Diagnosis of Airflow Limitation Combined With Smoking Cessation Advice Increases Stop-Smoking Rate*

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Objectives: To assess how the diagnosis of airflow limitation (AL) combined with advice to stop smoking in middle-aged smokers influence the smoking cessation rate and to identify predictors of successful outcome.

Design: Prospective, single-center, comparative study of the effects of smoking intervention in smokers with diagnosed AL and in smokers with normal lung function (NLF).

Setting: University hospital, out-patient clinic.

Participants: Of 659 smokers participating in a population spirometric screening for COPD combined with smoking cessation advice, 558 (AL, 297 smokers; NLF, 261 smokers) were invited for a follow-up after 1 year.

Intervention: At follow-up, spirometry was repeated and smoking status was assessed. Nonsmoking status was validated with carbon monoxide measurements in exhaled air. Patients who did not come for the follow-up visit were considered to be smokers.

Results: Of 558 smokers invited, 368 (66%) presented for the follow-up visit. All had tried to reduce their smoking habit. The number of cigarettes smoked per day (cpd) at 1 year was 5.2 (p < 0.01) in patients with AL and 2.7 (not significant [NS]) in those with NLF. The 1-year cessation rate in smokers with AL was 10.1% vs 8.4% in smokers with NLF (NS). After stratifying the patients according to AL severity, the highest cessation rate was observed in smokers with moderate and severe AL (16.5%) compared to smokers with mild AL (6.4%; p < 0.001) and smokers with NLF (8.4%; p < 0.05). In a univariate analysis, the cessation of smoking was correlated with older age (p < 0.001), later age when starting smoking (p < 0.005), lower tobacco exposure (in pack-years; p < 0.01), fewer cpd (p < 0.001), and lower lung function (p < 0.05). No interaction effect was observed for any of the studied variables using two-way analysis of variance. In a stepwise logistic regression analysis, age (p < 0.001), tobacco exposure (in pack-years; p < 0.001), and FEV1 percent predicted (p < 0.01) proved to be significant predictors of success in stopping smoking.

Conclusion: All smokers, irrespective of their lung function, tried to modify their habit as the result of screening for COPD combined with smoking cessation advice. The diagnosis of AL motivated smokers to attempt to quit smoking. Older age, lower tobacco exposure, and lower lung function were the predictors of success in quitting smoking.

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Key words: airflow limitation; asymptomatic smokers; smoking cessation advice; spirometric screening

Abbreviations: AL = airflow limitation; ANOVA = analysis of variance; CI = confidence interval; CO = carbon monoxide; cpd = cigarettes per day; FNDT = Fagerström nicotine dependence test; LHS = Lung Health Study; NLF = normal lung function; OR = odds ratio; SR = sustained release

Population spirometric screening in middle-aged smokers in Poland proved to be an effective method for the early diagnosis of COPD. With this method, up to 30% of smokers aged ≥ 40 with an exposure to tobacco smoke of > 10 pack-years were found to present with airflow limitation (AL).1

Tobacco smoking is responsible for the majority (> 80%) of all cases of COPD2 and causes the

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relentless progression of the disease. Smoking cessation is a central part of early diagnosis and prevention of the disease. The minimal intervention (the “four A” method) was demonstrated as a cost-effective incentive for a substantial number of smokers to modify their habit. However, only a small proportion (2 to 5%) of smokers quit for at least 1 year. Our own preliminary results have suggested that the 1-year cessation rate among smokers who participated in spirometric screening was substantially higher in those with newly diagnosed AL (15%) than in smokers with normal lung function (NLF; 4.5%). These results compared favorably with the results of minimal and brief interventions from Europe and North America.

We hypothesized that the diagnosis of COPD, as documented by abnormal spirometry findings, would increase the smoking cessation rate. The aim of the study was to assess whether the diagnosis of AL combined with a doctor’s advice to stop smoking in middle-aged smokers influences the cessation rate, and to identify the predictors of successful outcome.

Materials and Methods

The study was performed at the outpatient clinic of the Institute of Tuberculosis and Lung Diseases in Warsaw, Poland. The methods of the spirometric screening have been described previously. In brief, since 1999 pulmonary physicians in Poland have been performing screenings for COPD in pulmonary outpatient clinics. Local television, radio, and newspapers spread information on the causes and symptoms of COPD. Free-of-charge spirometry testing was offered to smokers who were aged ≥ 40 years with a history of > 10 pack-years of smoking. However, all people who presented for spirometry were accepted. Our clinic was one of the participating centers.

Spirometric measurements (α 3 spirometer; Vitalograph; Maidenhead, UK) were taken by experienced technicians according to American Thoracic Society recommendations. FVC and FEV₁ were measured. The reference values were those of the European Community for Coal and Steel, which have been approved by the European Respiratory Society. The FEV₁/FVC ratio was calculated. The pattern of ventilatory impairment and severity of AL was classified according to the European Respiratory Society Guidelines. The obstructive pattern was diagnosed when the FEV₁/FVC ratio was < 85% of the predicted normal value. The severity of the airway obstruction was categorized as mild (FEV₁ ≥ 70% of normal), moderate (FEV₁ 50 to 69% of normal), and severe (FEV₁ < 50% of normal).

The results of spirometry testing (in absolute values and percentage of predicted values) were recorded in a small booklet entitled the Lung Health Card, which was presented to each subject who was screened. The booklet included basic recommendations related to the result of spirometry. One part of the booklet was devoted to smoking habits, including a suggestion to enter the patient’s actual smoking status every 3 months. In the spirometric part of the booklet, there was a place for multiple future entries.

While waiting to undergo spirometry testing, subjects filled out a short questionnaire concerning their smoking habits. Variables such as age at the time they had started smoking, the number of cigarettes per day (cpd) smoked, and the length of the smoking habit were evaluated. The number of pack-years smoked was calculated. Subjects also answered a modified Fagerström nicotine dependence test (FNNDT), and the score was calculated.

All subjects, while receiving the Lung Health Card, were reviewed by a physician who was participating in the study, who explained the relationship between the results of individual’s spirometry tests and their smoking habit using the modified graph of Fletcher and Peto, strongly advising every smoker to stop smoking, and finally presented them with a booklet containing information about the harmful effects of smoking and advice on how to stop smoking. Smokers with abnormal spirometry findings were advised to visit a family physician for further evaluation and were given an appropriate referral letter.

After 1 year, a follow-up visit was arranged. Smokers with obstructive ventilatory impairment that had been detected in the preceeding year and smokers with NLF were twice invited by letter for a second free-of-charge session of spirometry testing and an assessment of their smoking habits during the previous 12 months. Subjects again filled out a questionnaire concerning their smoking habits. The results of the spirometry testing were entered into the Lung Health Card.

In both groups, the effects of smoking cessation advice were assessed. The smoking cessation rate was calculated in smokers with AL and with NLF. Sustained smoking cessation was defined as self-reported tobacco abstinence for at least 1 year. The entries concerning smoking habits were inspected in the Lung Health Card. Nonsmoking status was validated during the follow-up visit by carbon monoxide (CO) measurements in the exhaled air (MicroCO; Micro Medical Ltd; Rochester, UK). A concentration of CO ≥ 10 ppm indicated that the subject was a current smoker. The subjects were naïve to the method of CO validation before the follow-up visit. Subjects who had permanently or temporarily quit smoking were considered to be modifiers of their habit. All subjects who did not attend the follow-up visit were considered to be continuous smokers. Factors related to success in smoking cessation were evaluated.

The demographics of the investigated subjects, the results of the smoking questionnaires, and the spirometric measurements were entered into the database created for the research work, and were analyzed using a statistical software package (Statistica; SAS Institute; Cary, NC). Descriptive statistics were calculated using the mean ± SD. For categorized data, the χ² test was applied. For continuous data, one-way and multivariate analysis of variance (ANOVA) were used. Two-way ANOVA for differences between quitters and nonquitters was performed using AL-NLF as the second stratifying variable. A multivariate logistic regression analysis was performed to investigate the relationship of different variables with the sustained cessation rate. The dependent diagnosis was the quit rate, and the independent variables were as follows: gender; age coded as < 55 vs ≥ 55 years; tobacco consumption coded as < 20 vs ≥ 20 pack-years; FNNDT score coded as < 7 vs ≥ 7; and FEV₁ percent predicted coded as < 88% vs ≥ 88% of predicted. In post hoc analyses the Tukey test was used. For correlations, Pearson coefficients were prepared. Statistical significance was considered to be present at p < 0.05.

Results

The trial profile is presented in Figure 1. Of a total of 1,158 subjects screened in 1999, a restrictive...
pattern of ventilatory impairment was diagnosed in 43. Of the remaining 1,115 subjects, 659 were current smokers, 322 were ex-smokers, and 34 were never smokers. AL was diagnosed in 478 subjects (41.3%).

Of 558 subjects invited for a follow-up (AL, 297 subjects; NLF, 261 subjects [acting as controls]), 368 subjects attended (66%). A similar proportion of those invited (53%) and those who attended (52%) had AL. There were no differences in sex (p = 0.18), smoking habit (cpd, p = 0.553; pack-years, p = 0.38), and lung function (FEV₁ percent predicted, p = 0.49; FEV₁/FVC percent predicted, p = 0.841) between those who attended the follow-up and those who were lost to follow-up (n = 190), except for the variable of age (56.5 ± 10.9 vs 52.8 ± 11.1 years, respectively; p < 0.001).

The study entry demographics, lung function, and smoking habits of 558 smokers categorized to have

![Figure 1. Trial profile.](http://journal.publications.chestnet.org/pdfaccess.ashx?url=/data/journals/chest/21995/)

| Table 1—Baseline Characteristics and Smoking Habit Data in Smokers With NLF and AL* |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| Variables                       | NLF (Control Subjects) | AL              |                 |                 |                 |
|                                 | Smokers (n = 239) | Quitters (n = 22) | Smokers (n = 267) | Quitters (n = 30) | Total (n = 558) |
| Sex, No.                        |                  |                 |                  |                 |                 |
| Male                            | 132              | 15              | 149              | 14              | 310             |
| Female                          | 107              | 7               | 118              | 16              | 248             |
| Age, yr                         | 53.2 ± 10.8      | 60.1 ± 10.8     | 56.1 ± 11.2      | 60.7 ± 8.3      | 55.2 ± 11.1     |
| Age at starting smoking, yr     | 19.2 ± 5.7       | 22.5 ± 7.8      | 19.5 ± 5.4       | 21.7 ± 4.8      | 19.6 ± 5.7      |
| FVC L                           | 4.00 ± 1.1       | 3.91 ± 1.0      | 3.82 ± 1.3       | 3.26 ± 1.1      | 3.86 ± 1.2      |
| % of normal                     | 108.5 ± 15.5     | 104.4 ± 12.9    | 105.1 ± 23.0     | 97.0 ± 21.4     | 106.1 ± 19.9    |
| FEV₁ L                          | 3.17 ± 0.84      | 3.02 ± 0.74     | 2.25 ± 0.86      | 1.92 ± 0.79     | 2.65 ± 0.97     |
| % of normal                     | 103.8 ± 15.5     | 100.5 ± 10.7    | 75.7 ± 21.3      | 65.9 ± 22.0     | 88.3 ± 23.4     |
| FEV₁/FVC, % predicted           | 96.7 ± 7.7       | 96.7 ± 5.8      | 71.2 ± 11.8      | 66.3 ± 13.1     | 82.8 ± 16.5     |
| No. cpd                         | 18.7 ± 7.7       | 13.2 ± 7.9      | 19.7 ± 8.5       | 17.7 ± 10.0     | 18.9 ± 8.3      |
| Pack-years                      | 31.0 ± 15.6      | 22.1 ± 17.6     | 34.5 ± 18.4      | 31.6 ± 15.4     | 32.4 ± 17.3     |
| Previous quit attempts          | 0.68 ± 2.1       | 0.66 ± 1.0      | 0.59 ± 2.2       | 1.66 ± 4.5      | 0.7 ± 2.3       |
| FNDT score                      | 4.88 ± 2.4       | 5.00 ± 2.0      | 4.81 ± 2.5       | 4.81 ± 2.6      | 4.9 ± 2.4       |

*Values given as mean ± SD, unless otherwise indicated.
AL and NLF are shown in Table 1. The mean age was 55.2 ± 11.1 years. There were 310 men (56%) and 248 women (44%), who had been exposed to a mean of 32.4 ± 17.3 pack-years, smoking on average 19 cpd. The mean nicotine dependence score was 4.9 ± 2.4 points. The mean interval between the two spirometry-testing sessions was 1.01 ± 0.2 years. In 297 patients with AL, AL at entry was categorized as mild in 188 (63%), moderate in 65 (22%), and severe in 44 (15%).

Of 558 smokers who had been present at the initial spirometric screening, 52 (9.3%) were nonsmokers after 1 year. An additional 45 subjects (8.1%) quit smoking for some time and then resumed the habit. In the AL group, 30 subjects (10.1%) quit for 1 year, and an additional 26 smokers (8.8%) quit temporarily. The number of sustained quitters among smokers with NLF was 22 (8.4%), and temporary cessation was observed in 19 smokers (7.3%). The differences were not statistically significant. Differences in groups of subjects with AL and NLF who succeeded in quitting compared to those who remained smokers were assessed at 1 year, using two-way ANOVA (Table 2). Smokers with AL compared to those with NLF, smoked more cpd (p < 0.05), had been exposed to more pack-years of smoking (p < 0.05), and, as expected, differed significantly in lung function. Smokers who were older (p < 0.001), had started smoking later (p < 0.005), had lower levels of tobacco exposure (ie, number of pack-years; p < 0.01), had consumed fewer cpd (p < 0.001), and had lower lung function (p < 0.05) were more likely to quit smoking. No interaction effect was observed for any of the studied variables.

There was no difference in FNDT score between those who remained smokers after 1 year (4.8 points) and sustained quitters (4.9 points; p = 0.886). However, when the analysis concerned all smokers who had tried to quit compared to those who did not make such an attempt, the modifiers of the habit had a lower score (4.3) than did continuous smokers (5.0; p < 0.05).

There were significant differences in smoking habit and lung function between men and women (Table 3). Women had higher FVC percent predicted values (p < 0.001), higher FEV₁ percent predicted values (p < 0.01), lower tobacco exposure (in pack-years smoked; p < 0.001), and lower number of cpd smoked than men (p < 0.001). They also had started smoking, on average, 2 years later than men (p < 0.001), but they were as dependent on nicotine as were men. A comparable number of men (mean, 29 ± 9.4%) and women (mean, 23 ± 9.3%; not significant) were nonsmokers at follow-up.

In a stepwise logistic regression analysis (Table 4), age (p < 0.001), tobacco consumption (in pack-years smoked; p < 0.001); and FEV₁ percent predicted (p < 0.01) remained in the model and proved to be significant predictors of success in stopping smoking. The odds ratio (OR) and 95% confidence interval (CI) were used to explain the likelihood of abstinence at the follow-up visit after 1 year. For each predictor presented, an OR of 1.0 was used to

Table 2—Statistical Significance of Predictors in Smoking Cessation According to Lung Function*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Men (n = 297)</th>
<th>Women (n = 248)</th>
<th>OR Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, yr</td>
<td>55.5 ± 10.5</td>
<td>54.9 ± 10.5</td>
<td>0.515</td>
</tr>
<tr>
<td>FVC, % predicted</td>
<td>102.9 ± 18.9</td>
<td>110 ± 20.5</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>FEV₁, % predicted</td>
<td>86.1 ± 23.2</td>
<td>91.2 ± 23.4</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>Age at starting smoking</td>
<td>18.7 ± 4.8</td>
<td>20.8 ± 6.3</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>cpd, No.</td>
<td>20.0 ± 8.5</td>
<td>17.5 ± 7.9</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

Table 3—Baseline Characteristics and Smoking Habits in Men and Women*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Men (n = 310)</th>
<th>Women (n = 248)</th>
<th>p Value†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, yr</td>
<td>55.5 ± 11.5</td>
<td>54.9 ± 10.5</td>
<td>0.515</td>
</tr>
<tr>
<td>FVC, % predicted</td>
<td>102.9 ± 18.9</td>
<td>110 ± 20.5</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>FEV₁, % predicted</td>
<td>86.1 ± 23.2</td>
<td>91.2 ± 23.4</td>
<td>&lt; 0.01</td>
</tr>
<tr>
<td>FEV₁/FVC, %</td>
<td>83.1 ± 17.4</td>
<td>82.5 ± 15.3</td>
<td>0.689</td>
</tr>
<tr>
<td>Age at starting smoking, yr</td>
<td>18.7 ± 4.8</td>
<td>20.8 ± 6.3</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>cpd, No.</td>
<td>20.0 ± 8.5</td>
<td>17.5 ± 7.9</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

Table 4—Predictors of Validated Sustained Smoking Cessation and Results of Stepwise Logistic Regression Analysis

<table>
<thead>
<tr>
<th>Variables</th>
<th>β</th>
<th>p Value</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, ≥ 55 vs &lt; 55 yr</td>
<td>0.821</td>
<td>&lt; 0.001</td>
<td>2.26</td>
<td>1.23–4.15</td>
</tr>
<tr>
<td>Pack-years &lt; 20 vs ≥ 20</td>
<td>0.407</td>
<td>&lt; 0.001</td>
<td>1.94</td>
<td>1.04–3.61</td>
</tr>
<tr>
<td>FEV₁ &lt; 88 vs ≥ 88% predicted</td>
<td>0.335</td>
<td>&lt; 0.01</td>
<td>1.61</td>
<td>0.91–2.87</td>
</tr>
</tbody>
</table>

*Values given as mean ± SD, unless otherwise indicated. †ANOVA.
Table 5—Smoking Cessation Rates at 1 Year Among Smokers With AL and Control Subjects

<table>
<thead>
<tr>
<th>Variables</th>
<th>TotalSubjects</th>
<th>AL</th>
<th>Mild AL</th>
<th>Moderate + AL</th>
<th>Severe AL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quitters, No.</td>
<td>52</td>
<td>22</td>
<td>30</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Total subjects, No.</td>
<td>588</td>
<td>261</td>
<td>297</td>
<td>158</td>
<td>109</td>
</tr>
<tr>
<td>Cessation rate, %</td>
<td>9.32</td>
<td>8.43*†</td>
<td>10.10‡</td>
<td>6.38†§</td>
<td>16.51†‡</td>
</tr>
</tbody>
</table>

*p = 0.497 (control subjects vs AL).
*p = 0.42 (control subjects vs mild AL).
*p < 0.05 (control subjects vs moderate and severe AL).
*p < 0.001 (mild AL vs moderate and severe AL).

increase the reference group. Smokers of age ≥ 55 years of age who had been exposed to < 20 pack-years of tobacco smoke were twice as likely to stop smoking than were smokers who were younger and had longer tobacco exposure. Lower lung function (ie, FEV₁, < 88% of predicted value) also predicted greater (OR, 1.61; 95% CI, 0.95 to 2.87) success in smoking cessation. The nicotine dependence score did not predict success in smoking cessation.

Although no significant differences were found in the quit rates between all smokers with AL and NLF, after stratifying the patients with AL according to the disease severity, a much higher smoking cessation rate was observed in smokers with moderate and severe AL (16.5%) compared to those with mild AL (6.4%; p < 0.001) and smokers with NLF (8.4%; p < 0.05) [Table 5]. The highest quit rate (20%) was observed in smokers with moderate airflow obstruction (ie, FEV₁, 69 to 50% of predicted).

The advice to stop smoking resulted in a decrease of cigarette consumption in all investigated subjects, but statistical significance was obtained only in subjects with AL. In this group, the mean number of cpd smoked decreased from 19.8 ± 8.7 to 14.6 ± 10.4 after 1 year (p < 0.001). In control subjects, the mean number of cpd smoked was initially 18.5 ± 8.1 and decreased after a year to 16.0 ± 10.1 (not significant).

**DISCUSSION**

In a population spirometric screening of 11,027 subjects who were at risk for COPD in 12 Polish cities, AL was detected in 30.6% of smokers who were > 39 years of age who had a smoking history of > 10 pack-years.1 Of the patients with AL, 40% had moderate airflow obstruction and 20% had severe airflow obstruction. In our study, AL was diagnosed in 41% of patients who were at risk for COPD, most of whom (63%) were in a mild stage of COPD. It is worth mentioning that these subjects had spirometry performed for the first time in their life and learned only then about their disease.

All current smokers in our study were advised to stop smoking. The advice was individualized, and all were acquainted with the modified graph of Fletcher and Peto4 to visualize the age of their lungs and the perspectives on FEV₁ decline if they stopped smoking or if they continued to smoke. Smokers with AL were strongly warned about the progression of the disease. Smokers with NLF were congratulated that they still had healthy lungs but were warned about the risk of developing COPD in the future if they continued to smoke. The intensity of the advice to stop smoking was intended to be the same in both groups, however, smokers with newly diagnosed disease showed concern about the diagnosis, and this may have affected the results of the study, especially in smokers with moderate and severe COPD.

Smoking intervention preferably should target smokers with NLF or those with mild and moderate disease to prevent the inevitable progression of the disease.6 In the Lung Health Study (LHS),5 an intensive group therapy intervention with behavior-modification techniques and nicotine gum therapy in moderately obstructed patients yielded an exceptionally high cross-sectional success rate of 35% for > 5 years, with a sustained quit rate at the end of the study of 22%. The cross-sectional success rate in usual-care patients was 10% at 1 year and 20% at the end of study. The sustained cessation rate in this group after 5 years was 5%.

In a study of smokers with mild-to-moderate COPD who had been treated with sustained-release (SR) bupropion, the sustained cessation rates at 6 months were 16% for the active treatment group and 9% for placebo group. The success rates were higher in smokers with stage I disease than in those with stage II disease. In our study, 10.1% of patients with AL and 8.4% of smokers with NLF quit smoking for 1 year as the result of simple advice from a physician accompanied by an educational booklet. There were, however, significant differences in the smoking quit rate according to the severity of the AL. The highest quit rate (16.5%) was observed in smokers with moderate and severe airflow obstruction, compared to smokers with mild obstruction (6.4%; p < 0.001) and smokers with NLF (8.4%; p < 0.05).

The observed differences in the average outcome of smoking intervention between our study and the studies mentioned above was probably due to the smoking intervention intensity (ie, minimal intervention in our study, multifactorial intervention in the LHS,5 and the use of SR bupropion together with counseling in the study by Tashkin et al17).

It is interesting to note that in our patients with moderate and severe disease the sustained validated quit rate at 1 year was 16.5%. One should be...
cautious in interpreting these results because of self-reporting and a relatively small number of subjects in that group. However, such an outcome is comparable to that observed in COPD patients who have been treated with SR bupropion. This could be explained by the different criteria of AL severity used in each of the mentioned studies. In the LHS, patients were ineligible if at the second screening examination FEV1 was > 90% of predicted or < 55% of predicted (the latter to exclude individuals with clinical COPD). The SR bupropion study included current smokers with airflow obstruction (FEV1/FVC ratio, < 0.70), with stage I COPD defined as an FEV1 of ≥ 50% of predicted and stage II COPD defined as FEV1 of 35 to 49% of predicted. In our study, we used the staging of AL according to European Respiratory Society guidelines so that our patients with severe disease (ie, FEV1 < 50% of predicted) would correspond to the patients with stage II disease in the study by Tashkin et al., whereas those with moderate AL (ie, FEV1 50 to 69% of predicted) and mild COPD (ie, FEV1 > 70% of predicted) taken together would compare with stage I COPD patients in the SR bupropion study and with patients in the LHS. In our experience, there were striking differences in the rates of stopping smoking among patients with mild AL who had quit smoking at a rate comparable to smokers with NLF, compared to those with moderate and severe COPD. We speculate that this difference can be explained by the appearance of clinical signs of COPD in the more affected patients. We suggest making this group a special target for future antismoking interventions to achieve the best cessation results.

In our study, we evaluated the predictors of success in stopping smoking among smokers who were at risk for COPD. In the univariate analysis, we found that older age, lower exposure to the tobacco smoke (ie, fewer pack-years, fewer cpd smoked, and older age at the start of smoking), as well as lower FEV1 were all correlated with success in smoking cessation. The two-way ANOVA did not show any significant interaction effect. Multiple, stepwise, logistic regression analysis showed that age, tobacco exposure in pack-years, and lung function were related to positive outcomes. In our study, the degree of nicotine dependence did not predict cessation, but a lower dependence score was associated with a quit attempt.

A 2001 study analyzing the predictors of success in stopping smoking among healthy smokers of an earlier study that had evaluated the result of various doses of SR bupropion vs placebo, demonstrated, comparably to our results, that older age and a lower number of cpd smoked were related to success. A lower Fagerström tolerance questionnaire score, contrary to our study, also was related to a successful outcome. Multivariate predictors of abstinence were the longest time previously abstinent from smoking and male gender, and the number of previous attempts to stop smoking independent of the dose of bupropion. Fagerström listed the following factors as being related to better outcomes of smoking cessation: motivation; amount smoked; degree of nicotine dependence; CO measurements; earlier smoking cessation experience; comorbidity; and lung function testing.

From the experience of this study, and also that reported from another city in Poland, it seems that patients with AL are more motivated to quit smoking than are smokers with NLF. Additional random telephone screening of 59 smokers (AL, 30 smokers; NLF, 29 smokers) who did not attend the follow-up (of 115 who had a telephone), revealed an additional 4 quitters with AL compared to no quitters in the NLF group (results not included in the analysis).

The abstinence from cigarette smoking in our study was validated with the measurements of exhaled CO levels. Only those with a CO level of < 10 ppm were considered to be nonsmokers. As CO levels in exhaled breath decrease rapidly from the time of last tobacco use, we performed our study at midday, and the smokers were not informed of the meaning of this measurement before the follow-up visit. For this reason, we are rather confident that the obtained abstinence rates are reliable. Smokers from both groups tried to modify their habits, with some of them quitting smoking for some time (AL group, 8.8%; control subjects, 7.3%) and then resuming smoking, others cutting down the number of cpd smoked. The attempt to quit smoking relied on self-reporting and on the entries in the Lung Health Card.

We think that the relatively high number of smokers who tried to quit smoking or to modify their cigarette consumption, irrespective of the results of the lung function tests, resulted from high health awareness of the participants in the spirometric screening who volunteered to come after receiving mass media information about deleterious effects of smoking on lung health. Also, the performance of spirometry could have had an additional effect on their decision to modify their smoking habit, as described in an analysis of the effectiveness of interventions intended to help people to stop smoking. We also conveyed to all studied subjects firm advice from a physician to stop smoking using a visual presentation of an individual’s lung function and its progress depending on whether smoking is continued or not.

A number of guidelines for the health-care
system have been published on the treatment of tobacco use and tobacco dependence, with no information included however, on the value of spirometry in motivating smokers to quit. A 2000 consensus statement on the value of office spirometry for lung health assessment in adults discussed this issue in more detail, recommending the performance of spirometry to enhance the motivation of smokers to quit. There are, however, conflicting results of the effects of spirometry on stopping smoking. Some older studies have reported that the knowledge of abnormal lung function doubled the chances of quitting smoking, but a 1997 review doubted whether the measurements of lung function enhanced the smoking cessation rates. Two randomized trials demonstrated some additional effect of performing spirometry on smoking cessation rates. An Italian study in 923 smokers showed 1-year smoking cessation rates of 6.5% among those who received counseling combined with spirometry testing, compared to 5.5% among those who received counseling alone and 4.5% among those who received a minimal intervention. The differences were not statistically significant. In a Norwegian study of patients with asbestos exposure, low FEV1 values, and both risks, a personalized letter with the advice to stop smoking was sent to 1,300 smokers, resulting in a 5.6% quit rate at 12 months in the intervention group compared to 3.5% in 1,310 control subjects (p < 0.01) who had not been informed about their lung function. In our study, the diagnosis of moderate and severe AL significantly increased the successful outcome.

To summarize, in our experience all smokers, irrespective of their lung function, tried to modify their habit as the result of screening for COPD. The diagnosis of AL and, presumably, symptoms of COPD, motivated a quit attempt in smokers with moderate and severe AL. Fewer smokers with mild disease and with NLF tried to modify their habits. Older age, lower tobacco exposure, and poorer lung function were predictors of success in smoking cessation.

REFERENCES
5 Anthonisen NR, Connet JE, Kiley JP, et al. Effects of smoking intervention and the use of an inhaled anticholinergic bronchodilator on the rate of decline of FEV1; the Lung Health Study. JAMA 1994; 272:1497–1505
20 Fagerström KO. Assessment of the smoker who wants to quit. Monaldi Arch Chest Dis 2001; 56:124–127
26 Fiore MC. US public health service clinical practice guideline: treating tobacco use and dependence. Respir Care 2000; 45:1200–1262

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