidemiol Biomarkers Prev*. 2009;18(12):3484-9.

41. Taylor KL, Cox LS, Zincke N, Mehta L, McGuire C, Gelmann E. Lung cancer screening as a teachable moment for smoking cessation. *Lung Cancer*. 2007;56(1):125-34.
42. Townsend CO, Clark MM, Jett JR, Patten CA, Schroeder DR, Nirelli LM, et al. Relation between smoking cessation and receiving results from three annual spiral chest computed tomography scans for lung carcinoma screening. *Cancer*. 2005;103(10):2154-62.
43. Tsushima K, Sone S, Hanaoka T, Kubo K. Radiological diagnosis of small pulmonary nodules detected on low-dose screening computed tomography. *Respirology*. 2008;13(6):817-24.
44. Wagnetz U, Menezes RJ, Boerner S, Paul NS, Wagnetz D, Keshavjee S, et al. CT screening for lung cancer: implication of lung biopsy recommendations. *Am J Roentgenol*. 2012;198(2):351-8.
45. Berrington de Gonzalez A, Kim KP, Berg CD. Low-dose lung computed tomography screening before age 55: estimates of the mortality reduction required to outweigh the radiation-induced cancer risk. *J Med Screen*. 2008;15(3):153-8.

Level 3: Study Design

1. Shmueli A, Fraifeld S, Peretz T, Gutfeld O, Gips M, Sosna J, et al. Cost-effectiveness of baseline low-dose computed tomography screening for lung cancer: the Israeli experience. *Value in Health: The Journal of the International Society for Pharmacoeconomics and Outcomes Research*. 2013;16(6):922-31.
2. Marshall HM, Bowman RV, Crossin J, Lau MA, Slaughter RE, Passmore LH, et al. Queensland Lung Cancer Screening Study: rationale, design and methods. *Intern Med J*. 2013;43(2):174-82.
3. Dominioni L, Poli A, Mantovani W, Pisani S, Rotolo N, Paolucci M, et al. Assessment of lung cancer mortality reduction after chest X-ray screening in smokers: a population-based cohort study in Varese, Italy. *Lung Cancer*. 2013;80(1):50-4.
4. Grosu HB, Eapen GA, Jimenez CA, Morice RC, Ost D. Lung cancer screening: making the transition from research to clinical practice. *Curr Opin Pulm Med*. 2012;18(4):295-303.
5. Spiro SG, Navani N. Screening for lung cancer: is this the way forward? *Respirology*. 2012;17(2):237-46.
6. Ruano-Ravina A, Pérez Ríos M, Fernández-Villar A. Lung cancer screening with low-dose computed tomography after the National Lung Screening Trial. The debate is still open. *Arch Bronconeumol*. 2013;49(4):158-65.
7. Henschke CI, Yankelevitz DF. CT screening for lung cancer: update 2007. *The Oncologist*. 2008;13(1):65-78.
8. Lindell RM, Hartman TE, Swensen SJ, Jett JR, Midthun DE, Tazelaar HD, et al. Five-year lung cancer screening experience: CT appearance, growth rate, location, and histologic features of 61 lung cancers. *Radiology*. 2007;242(2):555-62.
9. Maggi F. Lung cancer screening with spiral CT. *Rays*. 2004;29(4):377-82.

10. Manser R. Screening for lung cancer: a review. *Curr Opin Pulm Med.* 2004;10(4):266-71.
11. Armstrong P, Husband JE, Holemans JA. Population screening for lung cancer. *Hosp Med.* 2004;65(7):404-11.
12. Wisnivesky JP, Mushlin AI, Sicherman N, Henschke C. The cost-effectiveness of low-dose CT screening for lung cancer: preliminary results of baseline screening. *Chest.* 2003;124(2):614-21.
13. Henschke CI, Yankelevitz DF, Kostis WJ. CT screening for lung cancer. *Seminars in Ultrasound, CT, and MR.* 2003;24(1):23-32.
14. Marcus PM. Lung cancer screening: an update. *J Clin Oncol.* 2001;19(18 Suppl):83S-6S.
15. Dominioni L, Strauss GM, Imperatori A, Rovera F, Dionigi G. Screening for lung cancer. *Chest Surg Clin N Am.* 2000;10(4):729-36.
16. Parkin DM, Moss SM. Lung cancer screening: improved survival but no reduction in deaths-the role of "overdiagnosis". *Cancer.* 2000;89(11 Suppl):2369-76.
17. Seijo Maceiras LM. Lung cancer screening with low-dose computed tomography. *Memo - Magazine of European Medical Oncology.* 2014;7(1):6-9.
18. Screening for lung cancer: Too many uncertainties, even for smokers. *Prescrire Int.* 2014;23(145):19-23.
19. Prokop M. Lung cancer screening: the radiologist's perspective. *Semin Respir Crit Care Med.* 2014;35(1):91-8.
20. Dhillon S, Loewen G, Jayaprakash V, Reid M. Lung cancer screening update. *J Carcinog.* 2013;12.
21. Devaraj A, Field JK. Early detection of lung cancer with low-dose computed tomography: An update on recently presented data. *Lung Cancer Management.* 2012;1(3):189-94.
22. Zalcman G, Reviron-Rabec L, Brosseau S, Levallet G, Bergot E. Le dépistage du futur du cancer broncho-pulmonaire: perspectives et mythes. *Revue des Maladies Respiratoires Actualites.* 2014;5(5):572-80.
23. Henschke CI, Yip R, Yankelevitz DF, Smith JP. Definition of a positive test result in computed tomography screening for lung cancer. *Ann Intern Med.* 2013;158(4):246-52.
24. Field JK, Oudkerk M, Pedersen JH, Duffy SW. Prospects for population screening and diagnosis of lung cancer. *Lancet.* 2013;382(9893):732-41.
25. Kasenda B, Raatz H, Bucher HC. Lung cancer screening - an overview about chances and risks. *Ther Umsch.* 2013;70(4):237-43.
26. Rampinelli C, Origgi D, Bellomi M. Low-dose CT: Technique, reading methods and image interpretation. *Cancer Imaging.* 2012;12(3):548-56.
27. Tammemagi MC, Katki HA, Hocking WG, Church TR, Caporaso N, Kvale PA, et al. Selection criteria for lung-cancer screening. *N Engl J Med.* 2013;368(8):728-36.
28. Bach PB. Review: CT screening for lung cancer reduced mortality in 1 large trial but not in 2 smaller trials. *Ann Intern Med.* 2012;157(6):JC3-6.

29. Lemarie E. Radiological screening for lung cancer. *Revue des Maladies Respiratoires Actualites*. 2012;4(6):457-62.
30. Harris K, Khachaturova I, Azab B, Maniatis T, Murukutla S, Chalhoub M, et al. Small cell lung cancer doubling time and its effect on clinical presentation: a concise review. *Clin Med Insights Oncol*. 2012;6:199-203.
31. Patel D, Akporobaro A, Chinyanganya N, Hackshaw A, Seale C, Spiro SG, et al. Attitudes to participation in a lung cancer screening trial: a qualitative study. *Thorax*. 2012;67(5):418-25.
32. Kanashiki M, Tomizawa T, Yamaguchi I, Kurishima K, Hizawa N, Ishikawa H, et al. Volume doubling time of lung cancers detected in a chest radiograph mass screening program: comparison with CT screening. *Oncol Lett*. 2012;4(3):513-6.
33. Armstrong P. Population screening for lung cancer. *CME Journal Radiology*. 2004;4(2):43-8.
34. van Klaveren RJ, Oudkerk M, Prokop M, Scholten ET, Nackaerts K, Vernhout R, et al. Management of lung nodules detected by volume CT scanning. *N Engl J Med*. 2009;361(23):2221-9.
35. McKenna Jr RJ, Houck W, Fuller CB. Video-assisted thoracic surgery lobectomy: experience with 1,100 cases. *Ann Thorac Surg*. . 2006;81(2):421-6.

Level 3: Outcomes

1. Mazzone PJ, Obuchowski N, Phillips M, Risius B, Bazerbashi B, Meziame M. Lung cancer screening with computer aided detection chest radiography: design and results of a randomized, controlled trial. *PLoS One*. 2013;8(3):e59650.
2. McRonald FE, Yadegarfar G, Baldwin DR, Devaraj A, Brain KE, Eisen T, et al. The UK Lung Screen (UKLS): Demographic profile of first 88,897 approaches provides recommendations for population screening. *Cancer Prev Res (Phila)*. 2014;7(3):362-71.