Beliefs Among Pulmonologists and Thoracic Surgeons in the Therapeutic Approach to Non-small Cell Lung Cancer*

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Study objectives: The physicians who initially evaluate patients with non-small cell lung cancer (NSCLC) strongly impact the course of therapy. Their beliefs in treatment and prognosis may contribute to practices of variable quality and appropriateness. We sought to better describe beliefs among pulmonologists and thoracic surgeons who were selected for guiding early therapy and referrals in patients with NSCLC.

Design: Mail questionnaire focusing on survival estimates, treatment perceptions, and referral patterns.

Participants: Twelve hundred pulmonologists and 800 thoracic surgeons who were clinically active members of the American College of Chest Physicians.

Measurements and results: Response rates of 50% for pulmonologists and 52% for thoracic surgeons were obtained after two mailings. Five-year survival estimates for patients with resected stage I NSCLC revealed that 30% of respondents overestimated survival rates and 18% underestimated survival rates. The underestimation of survival rate was found among more respondents who are practicing pulmonology than thoracic surgery (22% vs 0.10%, respectively), who were trained before 1980 than after 1980 (29% vs 0.10%, respectively), and who were seeing < 10 lung cancer patients annually than those who were seeing > 25 (31% vs 0.14%, respectively). Beliefs in the survival benefit of adjuvant chemotherapy or of radiation in stage I-III disease divided respondents within both specialties. Chemotherapy plus radiation vs radiation alone in unresectable stage IIIA-B NSCLC was viewed as benefiting survival less often by physicians seeing < 10 lung cancer patients annually rather than > 25 (57% vs 0.77%, respectively) and by physicians underestimating rather than correctly estimating survival in early-stage disease (58% vs 0.72%, respectively). Chemotherapy was believed to confer survival benefits in patients with stage IV disease by one third of respondents.

Conclusions: Certain physician characteristics, particularly the length of time since training and NSCLC patient volume, are associated with beliefs not conclusively supported in the medical literature or with opinions inconsistent within and between specialties.

Key words: attitudes; carcinoma; clinical practice patterns; lung cancer; non-small cell physician knowledge; physician surveys; practice

Abbreviations: ACCP = American College of Chest Physicians; CXR = chest radiograph; NSCLC = non-small cell lung cancer

Lung cancer remains the leading cause of cancer-related deaths for both men and women in the United States. In 1999, > 160,000 deaths due to lung cancer are expected in this country.1 The combination of overall 5-year survival estimates ranging as low as 10 to 15% and studies from the early 1980s indicating that alkylating agents in lung cancer therapy actually reduce survival have served to establish a general pessimism regarding lung cancer prognosis and therapy.2,3 Clinical trials investigating the treatment of non-small cell lung cancer (NSCLC) have shown significant improvement in survival with the use of new chemotherapeutic agents and multimodality treatment; however, the adoption of practices reflecting these findings does not appear pervasive among US physicians.4

It is speculated that physician attitude may influence treatment recommendations while also contributing to practice variation both within and between specialties. In particular, a nihilistic perspective toward the prognosis of patients with NSCLC may...
result in both the underuse of potentially beneficial therapies and a delay in the widespread adoption of newer therapies. Conversely, an overly optimistic perspective toward prognosis also may result in the underuse of therapy if it is deemed superfluous. Therefore, we sought to depict the actual beliefs regarding therapy and prognosis among physicians commonly diagnosing and recommending treatment to patients with NSCLC. We compared these beliefs among physicians by specialty, patient volume, years since training, practice setting, and relative optimism toward survival. In this study, physicians practicing in the United States within the fields of pulmonary medicine or thoracic surgery were questioned about their opinions regarding diagnostic tools, treatment modalities, and referral preferences in caring for NSCLC patients. Pulmonologists and thoracic surgeons were selected due to their potential for impacting NSCLC treatment by having high concentrations of lung cancer patients within their practices, working with patients early in the diagnosis and treatment of the disease, and serving as referents to other specialists, namely, medical and radiation oncologists.

**Materials and Methods**

**Participants and Survey Instrument**

The eligible group of survey recipients consisted of American College of Chest Physicians (ACCP) physician members practicing adult patient care in either pulmonary medicine or thoracic surgery, as indicated by self-report. Physicians not in active practice within the United States were excluded. From the eligible membership, 1,200 pulmonary medicine specialists and 800 thoracic surgery specialists were randomly selected. This represented 30% of the eligible membership in pulmonary medicine, the primary constituents of the organization. Thoracic surgeons were oversampled to provide an adequate comparison, resulting in a survey of approximately 90% of the eligible ACCP membership who practice thoracic surgery. General internal medicine was not included due to the low concentration of internists treating a large volume of lung cancer patients within the same physician population.

The 15-item survey (Fig 1) examined perceptions about screening chest radiographs (CXRs) and staging tool utility, resected stage I NSCLC prognosis, treatment efficacy, and referral pattern preferences. The survey additionally requested information on respondent gender, completion date of medical training, and practice setting. A second mailing was conducted for nonrespondents approximately 2 months after the initial mailing. The study was closed to all responses postmarked after the date preceding a presentation by several study authors at a national ACCP meeting on subjects relevant to the survey questions.

Responses were included if the physician indicated that she or he provided direct patient care to adults and practiced primarily in either pulmonology or thoracic surgery. A comparison between respondents and a random sample of 10% of the nonrespondents from each specialty was performed based on the completion date of medical training and gender, the two demographic questions on the survey. This information was obtained from respondents by self-report and on nonrespondents from the American Medical Association Web site. American Medical Association data record the year of medical school graduation rather than the completion date of medical training as asked on the survey. Therefore, to estimate the completion date of medical training, 7 years were added to

**Common Beliefs and Referral Patterns in Lung Cancer Therapy**

1. Do you provide direct patient care to adults?  
   - Yes  
   - No  
   - If NO, please stop here and return survey.

2. In which one specialty do you spend the most clinical time?  
   - Pulmonary Medicine  
   - Thoracic Surgery  
   - Internal Medicine  
   - Other

3. How many patients a year do you evaluate with normal or suspected lung cancer?  
   - 0-1  
   - 2-10  
   - 11-25  
   - >25

4. Do you believe screening for lung cancer is appropriate in patients you oversee to be at high risk for lung cancer?  
   - Yes  
   - No

5. In your opinion, what is the optimal method for staging mediastinal lymph nodes?  
   - CT scan  
   - PET scan  
   - Mediastinoscopy  
   - Fine needle biopsy

6. In resected stage I non-small-cell lung cancer (NSCLC), what is your estimate of five-year survival?  
   - 85%  
   - 65%  
   - 45%  
   - 25%

7. In resected early stage NSCLC (IIIA), do you believe:  
   - There is a survival benefit in adjuvant chemotherapy?  
   - Yes  
   - No
   - There is a survival benefit in adjuvant radiotherapy?  
   - Yes  
   - No

8. In unresectable locally advanced NSCLC (IIIA–IIIB), do you believe there is a survival benefit in chemotherapy plus radiotherapy compared to radiotherapy alone?  
   - Yes  
   - No

9. In metastatic NSCLC (IV), do you believe:  
   - There is a survival benefit in chemotherapy?  
   - Yes  
   - No
   - There is a survival benefit in palliative chemotherapy?  
   - Yes  
   - No

10. To which of the following do you think a patient with stage III NSCLC should be referred?  
   - Thoracic Surgery  
   - Medical Oncology  
   - Radiation Oncology  
   - Other

11. To which of the following do you think a patient with stage III locally advanced NSCLC should be referred?  
   - Thoracic Surgery  
   - Medical Oncology  
   - Radiation Oncology  
   - Other

12. To which of the following do you think a patient with stage IV NSCLC should be referred?  
   - Thoracic Surgery  
   - Medical Oncology  
   - Radiation Oncology  
   - Other

13. Completed medical training:  
   - Prior to 1980  
   - 1980-1990  
   - After 1990

14. Principal practice setting:  
   - Solo  
   - Small group (2-5)  
   - Large group (10+)  
   - Academic

15. Gender:  
   - Male  
   - Female

Figure 1. Survey questions on beliefs and referral patterns in lung cancer therapy.
the medical school graduation date for thoracic surgeons and 6 years were added for pulmonologists to account for residency and fellowship.

Statistical Analysis

Data analysis involving comparisons between beliefs in therapy and physician characteristics was performed using Pearson’s $\chi^2$ test. All probability values reflect two-sided tests and were considered statistically significant at $\leq 0.05$. Statistical analysis was performed using computer software (Stata, version 5.0; Stata Corp; College Station, TX).

RESULTS

Response Rates

Similar response rates were obtained from both specialties. There were 594 responses from pulmonologists (50%) and 416 responses from thoracic surgeons (52%). Ineligible responses were received from 17 pulmonologists and 24 thoracic surgeons. The two most common reasons for ineligibility included not being in active practice and not treating lung cancer patients. The sample of nonrespondents in both specialties was comparable to the respondents by the proportions of physicians completing medical training before and after 1980 and by gender.

Respondent Characteristics

General demographic and practice characteristics of respondents from the two specialties are listed in Table 1. Compared to thoracic surgeons, a larger proportion of the pulmonologists graduated after 1980 were women and practiced in large groups of 10 physicians. The two specialties, however, reported similar case volumes of patients known or suspected to have lung cancer, with 60% from both specialties claiming to evaluate 25 such patients annually. These differences in physician and practice characteristics also were noted in relation to time since medical training completion, as would be expected based on general trends in the medical workforce. A much larger proportion of women respondents completed medical training after 1980 than men (87% of women vs 59% of men). A pattern of fewer younger doctors entering solo practice with a corresponding increase in group practice participation also was witnessed. The proportion of doctors working in solo practice decreased by 40% between those physicians completing medical training before 1980 and those completing training after 1980 (22% before 1980 vs 13% after 1980). In contrast, academic physicians comprised 25% of respondents regardless of the time of training completion. Differences between practice settings and the volume of lung cancer patients treated annually were seen in that 50% of solo practitioners, 61% of academic physicians, and 66% of doctors practicing in a large-group setting saw > 25 such patients each year ($p < 0.01$).

Beliefs in Screening and Staging

Participants were asked whether they believed in screening those patients who were perceived to be at high risk for developing lung cancer; a definition of “high risk” was not given in the survey. The majority of respondents (75%) answered that they did think this practice was warranted. This belief was found to be higher among thoracic surgeons than pulmonologists (85% vs 67%, respectively; $p < 0.001$). No difference was identified in screening beliefs between physicians completing training before 1980 or after 1980; screening was advocated by > 70% of physicians in both groups. The practice setting of the respondents appeared to be associated with screening beliefs; 77% of small-group, large-group, or health maintenance organization physicians believed screening to have merit in comparison to 67% of academic physicians and 74% of solo practitioners ($p = 0.06$).

As the optimal method of staging mediastinal lymph nodes, > 65% of both specialties indicated mediastinoscopy as their first choice over CT scan, positron emission tomography scan, and transbron-
chial needle biopsy. CT scan constituted the second most common choice, with > 20% of both groups selecting this option. Physicians completing medical training before 1980 were more likely to select CT scan as an optimal method for staging mediastinal lymphadenopathy than those finishing after 1980 (31.5% vs 19%, respectively; p < 0.001); however, both groups still indicated mediastinoscopy most often as the optimal method.

Survival Estimates

To quantify a parameter of nihilism or optimism about NSCLC prognosis, study participants were asked to estimate 5-year survival rates among patients with resected stage I NSCLC, which presumably would offer the highest survival potential. Choices of 85%, 65%, 45%, and 25% 5-year survival rate estimates were provided. The proportion of respondents selecting each choice is represented in Table 2. If the closest estimate documented in the literature of 65% is accepted, it is notable that approximately 30% of both specialties overestimated the survival rate. In contrast, 22% of pulmonologists and 10% of thoracic surgeons underestimated the survival rate (p < 0.001).

Physicians who were more pessimistic about 5-year survival rates in patients with resected stage I NSCLC, defined as estimating survival at 45% or 25%, were significantly more likely to have completed training before 1980, to have seen < 10 lung cancer patients per year, and to practice in a nonacademic setting. No differences in survival rate estimates were identified based on physician gender.

### Table 2—Estimated 5-Year Survival Rates for Resected Stage I Disease Selected by Proportion of Respondents Categorized by Various Characteristics*

<table>
<thead>
<tr>
<th>Respondent Characteristics</th>
<th>45% and 25%</th>
<th>65%</th>
<th>Chi-Square and p Value†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician specialty</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulmonary medicine</td>
<td>29</td>
<td>49</td>
<td>22</td>
</tr>
<tr>
<td>Thoracic surgery</td>
<td>32</td>
<td>58</td>
<td>10</td>
</tr>
<tr>
<td>Completion of medical training</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before 1980</td>
<td>24</td>
<td>47</td>
<td>29</td>
</tr>
<tr>
<td>After 1980</td>
<td>34</td>
<td>56</td>
<td>10</td>
</tr>
<tr>
<td>Annual caseload of lung cancer patients</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 10</td>
<td>29</td>
<td>40</td>
<td>31</td>
</tr>
<tr>
<td>10–25</td>
<td>28</td>
<td>53</td>
<td>19</td>
</tr>
<tr>
<td>&gt; 25</td>
<td>31</td>
<td>55</td>
<td>14</td>
</tr>
<tr>
<td>Practice setting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solo</td>
<td>35</td>
<td>41</td>
<td>24</td>
</tr>
<tr>
<td>Small group (2–9)</td>
<td>32</td>
<td>51</td>
<td>17</td>
</tr>
<tr>
<td>Large group (&gt; 10)</td>
<td>28</td>
<td>52</td>
<td>20</td>
</tr>
<tr>
<td>HMO</td>
<td>45</td>
<td>45</td>
<td>10</td>
</tr>
<tr>
<td>Academic</td>
<td>24</td>
<td>62</td>
<td>14</td>
</tr>
</tbody>
</table>

*See Table 1 for other abbreviation.

†p value reflects χ² comparison of three survival estimates between each category of respondent characteristic.

### Treatment Beliefs

In order to evaluate beliefs pertaining to treatment efficacy, therapy options were offered by stage of disease and by benefit in survival or palliation. The results of these survey items are reported by physician specialty and time of training in Table 3 and by survival optimism for stage I disease and lung cancer patient volume in Table 4. Just over half of all respondents believed that adjuvant chemotherapy, but not adjuvant radiotherapy, yielded a survival benefit to patients with resected stage I-IIIA NSCLC. Pulmonologists were significantly more likely than thoracic surgeons to believe in the efficacy of either therapy (Table 3). Interestingly, both specialties appeared generally divided regarding the survival benefit of adjuvant chemotherapy or radiotherapy in stage I-IIIA disease. Since nearly 50% of physicians responded both “yes” and “no” to these questions, no distinct majority opinion prevailed in either specialty. Physicians who completed training after 1980 believed that adjuvant chemotherapy conferred a survival benefit in stage I-IIIA disease more frequently than did physicians who completed training before 1980 (Table 3). This association, however, did not apply to beliefs about adjuvant radiotherapy in stage I-IIIA. Lung cancer patient volume was not affiliated with particular belief patterns about early-stage disease. Physicians indicating increased optimism toward prognosis for patients with resected stage I disease also tended to believe more frequently that adjuvant chemotherapy bore a survival benefit in stage I-IIIA NSCLC (Table 4). This trend did not apply to beliefs about adjuvant radiation therapy offering a survival benefit in stage I-IIIA.

For treating unresectable stage III NSCLC, the combination of chemotherapy plus radiation was believed to be more efficacious in improving survival than radiation alone by 70% of respondents overall with no significant difference between the two specialty groups or between groups finishing training before or after 1980 (Table 3). The most marked associations were noted by case volume and survival estimates (Table 4). Physicians seeing larger volumes of lung cancer patients were more likely to espouse combination therapy as being beneficial than those physicians seeing fewer lung cancer patients. Similarly, those physicians who had correctly estimated...
or had overestimated the 5-year survival rate for stage I disease were significantly more likely to believe that combination therapy was beneficial for unresectable stage III NSCLC than those who demonstrated greater pessimism toward prognosis.

Approximately a third of respondents believed that chemotherapy bears a survival benefit for patients with stage IV disease. Although no difference was seen in this opinion between the two specialties, a somewhat greater proportion of physicians completing their training after 1980 accepted this therapy as efficacious than did those physicians completing training before 1980 (Table 3). Time since training, however, was not associated with beliefs about chemotherapy providing a palliative benefit in metastatic NSCLC. Thoracic surgeons were more likely to support chemotherapy for palliation than were pulmonary medicine specialists (Table 3). Increasing patient volume was found to correspond with a belief in chemotherapy extending both survival and palliation benefits in stage IV disease (Table 4). Survival optimism for early-stage disease was not associated with a higher proportion of respondents believing in the efficacy of chemotherapy for survival or palliative benefit in stage IV NSCLC (Table 4). Practice setting did not demonstrate any strong associations with treatment beliefs.

Referral Patterns

Referral patterns were evaluated by asking, for a given stage of disease, whether a physician would refer a patient to any combination of a thoracic surgeon, medical oncologist, radiation oncologist, hospice, or other. The percentage of physicians indicating that they would refer patients to a certain specialist, categorized by physician specialty and completion of medical training, is recounted in Table 4—Respondents Believing in Treatment Benefit by Survival Estimate and Patient Volume.*

<table>
<thead>
<tr>
<th>Treatment Belief</th>
<th>Survival Estimate for Stage I Disease</th>
<th>p Value†</th>
<th>Completion of Medical Training</th>
<th>p Value†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survival benefit with adjuvant chemotherapy in stage I-IIIA?</td>
<td>61 55 50</td>
<td>0.07</td>
<td>54 52 57</td>
<td>0.39</td>
</tr>
<tr>
<td>Survival benefit with adjuvant radiotherapy in stage I-IIIA?</td>
<td>45 42 44</td>
<td>0.66</td>
<td>46 44 42</td>
<td>0.59</td>
</tr>
<tr>
<td>Survival benefit with chemotherapy plus radiotherapy vs radiotherapy alone in unresectable stage IIIA-IIIB?</td>
<td>76 72 58</td>
<td>&lt; 0.001</td>
<td>57 64 77</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Survival benefit with chemotherapy in stage IV?</td>
<td>36 33 29</td>
<td>0.31</td>
<td>22 33 36</td>
<td>0.02</td>
</tr>
<tr>
<td>Palliation benefit with chemotherapy in stage IV?</td>
<td>61 67 61</td>
<td>0.19</td>
<td>56 61 67</td>
<td>0.04</td>
</tr>
</tbody>
</table>

*Values given as the percentage responding “yes” to treatment belief question.
†p values refer to χ² comparisons of respondents answering “yes” to a treatment belief statement in each category of physician characteristic.
5. The most common written-in explanation for “other” was a form of multidisciplinary team. The referral patterns indicate that there is a considerable unanimity for thoracic surgery being appropriate in early-stage disease and a clear majority advocating medical oncology referrals in stage III and stage IV disease. Greater uncertainty was seen for the role of radiation oncology in stage III and stage IV disease and for the role of thoracic surgery in stage III disease, as evidenced by the fact that approximately 50% of respondents selected such referrals and 50% did not. Interestingly, approximately 30% of respondents indicated that they would refer a patient with stage IV disease to a hospice, although most had suggested earlier that they believed chemotherapy offered primarily a palliative benefit rather than a survival benefit in stage IV disease.

**DISCUSSION**

This study demonstrates that NSCLC treatment beliefs among pulmonologists and thoracic surgeons vary in association with particular physician characteristics, do not consistently reflect evidence within the medical literature, and at times lack uniformity across and between specialties. A nihilistic attitude toward prognosis, as extrapolated from underestimating the 5-year survival rate for resected stage I disease, was not found to be as pervasive as anticipated. Pessimism toward prognosis was associated with physician training and experience. Lower survival rate estimates were affiliated with physicians practicing pulmonary medicine, having completed training before 1980, and seeing < 25 lung cancer patients annually. Beliefs related to the efficacy of therapy in various stages of NSCLC revealed a trend toward the more pessimistic respondents being less often convinced of the benefit of chemotherapy than those respondents who were less pessimistic. This tendency was not seen for radiation therapy or for palliative applications of chemotherapy. The completion of medical training followed a similar pattern. Physicians trained prior to 1980 were distinct from their more recently trained counterparts in that chemotherapy was less often viewed as beneficial to survival but radiation therapy and palliative chemotherapy were viewed equally by both groups.

The role of chemotherapy in the management of NSCLC is well-established. In stage IV NSCLC, chemotherapy prolongs survival and provides relief of symptoms in a significant percentage of patients. In unresectable stage III NSCLC, the addition of chemotherapy to thoracic radiation clearly improves the long-term survival rate. Our findings reveal

<table>
<thead>
<tr>
<th>Referral Use</th>
<th>Physician Specialty</th>
<th>Completion of Medical Training</th>
<th>p Value†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I/II</td>
<td></td>
<td></td>
<td>p Value†</td>
</tr>
<tr>
<td>Thoracic surgery</td>
<td>94</td>
<td>99</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Medical</td>
<td>35</td>
<td>23</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Radiation Oncology</td>
<td>17</td>
<td>13</td>
<td>0.13</td>
</tr>
<tr>
<td>Radiation Oncology</td>
<td>0</td>
<td>1</td>
<td>0.70</td>
</tr>
<tr>
<td>Hospice</td>
<td>0</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Stage III</td>
<td></td>
<td></td>
<td>p Value†</td>
</tr>
<tr>
<td>Thoracic surgery</td>
<td>43</td>
<td>65</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Medical</td>
<td>53</td>
<td>73</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Radiation Oncology</td>
<td>58</td>
<td>55</td>
<td>0.47</td>
</tr>
<tr>
<td>Radiation Oncology</td>
<td>5</td>
<td>3</td>
<td>0.09</td>
</tr>
<tr>
<td>Hospice</td>
<td>5</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Stage IV</td>
<td></td>
<td></td>
<td>p Value†</td>
</tr>
<tr>
<td>Thoracic surgery</td>
<td>3</td>
<td>11</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Medical</td>
<td>71</td>
<td>80</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Radiation Oncology</td>
<td>53</td>
<td>54</td>
<td>0.83</td>
</tr>
<tr>
<td>Radiation Oncology</td>
<td>35</td>
<td>25</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

*Values given as the percentage responding “yes” to referral use. Each respondent could select one or more of the referral options, and, therefore, they do not add up to 100%.
†p values refer to χ² comparisons of proportions of respondents preferring each type of referral by each category of physician characteristic.
some prevalent opinions among the participant population that are not conclusively supported in the medical literature. For example, only 33% of respondents overall claimed to be convinced that chemotherapy grants a survival benefit in patients with stage IV disease. This positive effect has been demonstrated sufficiently in trials and meta-analyses and has been adopted as recommended therapy in the American Society of Clinical Oncology guidelines.\(^6,7\) However, the majority of physicians (71%) espoused the use of chemotherapy plus radiation in patients with unresectable stage IIIA/IIIB NSCLC over radiation alone. This combination therapy has been recommended in the same guidelines.\(^7\)

Other beliefs regarding therapy reflected uncertainty within the profession. The role of adjuvant chemotherapy remains controversial and is not routinely recommended in patients with resected early-stage NSCLC.\(^10\) However, it is well-established that adjuvant thoracic radiation therapy reduces local recurrences but confers no survival benefit.\(^11\) The responses of pulmonologists and thoracic surgeons were essentially divided as to whether adjuvant chemotherapy or radiation offered a survival benefit in patients with resected early-stage disease. This equivocal response for therapy in stage I-IIIA disease persisted regardless of whether the respondents were characterized by training period, case volume, or survival optimism. This demonstrates inconsistencies in beliefs not only between specialties but also within one specialty.

It is of interest that 75% of respondents thought that screening was appropriate for patients thought to be at high-risk. We did not provide a definition for “high-risk” as we wanted to leave this to the respondents’ judgment. It is well-known that the following factors connote a higher risk for the development of lung cancer: smoking; COPD; exposure to occupational carcinogens such as asbestos; prior tobacco-related cancer; family history; and female gender.\(^12,13\) The issue of screening for lung cancer with a plain CXR has not been addressed directly. In a review by Strauss et al.,\(^14\) the four trials published to date have been extensively reviewed. All examined the addition of sputum cytology testing to CXR or less vs more frequent screening with sputum cytology testing and a CXR. All the studies included only men >40 years, and all were reported as negative regarding any benefit in survival for this approach. Although screening with CXRs did detect more stage I lung cancers, the overall lung cancer mortality rate was not changed. Therefore, the role of screening CXRs remains controversial. It may be that the reasons that 75% of respondents choose to screen with a CXR are the following: (1) a better understanding of risk factors; (2) detection of more lung cancer in stage I; and (3) the perceived benefit that the patient may gain from a low-cost, low-intervention procedure.

Several reports have documented the ability of low-radiation-dose screening spiral CT (low-dose CT) to detect lung cancer at an early stage. In a study by Kaneko et al.,\(^15\) 1,369 individuals underwent a low-dose CT scan, a CXR, and a cytologic examination of sputum. In 701 individuals, an abnormality was detected on either low-dose CT or CXR, and 229 of the 701 individuals were evaluated further using thin-section CT scanning of the chest. After undergoing thin-section CT scans, 19 of the 229 patients (8.3%) were referred for lung biopsy, and the rest underwent biannual follow-up evaluations. Of the 19 patients who underwent biopsies, primary lung cancer was revealed in 15. While all 15 cancers had been detected on low-dose CT scans, only 4 of these lesions were detected on CXRs. Of the 15 lung cancers detected by low-dose CT scanning, 14 (93%) were stage I (mean diameter, 1.6 cm; range, 0.8 to 3.5 cm). In another Japanese study, Sone and colleagues\(^16\) screened 5,483 individuals with CXRs and low-dose CT scans. Of these, 223 individuals were found to have indeterminate or suspicious lesions. Twenty-one lesions were resected, and 19 of them were histologically proven lung cancer. Of these 19 tumors that were detected by CT scans and confirmed to be lung cancers by histology testing, 16 were stage I tumors. The Early Lung Cancer Action Project\(^17\) screened 1,000 symptom-free volunteers (46% women) with CXR and low-dose CT scanning. Noncalcified nodules were detected in 233 participants (23%; 95% confidence interval, 21 to 26%) by low-dose CT scans compared to only 68 participants (7%; 95% confidence interval, 5 to 9%) by CXR. Thus, among the whole study population, a positive result was found three times more commonly on low-dose CT scan than on CXR. In 27 of the 233 participants (12%) found to have nodules on low-dose CT, the nodules turned out to be malignant, while only 7 of the 68 participants (10%) found to have nodules on CXR were found to have malignant disease, making the prevalence rate of malignant disease detected by low-dose CT scan four times higher than that of CXR (2.7% vs 0.7%, respectively). Of the 27 malignant tumors detected on low-dose CT scan, 23 (85%) were stage I (stage IA, 22; stage IB, 1). Only four of the stage I tumors were detected on CXR, thus, stage I tumors were detected six times more frequently on low-dose CT scans than on CXRs (2.3% [range, 1.5 to 3.3%] vs 0.4% [range, 0.1 to 0.9%], respectively). These data suggest that low-dose spiral CT scanning of the chest is more effective than chest radiography in detecting lung cancer. The ultimate role of this modality in screen-
ing for lung cancer remains to be determined. The concept of screening with low-dose spiral CT scanning has led to a new optimism regarding the role of screening, which also may have impacted the response to the screening question.

In extrapolating implications from this study, two key assumptions become necessary: first, beliefs about therapy reflect knowledge about therapy; and, second, beliefs about therapy influence actual practice. It is speculated that physician attitude toward the disease and the available therapies may color treatment recommendations. In the current study, 30% of doctors overestimated and 18% of doctors underestimated the 5-year survival rate of a patient with resected stage I disease. Of interest is whether or not either belief results in the overuse or underuse of a potentially beneficial therapy. A correlation between belief in prognosis and treatment recommendations was found among Canadian physicians studied in 1993. This survey study further confirmed that some physician beliefs regarding treatment efficacy in NSCLC care did not reflect the results of a randomized, controlled trial studying these therapies.18 A separate survey study of British physicians again identified that physician beliefs did not resonate with current medical knowledge and portrayed a more negative impression of NSCLC prognosis than the results of other trials would warrant.19 Another study, also of Canadian physicians, dating from the late 1980s, demonstrated that remarkably few doctors would wish chemotherapy for themselves given hypothetical situations of disease stage.20,21

Among US physicians, two survey studies have been conducted using the ACCP membership. The first, conducted in 1985, assessed treatment beliefs and practice patterns among approximately 930 members. No explanation was provided regarding which members were included in the survey, but 70% of respondents were classified as surgeons. This study concluded that unanimity of opinion was missing in many areas of lung cancer treatment, that many respondents have not appreciably altered their beliefs with regard to lung cancer since leaving training, and that surgeons displayed more optimism about survival rates than the nonsurgeons.22 The actual treatment beliefs recounted in the study predate many important trials. A more recent study was conducted in 1996–1997 and presented 350 physicians from five different specialties with five clinical scenarios. The responses indicated considerable variability in treatment recommendations and perceived treatment efficacy both within and between specialties, a finding that our study supports. The participants also attested that the most influential factors in their clinical choices were perceived outcomes such as the chance of success with therapy or the impact on quality of life with therapy.4 Given this result that physicians claim that their perceptions of efficacy and benefit do impact clinical choices, an understanding of prevalent beliefs becomes important and offers potential insight into the underlying sources of practice variation.

This study has several limitations. It offers only a cursory profile of treatment beliefs. The questions focused on general applications of therapeutic or diagnostic modalities in nonspecific clinical situations. Such questions cannot, of course, mirror the complex considerations that enter into medical decision making. Furthermore, we made an assumption that a pessimistic attitude toward prognosis in a disease stage with the best possible survival potential would be representative of an attitude toward survival in other stages as well. However, it is uncertain whether such a measure would systematically influence treatment beliefs in more advanced disease.

A 1998 article appealed to the medical community to change its nihilistic attitude toward the prognosis of patients with NSCLC in light of new chemotherapy studies.3 For the state of knowledge to advance, an understanding of why beliefs within the profession reflect clinical uncertainty and are not necessarily consistent with published data, even given reasonable time for information dissemination, is important. Progress toward that objective has been made in a study by Brundage and Mackillop,23 which evaluates how well controversial and important questions facing NSCLC care are answered in existing clinical trials. An additional goal of future study includes a better understanding of how physician beliefs about therapy and prognosis translate into actual practice.

References


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