**Lung Cancer Screening**

**For the Scientific Advances in Lung Cancer 2016**

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This is a very dynamic time for both CT-based lung cancer screening research in regard to both research as well as with the process of clinical implementation. Notable improvements in efficient screening case detection rates have been reported that address concerns about high-false positivity in screening work-ups. These reports cite false-positive diagnostic detection rates of less than 10% and include the British pilot study, UKLS (1), the NELSON trial group (2, 3), the I-ELCAP (4) and the preliminary experiences with the ACR LungRADS approach (4, 5). In addition, the field recognized that non-standardized terms for characterizing the efficiency screening process was also confusing. Some investigators consider the finding of lung nodules on a CT scan as being equivalent to a cancer diagnosis and since lung nodules are common in smokers this misconception resulted in the perception of a high false diagnosis rate. From a screening subject perspective this situation lead to unnecessary distress as it is well known that most pulmonary nodules are benign in origin. This situation would benefit from the informed decision making with colon cancer screening where subjects are much better educated about the natural history of polyps relative to their chances of being found with a colon cancer. A consensus is emerging that working towards more systematic definitions for key parameters for lung cancer screening process is a near term priority that could reset screening subject expectations and greatly reduce anxiety with the screening process (3, 6-13).

Additional areas of process include a number of research efforts to productively integrate tobacco cessation both as a service and as a research focus within the process of lung cancer screening (14, 15) . Dr. Jamie Ostroff of Memorial Sloan Kettering Institute is leading an exciting new research effort to address this vital aspect of lung cancer screening research.

A major Canadian effort buttressed the growing evidence of the cost efficiency of providing high quality lung cancer screening services while still providing public health benefit (16, 17). Using even very conservative assumptions analysis of screening benefit was favorable relative to its impact on person-years of life saved. However it remains for each nation has to make its own decision relative to the complex array of health priorities in each distinctive national setting.

1. Field JK, Duffy SW, Baldwin DR, Brain KE, Devaraj A, Eisen T, et al. The UK Lung Cancer Screening Trial: a pilot randomised controlled trial of low-dose computed tomography screening for the early detection of lung cancer. Health Technol Assess. 2016;20(40):1-146.

2. Horeweg N, van der Aalst CM, Vliegenthart R, Zhao Y, Xie X, Scholten ET, et al. Volumetric computed tomography screening for lung cancer: three rounds of the NELSON trial. Eur Respir J. 2013;42(6):1659-67.

3. Yousaf-Khan U, van der Aalst C, de Jong PA, Heuvelmans M, Scholten E, Lammers JW, et al. Final screening round of the NELSON lung cancer screening trial: the effect of a 2.5-year screening interval. Thorax. 2017;72(1):48-56.

4. Henschke CI, Yip R, Yankelevitz DF et al. Definition of a positive test result in computed tomography screening for lung cancer: A cohort study. Ann Intern Med. 2013; 158(4): 246-252.

5. Pinsky PF, Gierada DS, Black W, Munden R, Nath H, Aberle D, et al. Performance of Lung-RADS in the National Lung Screening Trial: A Retrospective Assessment. Ann Intern Med. 2015.

5. Li K, Yip R, Avila R, Henschke CI, Yankelevitz DF. Size and Growth Assessment of Pulmonary Nodules: Consequences of the Rounding. J Thorac Oncol. 2016.

6. Horeweg N, Scholten ET, de Jong PA, van der Aalst CM, Weenink C, Lammers JW, et al. Detection of lung cancer through low-dose CT screening (NELSON): a prespecified analysis of screening test performance and interval cancers. Lancet Oncol. 2014;15(12):1342-50.

7. Horeweg N, van Rosmalen J, Heuvelmans MA, van der Aalst CM, Vliegenthart R, Scholten ET, et al. Lung cancer probability in patients with CT-detected pulmonary nodules: a prespecified analysis of data from the NELSON trial of low-dose CT screening. Lancet Oncol. 2014;15(12):1332-41.

8. Walter JE, Heuvelmans MA, de Jong PA, Vliegenthart R, van Ooijen PM, Peters RB, et al. Occurrence and lung cancer probability of new solid nodules at incidence screening with low-dose CT: analysis of data from the randomised, controlled NELSON trial. Lancet Oncol. 2016;17(7):907-16.

9. Yankelevitz DF, Henschke CI. Advancing and sharing the knowledge base of CT screening for lung cancer. Ann Transl Med. 2016;4(8):154.

10. Yip R, Henschke CI, Yankelevitz DF, Boffetta P, Smith JP, International Early Lung Cancer I. The impact of the regimen of screening on lung cancer cure: a comparison of I-ELCAP and NLST. Eur J Cancer Prev. 2015;24(3):201-8.

11. Field JK, Devaraj A, Duffy SW, Baldwin DR. CT screening for lung cancer: Is the evidence strong enough? Lung Cancer. 2016;91:29-35.

12. Callister ME, Baldwin DR, Akram AR, Barnard S, Cane P, Draffan J, et al. British Thoracic Society guidelines for the investigation and management of pulmonary nodules. Thorax. 2015;70 Suppl 2:ii1-ii54.

13. Ten Haaf K, van Rosmalen J, de Koning HJ. Lung cancer detectability by test, histology, stage, and gender: estimates from the NLST and the PLCO trials. Cancer Epidemiol Biomarkers Prev. 2015;24(1):154-61.

14. Ostroff JS, Copeland A, Borderud SP, Li Y, Shelley DR, Henschke CI. Readiness of Lung Cancer Screening Sites to Deliver Smoking Cessation Treatment: Current Practices, Organizational Priority, and Perceived Barriers. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco. 2016;18(5):1067-75.

15. Warren GW, Ostroff JS, Goffin JR. Lung Cancer Screening, Cancer Treatment, and Addressing the Continuum of Health Risks Caused by Tobacco. Am Soc Clin Oncol Educ Book. 2016;35:223-9.

16. Goffin JR, Flanagan WM, Miller AB, Fitzgerald NR, Memon S, Wolfson MC, et al. Cost-effectiveness of Lung Cancer Screening in Canada. JAMA Oncol. 2015;1(6):807-13.

17. Goffin JR, Flanagan WM, Miller AB, Fitzgerald NR, Memon S, Wolfson MC, et al. Biennial lung cancer screening in Canada with smoking cessation-outcomes and cost-effectiveness. Lung Cancer. 2016;101:98-103.