BACKGROUND

Lung cancer (LC) is the commonest cause of cancer death in US, in part because it is typically diagnosed in advanced stages. Clinical trials suggest screening with chest x-ray (CT) may yield favorable shift in LC stage at diagnosis; however, a survival benefit from CT screening has not been convincingly demonstrated.

An autobody test (AABT)—earlyCT-Lung ( Oncimmune Ltd.)—to aid in LC diagnosis has recently been developed:

- While less sensitive than CT, AABT can detect smaller and less advanced cancers and has greater specificity.
- Patients positive on AABT—and CT—are much more likely to have LC and thus may be more aggressively evaluated and treated.

STUDY OBJECTIVE

To estimate cost-effectiveness of using AABT as an aid to CT in the detection of LC in high-risk patients.

STUDY METHODS

Model Description

- Model depicts clinical and economic consequences of alternative strategies for LC screening in cohort of 100,000 previously unscreened high-risk patients.
- Model considers a single "prevalence-round" screening exam.

- Screening strategies include:
  - CT followed by AABT if positive (CT+→AABT).
  - CT alone.
  - No Screening.

- Patients assumed to be at high-risk of having previously undetected LC—NSCLC or SCLC—due to current or former smoking—and to be 60 years of age:
  - NSCLC stratified based on nature of disease—aggressive vs indolent; all SCLC assumed to be aggressive.

- Patients classified into one of four groups—true-positive, true-negative, false-positive, or false-negative—based on LC vs CT screening results.

- True-positives undergo further diagnostic evaluation following CT treatment:
  - CT
  - SCLC
  - NSCLC

- Diagnosis of indolent NSCLC by CT screening results in a "nodule" that is not treatable with CT for up to three years.

- CT sensitivity/specificity calculated from data published.

- Costs:
  - Indolent NSCLC: $15,000
  - Aggressive NSCLC: $35,000
  - SCLC: $43,780

- Sensitivity of CT+→AABT and AABT alone:
  - CT: 16.0%
  - AABT: 50.0%

- Sensitivity and Specificity of CT screening:
  - CT: 25.0%

- Sensitivity and Specificity of AABT screening:
  - AABT: 92.0%

- Test Characteristics:
  - CT: False Positives 17,700; True Positives 1,770; False Negatives 1,770; True Negatives 93,230
  - AABT: False Positives 1,770; True Positives 1,770; False Negatives 1,770; True Negatives 93,230

- Utility of CT+→AABT:
  - CT: Cost $35,000
  - AABT: Cost $15,000

- Diagnostic accuracy of CT vs AABT:
  - CT: Accuracy 62%. AABT: Accuracy 92%

- Sensitivity and Specificity of Test:
  - CT: Sensitivity 35.0%; Specificity 95.0%
  - AABT: Sensitivity 92.0%; Specificity 52.0%

- Test Results:
  - CT: Sensitivity 35.0%; Specificity 95.0%
  - AABT: Sensitivity 92.0%; Specificity 52.0%

- Indicator of lung cancer:
  - CT: 10.0% sensitivity
  - AABT: 10.0% sensitivity

- Indolent NSCLC:
  - CT: Sensitivity 40.0%
  - AABT: Sensitivity 92.0%

- Interrogation results of CT+→AABT:
  - CT: Sensitivity 10.0%
  - AABT: Sensitivity 10.0%

- AABT vs CT+→AABT:
  - CT: Sensitivity 10.0%
  - AABT: Sensitivity 10.0%

- Indolent NSCLC:
  - CT: Sensitivity 40.0%
  - AABT: Sensitivity 92.0%

- Cost-effectiveness calculated as ratio of difference in expected costs to differences in expected quality-adjusted life-years (QALYs) between AABT and CT. AABT alone is a dominant strategy.

- Conclusions:
  - AABT is preferred to CT in screening for LC.

- Sensitivity Analyses:
  - Cost-effectiveness highly sensitive to assumed stage shift, and moderately sensitive to cost of AABT and prevalence of undiagnosed LC.

CONCLUSION

Under our base case assumptions, and reasonable variations thereof, using AABT—EarlyCT-Lung—as an aid to CT in screening high-risk patients for LC is cost-effective in comparison with no screening or screening with CT alone.

REFERENCES


Table 1. Outcomes from screening for lung cancer with CT+→AABT vs CT alone, respectively, in a hypothetical population of 100,000 smokers aged 55-74 years.

Table 2. Classification of patients from screening for lung cancer with CT and CT+→AABT, respectively, in a hypothetical population of 100,000 smokers aged 55-74 years.

Table 3. Cost-effectiveness of AABT+→CT vs CT+ in the detection of breast cancer.

Table 4. Cost-effectiveness of AABT+→CT vs CT alone in the detection of breast cancer.

Figure 1. Cost-effectiveness of AABT+→CT vs CT alone in the detection of breast cancer.