In summary, the majority of studies so far reported indicate that cigarette smokers run a higher risk of developing postoperative pulmonary complications than do nonsmokers, corroborating a long-held clinical impression. The risk of developing such complications appears to increase with increasing dosage of cigarette smoke.

SUMMARY AND CONCLUSIONS

1. Cigarette smoking is the most important cause of chronic obstructive bronchopulmonary disease in the United States. Cigarette smoking increases the risk of dying from pulmonary emphysema and chronic bronchitis. Cigarette smokers show an increased prevalence of respiratory symptoms, including cough, sputum production, and breathlessness, when compared with nonsmokers. Ventilatory function is decreased in smokers when compared with nonsmokers.

2. Cigarette smoking does not appear to be related to death from bronchial asthma although it may increase the frequency and severity of asthmatic attacks in patients already suffering from this disease.

3. The risk of developing or dying from COPD among pipe and/or cigar smokers is probably higher than that among nonsmokers while clearly less than that among cigarette smokers.

4. Ex-cigarette smokers have lower death rates from COPD than do continuing smokers. The cessation of cigarette smoking is associated with improvement in ventilatory function and with a decrease in pulmonary symptom prevalence.

5. Young, relatively asymptomatic, cigarette smokers show measurably altered ventilatory function when compared with nonsmokers of the same age.

6. For the bulk of the population of the United States, the importance of cigarette smoking as a cause of COPD is much greater than that of atmospheric pollution or occupational exposure. However, exposure to excessive atmospheric pollution or dusty occupational materials, and cigarette smoking may act jointly to produce greater COPD morbidity and mortality.

7. The results of experiments in both animals and humans have demonstrated that the inhalation of cigarette smoke is associated with acute and chronic changes in ventilatory function and pulmonary histology. Cigarette smoking has been shown to alter the mechanism of pulmonary clearance and adversely affect ciliary function.

8. Pathological studies have shown that cigarette smokers who die of diseases other than COPD have histologic changes charac-
teristic of COPD in the bronchial tree and pulmonary parenchyma more frequently than do nonsmokers.

9. Respiratory infections are more prevalent and severe among cigarette smokers, particularly heavy smokers, than among nonsmokers.

10. Cigarette smokers appear to develop postoperative pulmonary complications more frequently than nonsmokers.

CHRONIC OBSTRUCTIVE BRONCHOPULMONARY DISEASE REFERENCES


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(75) EHRLICH, R., HENRY, M. C., FENTESS, J. Influence of nitrogen dioxide on resistance to respiratory infections. In: Hanna, M. G., Jr., Nette-


(93) GANDEVIA, B. A productive cough upon request as an index of chronic bronchitis: The effects of age, sex, smoking habit, and environment upon prevalence in Australian general practice. Medical Journal of Australia 1(1) : 16-20, January 4, 1969.


(105) HAMMOND, E. C., HORN, D. Smoking and death rates—report on forty-four months of follow-up of 187,783 men. II. Death rates by cause.


HOLMA, B. The acute effect of cigarette smoke on the initial course of lung clearance in rabbits. Archives of Environmental Health 18(2) : 171-173, February 1969.


(152) Leuchtenberger, C., Leuchtenberger, R., Zerbin, W., Shaffer, P. A. correlated histological, cytological, and cytochemical study of the tracheobronchial tree and lungs of mice exposed to cigarette smoke.


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BRONCHOPULMONARY

APPENDIX TABLES
<table>
<thead>
<tr>
<th>Author, year, country, reference</th>
<th>Number and type of population</th>
<th>Cough</th>
<th>Sputum production</th>
<th>Breathlessness or dyspnea</th>
<th>Other</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short et al., 1939, U.S.A.</td>
<td>2,031 male and female insurance policy holders.</td>
<td>NS .... 1.8 (489) SM .... 6.4 (2,293)</td>
<td>NS .... 10.0 SM .... 18.0</td>
<td>Chest illnesses not represented by frequent colds.</td>
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<tr>
<td>Oswald, et al., 1955, England (278)</td>
<td>3,602 male and 2,212 female clerical workers 10-65 years of age.</td>
<td>NS .... 16.2 (474) SM .... 18.4 (1,940)</td>
<td>NS .... 12.1 (619) SM .... 18.8 (570)</td>
<td>Chronic bronchitis defined by habitual cough and sputum production.</td>
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<td>Phillips et al., 1956, U.S.A. (222)</td>
<td>1,274 male factory workers without overt pulmonary disease or heart failure.</td>
<td>NS .... 2.0 (461) SM .... 6.0 (523)</td>
<td>NS .... 16.1 SM .... 8.6</td>
<td>Chronic bronchitis defined by habitual cough and sputum production.</td>
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<tr>
<td>Magnus, 1957, England (222)</td>
<td>260 male and 286 female rural dwellers 25-74 years of age.</td>
<td>Cough and sputum</td>
<td>Males</td>
<td>Males</td>
<td>Chronic bronchitis</td>
<td>Males</td>
</tr>
<tr>
<td></td>
<td>NS .... 7.1 (28) SM .... 6.5 (222)</td>
<td>NS .... 7.1</td>
<td>SM .... 13.1</td>
<td>NS .... 3.4</td>
<td>NS .... 3.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NS .... 9.3 (276) SM .... 12.8</td>
<td>NS .... 9.3</td>
<td>SM .... 17.8</td>
<td>SM .... 9.9</td>
<td>SM .... 9.9</td>
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</tr>
<tr>
<td></td>
<td>NS .... 9.7 (28) SM .... 9.2</td>
<td>NS .... 9.7</td>
<td>SM .... 15.1</td>
<td>SM .... 3.4</td>
<td>SM .... 3.4</td>
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</tr>
</tbody>
</table>

(Number in parenthesis represent total number of individuals in particular smoking group.)

SM = Smokers, NS = Non-smokers, EX = Ex-smokers.
<table>
<thead>
<tr>
<th>Author, year, country, reference</th>
<th>Number and type of population</th>
<th>Cough</th>
<th>Sputum production</th>
<th>Breathlessness or dyspnea</th>
<th>Chest illnesses</th>
<th>Other</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higgins, 1956, England (929)</td>
<td>94 males and 92 females</td>
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<tr>
<td>Cochran et al., 1959, England (114)</td>
<td>1,737 males, patients on lists of general practitioners &gt;60 years of age.</td>
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<tr>
<td>Edwards et al., 1956, U.S.A. (86)</td>
<td>222 male patients not suffering from overt cardiac pulmonary disease, 20-90 years of age.</td>
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<tr>
<td>Flick, 1956, U.S.A. (96)</td>
<td>776 males in various occupations, 25-64 years of age.</td>
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Numbers in parentheses represent total number of individuals in particular smoking group.

SM = Smokers, NS = Non-smokers, EX = Ex-smokers.

Cough and chronic obstructive pulmonary disease symptoms—percent prevalence (cont.)

<table>
<thead>
<tr>
<th>Author, year, country, reference</th>
<th>Number and type of population</th>
<th>Cough</th>
<th>Sputum production</th>
<th>Breathlessness or dyspnea</th>
<th>Chest illnesses</th>
<th>Other</th>
<th>Comments</th>
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<td>Higgins, 1956, England (929)</td>
<td>94 males and 92 females</td>
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<td>Cochran et al., 1959, England (114)</td>
<td>1,737 males, patients on lists of general practitioners &gt;60 years of age.</td>
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<td>Edwards et al., 1956, U.S.A. (86)</td>
<td>222 male patients not suffering from overt cardiac pulmonary disease, 20-90 years of age.</td>
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<td>Chronic bronchitis</td>
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<tr>
<td>Flick, 1956, U.S.A. (96)</td>
<td>776 males in various occupations, 25-64 years of age.</td>
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<td>Chronic bronchitis</td>
</tr>
</tbody>
</table>

Numbers in parentheses represent total number of individuals in particular smoking group.

SM = Smokers, NS = Non-smokers, EX = Ex-smokers.
<table>
<thead>
<tr>
<th>Author, year, country, reference</th>
<th>Number and type of population</th>
<th>Cough</th>
<th>Sputum production</th>
<th>Breathlessness or dyspnea</th>
<th>Chest illnesses</th>
<th>Other</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higgins, 1969 (62)</td>
<td>353 males in various occupations</td>
<td>Cough and sputum</td>
<td>NS ........ 0.0 (62)</td>
<td>NS ........ 16.0 (62)</td>
<td>NS ........ 5.0 (62)</td>
<td>NS ...... 0.0</td>
<td>Chronic bronchitis defined as persistent sputum and at least 1 chest illness in past 3 years.</td>
</tr>
<tr>
<td>Liebeschütz, 1867 (63)</td>
<td>NS ...... 0.0 (63)</td>
<td>NS ....... 0.0 (63)</td>
<td>NS ....... 0.0 (63)</td>
<td>NS ....... 0.0 (63)</td>
<td>NS ....... 0.0 (63)</td>
<td>NS ....... 0.0 (63)</td>
<td>Chronic bronchitis defined as persistent sputum and at least 1 chest illness in past 3 years.</td>
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<td>Ashford et al., 1961 (64)</td>
<td>Respiratory symptoms</td>
<td>Respiratory symptoms</td>
<td>NS ...... 10.0 (64)</td>
<td>NS ...... 10.0 (64)</td>
<td>NS ...... 10.0 (64)</td>
<td>NS ...... 10.0 (64)</td>
<td>smoking and occupational exposures found.</td>
</tr>
<tr>
<td>Author, year, country, reference</td>
<td>Number and age of population</td>
<td>Cough</td>
<td>Opium production</td>
<td>Breathlessness or dyspnea</td>
<td>Chest illnesses</td>
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<tr>
<td>Deaver, 1951, U.S.A. (21)</td>
<td>41, 40-70 years of age</td>
<td>NS</td>
<td>4.1 (46)</td>
<td>NS</td>
<td>34.7</td>
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<td>CHEST ILLENS-- chest cold during each of 10 yrs. with fever.</td>
</tr>
<tr>
<td>Fletcher and 303 male London</td>
<td>transport employees</td>
<td>NS</td>
<td>14 g./day</td>
<td>15</td>
<td>4.3</td>
<td></td>
<td></td>
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<tr>
<td>Tinker, 1951, England (181)</td>
<td>40-50 years of age</td>
<td>15</td>
<td>46</td>
<td>4.4</td>
<td></td>
<td></td>
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<tr>
<td>Brad, 1951, Australia (191)</td>
<td>individuals</td>
<td>NS</td>
<td>23.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Selby, interviewed EX</td>
<td>females</td>
<td>NS</td>
<td>21.2</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Australia in an out-patient clinic (191)</td>
<td></td>
<td>NS</td>
<td>4.9</td>
<td></td>
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<tr>
<td>Baldwin et al., 1951, U.S.A. (21)</td>
<td>industry employees in California</td>
<td>NS</td>
<td>11.0 (255)</td>
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<td>9.8</td>
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<tr>
<td></td>
<td></td>
<td>SM</td>
<td>9.0</td>
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### Table A2.—Smoking and chronic obstructive pulmonary disease symptoms—percent prevalence (cont.)

(Numbers in parentheses represent total number of individuals in particular smoking group)

<table>
<thead>
<tr>
<th>Author, year, country, reference</th>
<th>Number and type of population</th>
<th>Cough</th>
<th>Sputum production</th>
<th>Breathlessness or dyspnea</th>
<th>Chest illnesses</th>
<th>Other</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Recent, et al., 1962, enrolling U.S.A. in pulmonary neoplasm project.</td>
<td>6,137 males NS 13.0 (806)</td>
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<tr>
<td>Ferris, 90 male and 71 female</td>
<td>U.S.A. workers.</td>
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<td>Andersen, residents of U.S.A.</td>
<td>town chosen by random sampling of tenors.</td>
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#### Chronic Non-specific Respiratory Disease

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS</td>
<td>16.0 (23)</td>
<td>10.0 (20)</td>
</tr>
<tr>
<td>EX</td>
<td>12.5 (18)</td>
<td></td>
</tr>
<tr>
<td>1-10</td>
<td>27.3 (32)</td>
<td></td>
</tr>
<tr>
<td>&gt;20</td>
<td>23.1 (32)</td>
<td>26.0 (4)</td>
</tr>
</tbody>
</table>

#### Chronic Bronchitis

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>NS</td>
<td>12.8 (125)</td>
<td></td>
</tr>
<tr>
<td>EX</td>
<td>11.9 (111)</td>
<td></td>
</tr>
<tr>
<td>Cigarettes 10.1 (120)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-10</td>
<td>33.9</td>
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</tr>
<tr>
<td>11-20</td>
<td>34.2</td>
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<tr>
<td>&gt;41</td>
<td>75.4</td>
<td></td>
</tr>
<tr>
<td>NS</td>
<td>0.4 (378)</td>
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</tr>
<tr>
<td>EX</td>
<td>10.8 (371)</td>
<td></td>
</tr>
<tr>
<td>Cigarettes 10.8 (208)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-10</td>
<td>33.5</td>
<td></td>
</tr>
<tr>
<td>11-20</td>
<td>22.2</td>
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<tr>
<td>21-30</td>
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</tr>
<tr>
<td>21-40</td>
<td>27.3</td>
<td></td>
</tr>
<tr>
<td>&gt;41</td>
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