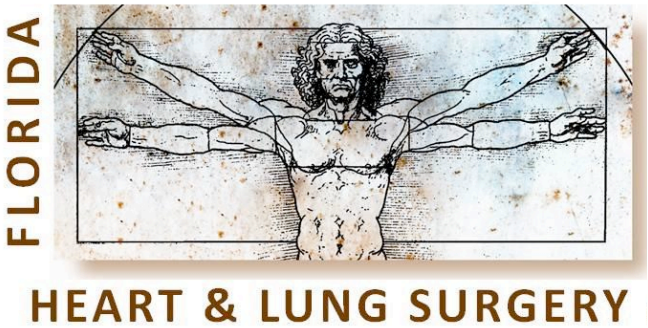
Review of Thoracic Surgical Oncology



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Edited by K. Eric Sommers, MD, FACS

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Lung cancer screening

US Preventive Services Task Force recommends low dose CT scanning to screen for lung cancer

Ann Intern Med. 2013 Jul 30. Screening for Lung Cancer With Low-Dose Computed Tomography: A Systematic Review to Update the U.S. Preventive Services Task Force Recommendation. Humphrey LL, Deffebach M, Pappas M, Baumann C, Artis K, Mitchell JP, Zakher B, Fu R, Slatore CG. BACKGROUND: Lung cancer is the leading cause of cancer-related death in the United States. Because early-stage lung cancer is associated with lower mortality than late-stage disease, early detection and treatment may be beneficial. PURPOSE: To update the 2004 review of screening for lung cancer for the U.S. Preventive Services Task Force, focusing on screening with low-dose computed tomography (LDCT). DATA SOURCES: MEDLINE (2000 to 31 May 2013), the Cochrane Central Register of Controlled Trials and Cochrane Database of Systematic Reviews (through the fourth quarter of 2012), Scopus, and reference lists. STUDY SELECTION: English-language randomized, controlled trials or cohort studies that evaluated LDCT screening for lung cancer. DATA EXTRACTION: One reviewer extracted study data about participants, design, analysis, follow-up, and results, and a second reviewer checked extractions. Two reviewers rated study quality using established criteria. DATA SYNTHESIS: Four trials reported results of LDCT screening among patients with smoking exposure. One large good-quality trial reported that screening was associated with significant reductions in lung cancer (20%) and all-cause (6.7%) mortality. Three small European trials showed no benefit of screening. Harms included radiation exposure, overdiagnosis, and a high rate of false-positive findings that typically resolved with further imaging. Smoking cessation was not affected. Incidental findings were common. LIMITATIONS: Three trials were underpowered and of insufficient duration to evaluate screening effectiveness. Overdiagnosis, an important harm of screening, is of uncertain magnitude. No studies reported results in women or minority populations. CONCLUSION: Strong evidence shows that LDCT screening can reduce lung cancer and all-cause mortality. The harms associated with screening must be balanced with the benefits.

Editor's commentary: For the first time, the USPSTF has come out with a recommendation to screen for lung cancer. This ensures that lung cancer screening will be a covered service by CMS and will be offered free to Medicare beneficiaries who qualify. Several questions remain unanswered however: who will prescreen patients to ensure they qualify? What, if any, informed consent will be required, and who will counsel patients? Will there be any requirements for multi-disciplinary work-up of positive scans? How will the 19 to 1 ratio of false positives to true positives be managed? Obviously lung cancer screening in the wider community will lead to more testing, more procedures, more potential harms than the tightly integrated circumstances of the NLST. I think we are about to witness a natural experiment in clinical translational medicine.

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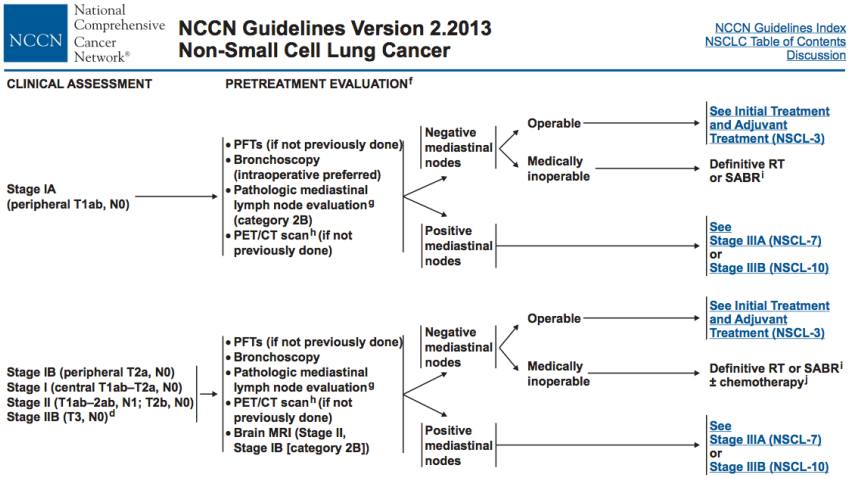
Predicting false negative PET mediastinal staging (aka the "real" story at Memorial Sloan-Kettering)

*J Thorac Oncol. 2013 Sep;8(9):1170-80. A prediction model for pathologic n2 disease in lung cancer patients with a negative mediastinum by positron emission tomography. Farjah F, Lou F, Sima C, Rusch VW, Rizk NP. *Department of Surgery, Division of Cardiothoracic Surgery, University of Washington, Seattle, Washington; and †Department of Surgery, Thoracic Service, Memorial Sloan-Kettering Cancer Center, New York, New York. INTRODUCTION: Guidance is limited for invasive staging in patients with lung cancer without mediastinal disease by positron emission tomography (PET). We developed and validated a prediction model for pathologic N2 disease (pN2), using six previously described risk factors: tumor location and size by computed tomography (CT), nodal disease by CT, maximum standardized uptake value of the primary tumor, N1 by PET, and histology. METHODS: A cohort study (2004-2009) was performed in patients with T1/T2 by CT and N0/N1 by PET. Logistic regression analysis was used to develop a prediction model for pN2 among a random development set (n = 625). The model was validated in both the development set, which comprised two thirds of the patients and the validation set (n = 313), which comprised the remaining one third. Model performance was assessed in terms of discrimination and calibration. RESULTS: Among 938 patients, 9.9% had pN2 (9 detected by invasive staging and 84 intraoperatively). In the development set, univariate analyses demonstrated a significant association between pN2 and increasing tumor size (p < 0.001), nodal status by CT (p = 0.007), maximum standardized uptake value of the primary tumor (p = 0.027), and N1 by PET (p < 0.001); however, only N1 by PET was associated with pN2 (p < 0.001) in the multivariate prediction model. The model performed reasonably well in the development (c-statistic, 0.70; 95% confidence interval, 0.63-0.77; goodness of fit p = 0.61) and validation (c-statistic, 0.65; 95% confidence interval, 0.56-0.74; goodness-of-fit p = 0.19) sets. CONCLUSION: A prediction model for pN2 based on six previously described risk factors has reasonable performance characteristics. Observations from this study may guide prospective, multicenter development and validation of a prediction model for pN2.*

Editor's commentary: This is a fascinating study from Memorial Sloan-Kettering on the utility of a PET scans negative in the mediastinum for NSCLC staging. Not only is it a common and important problem, but the study reveals some very interesting insights into the current practice at Memorial Sloan-Kettering. For instance, only 9.5% of NSCLC patients at MSK operated for curative intent underwent mediastinoscopy for staging. (And it wasn't because EBUS was used instead: only 1% of patients had EBUS). This was explained as an "institutional bias." Furthermore, for the patients who underwent mediastinoscopy, the false-negative rate was 50%! I also note also that only ***one*** of the nine listed surgeons sampled the NCCN-recommended 3 mediastinal lymph node stations intraoperatively. How about the fact that the ***average*** number of nodes sampled is less than 5? But wait, there's more: almost 6% of patients had a wedge resection! I find it amazing that the surgeons in this study averaged way less than 50 early stage NSCLC resections/year. These are not the statistics that one expects from such a revered program.



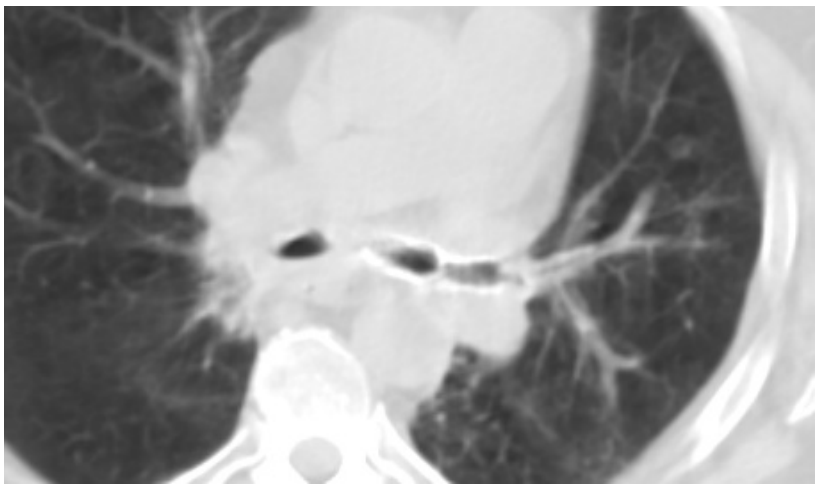
As for the subject matter of the report, overall, 9.9% of patients with a PET scan negative in the mediastinum were found to have pathologic involvement of N2 nodes at resection. In terms of predicting N2 involvement, not surprisingly, only N1 involvement was predictive of unsuspected N2 involvement. Over 30% of patients with PET positive N1 disease harbor PET negative but microscopically positive N2 disease. This finding is consistent with my experience. So my take-away is that patients with N1 disease on PET should be ***fully staged*** whether preoperatively, or intra-operatively. Also of interest in this report is the spectrum of adjuvant and neoadjuvant treatments listed for patients who were found to have N2 disease. I cannot recall encountering such a interesting example of "Do as I say, not as I do" when one considers the influence of MSK in the authoring of the NCCN guidelines, as well as in the world of cancer surgery in general.

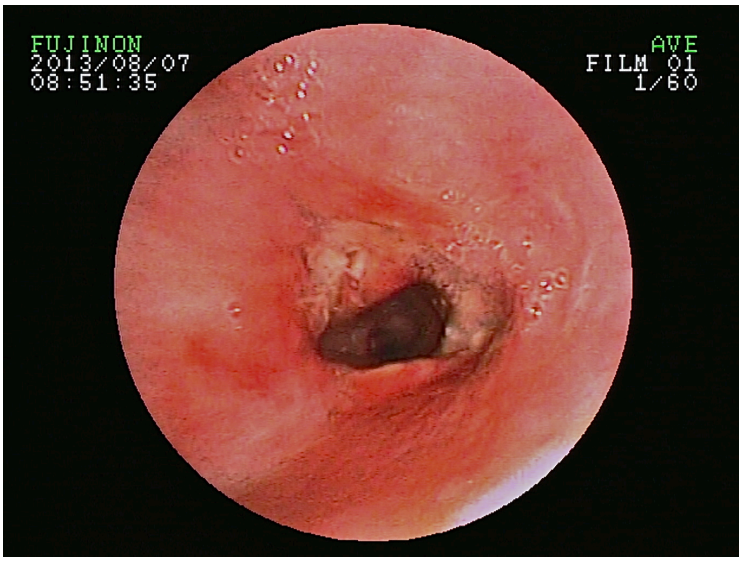
Interesting case presentation: carinal pneumonectomy

A 56 yo WM was referred for chronic left mainstem bronchial occlusion. Four years ago he was diagnosed with left mainstem NSCLC felt not to be resectable by a surgeon in Missouri. A stent was placed and he subsequently underwent combined chemoradiation with good initial response. Shortly after completing treatment, he developed cough and was treated for several episodes of pneumonia. A second stent was inserted but his symptoms continued. His wife described at least 30 bronchoscopies, 2 ICU admissions, and several episodes of post-tussive syncope. During his interview, he was unable to complete a sentence without violent coughing. A PET scan showed occlusion of the left mainstem bronchus and non-specific activity throughout his treatment field and in the left lung (see CT image below). Salvage resection of his left lung was advised and he was admitted to TGH.

At the time of surgery, bronchoscopy showed near complete occlusion of the distal trachea so that simple left pneumonectomy would leave the patient with residual occlusion of the right mainstem bronchus. Carinal pneumonectomy was performed in order to release obstruction of the distal tracheal. This required use of cardiopulmonary bypass. Omental harvest and transposition into the operative site was also used to buttress the anastomosis. The patient recovered slowly but uneventfully and was seen as an outpatient where postoperative bronchoscopy was performed to evaluate the airway anastomosis (see below; NB absence of the carina).

Carinal pneumonectomy is a rarely performed procedure that involves resection of the tracheal carina in addition to the mainstem bronchus. Re-construction requires re-anastomosis of the remaining mainstem bronchus to the distal trachea. While cardiopulmonary bypass was utilized in this case, it is possible to perform the procedure on the right side without it.





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