Committee on Environmental Hazards

Involuntary Smoking—A Hazard to Children

Children who live in households with smokers are involuntarily exposed to sidestream and secondhand cigarette smoke. The health hazards that result from passive smoking will be reviewed. This statement updates a 1982 American Academy of Pediatrics statement on the environmental consequences of tobacco smoking.[1]

COMPOSITION OF SIDESTREAM AND SECONDHAND SMOKE

Sidestream smoke arises from the burning end of a cigarette.[2,3] Secondhand or exhaled mainstream smoke is drawn into the respiratory tract of the smoker and then is exhaled. Both sidestream and secondhand smoke contain measurable quantities of such toxins as carbon monoxide (CO), ammonia, nicotine, and hydrogen cyanide. They also contain carcinogens, including benzo[*a*]pyrene, dimethylnitrosamine, tar, formaldehyde, and β-naphthylamine.[2] Concentrations of most of these materials are higher in sidestream than in mainstream smoke.[2] Air-sampling surveys have documented the involuntary exposure of nonsmokers to the products of cigarette combustion.[2,3] These studies have shown that smoking in enclosed rooms can produce CO levels greater than the national ambient air quality standard of 9 ppm.[4] Similarly, elevated concentrations of airborne nicotine, benzo[*a*]pyrene, and suspended particulates have been documented.[4]

Biologic evaluations of nonsmokers involuntarily exposed to cigarette smoke have demonstrated elevations of 1% to 3% in carboxyhemoglobin concentration.[5] Biologic evaluations of involuntary smokers have also found increased levels of nicotine and of cotinine,[6,7] the major metabolite of nicotine, in the urine and saliva. In addition, studies have demonstrated increased activity of enzymes that metabolize benzo[*a*]pyrene in the placentas of women who smoke[8] and, possibly, in the placentas of women involuntarily exposed to cigarette smoke.[9] Finally, increased urinary excretion of mutagens has been found in involuntary smokers.[10]

SIZE OF THE EXPOSED POPULATION

No firm estimates of the number of American children involuntarily exposed to cigarette smoke are available. However, recent surveys have found that 53% to 76% of the homes in the United States contain at least one smoker.[3] Application of these rates to the 1980 US Census indicates that between 8.7 and 12.4 million American children less than 5 years of age are exposed to cigarette smoke in their homes. Because smoking is most common in families of lower socioeconomic status,[11] involuntary smoking occurs more frequently among children in such families.

ACUTE HEALTH EFFECTS OF INVOLUNTARY SMOKING

Bronchitis, pneumonia, and respiratory syncytial virus (RSV) infection have all been found to occur more often in the children of parents who smoke than in the children of parents who do not smoke.[12,13] Furthermore, the frequency of these respiratory infections have been found to increase with the amount of parental smoking; children with two parents who smoke have significantly more infections than children with only one parent who smokes. Maternal smoking relates more closely to childhood respiratory infection than paternal smoking. The association between parental smoking and childhood respiratory infection is most strongly evident during the first 1 to 2 years of life and diminishes thereafter.[14-16]

Respiratory symptoms, persistent wheeze in particular, have also been reported to be more frequent in children whose parents smoke than in children whose parents do not smoke.[11,17-20] The frequency of these symptoms increases with the number of parents who smoke. The association is strongest in the first year of life.[21]

LONG-TERM HEALTH EFFECTS OF INVOLUNTARY SMOKING

Children of parents who smoke have been found to have small, but significant, decreases in pulmo-

nary function compared with children whose parents do not smoke.[17,18,22–24] These deficits are primarily obstructive and are manifest either by decreased forced expiratory volumes ($FEV_{1.10}$ or $FEB_{0.75}$) or decreased forced expiratory flow (FEF_{25-75}). These effects are more closely related to maternal than to paternal smoking. Several studies have suggested there is a dose-response relationship between the number of smokers in the home and the degree of obstructive impairment. Functional deficits appear to be more serious in younger than in older children.

Longitudinal follow-up of children whose parents smoke indicates that their annual rate of lung growth is significantly less than expected.[17,25] The subsequent failure of such children to attain their full, genetically determined level of pulmonary function may predispose them to chronic obstructive lung disease and premature pulmonary failure.

INVOLUNTARY SMOKING AND LUNG CANCER

Several studies have evaluated the association between involuntary smoking and lung cancer. A case-control study in Greece[26,27] and a longitudinal prospective study in Japan[28] both found a statistically significant association between the occurrence of lung cancer in nonsmoking women and smoking by their husbands. In both studies, the wives' risk of lung cancer increased two- to threefold according to the amount of the husband's smoking; in both studies, dose-response relationships were evident between the amount of involuntary exposure to smoke and cancer mortality.[26–28] However, a study by the American Cancer Society failed to find a statistically significant increase in lung cancer in the nonsmoking wives of husbands who smoked, although that study did observe a nonsignificant trend in lung cancer mortality.[29] Finally, recent studies from the National Institutes of Health have observed a positive association between cumulative lifetime exposure to passive smoking and overall cancer risk.[30–33] Cancer risks were greatest for persons whose involuntary exposure to smoke began in childhood and continued through adult life.

INVOLUNTARY SMOKING AND ISCHEMIC HEART DISEASE

A recent study of older adults found that the nonsmoking wives of men who smoked had a higher age-adjusted death rate from ischemic heart disease than did women whose husbands had never smoked.[34] This difference remained evident after adjustment of the data for differences in cardiac risk factors.

CONCLUSIONS

The involuntary exposure of children to tobacco smoke results in increased frequency of lower respiratory tract infections, increased frequency of respiratory symptoms, decreased pulmonary function, and decreased lung growth. In addition, involuntary exposure of children to cigarette smoke may result in predisposition to the development of chronic obstructive lung disease, lung cancer, and ischemic heart disease. Although further research will be required to establish these associations, all are biologically plausible consequences of involuntary smoking. Furthermore, all are of sufficient importance to children's future health that they demand prudent preventive action even in the absence of complete evidence on causality.

RECOMMENDATIONS

Vigorous and immediate action is required to reduce the involuntary exposure of children to tobacco smoke. Because the determinants of passive smoking are manifold, a successful strategy to reduce passive smoking must consist of several complementary elements:

1. Pediatricians should seek a history of involuntary exposure to tobacco smoke whenever they encounter a child with lower respiratory tract infection, persistent respiratory symptoms, or unexplained alterations in lung function.[2]
2. Pediatricians must increase their efforts to inform both patients and parents about the hazards of tobacco.[1]
3. Pediatricians should set an example by not using tobacco products.[1]
4. Pediatricians should take the lead in urging that (*a*) sales of all tobacco products be banned in all pediatric hospitals and in other facilities caring for children[35] and (*b*) cigarette smoking be banned in all such facilities, except in certain designated areas.[36]
5. Pediatricians and Academy chapters should urge their state and local governments to consider passage of clean indoor air legislation. Such legislation prohibits all indoor smoking, except in areas where it is specifically permitted; this legislation has been passed successfully in several states.[37,38]
6. Pediatricians and Academy chapters should encourage the Congress and the Federal Trade Commission to (*a*) ban all advertising in all media for all tobacco products[39,40]; (*b*) sponsor counter-advertisements, particularly on television, to inform the public of the dangers of tobacco; (*c*) strengthen the health warnings that appear on cigarette packages; such messages should specifically warn of the hazards of involuntary smoking; and (*d*) increase the federal excise tax on all tobacco products. Higher excise taxes have been shown to be an effective deterrent in the purchase of tobacco.[41]

7. Pediatricians and Academy chapters should urge Congress to dismantle the tobacco price support program.[1]

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