

## Indoor Air Pollution: An Introduction for Health Professionals

### Book <sup>1)</sup>

Health Problems Related To Environmental Tobacco Smoke

Key Signs/Symptoms in Adults ...

- \* rhinitis/pharyngitis, nasal congestion, persistent cough

- \* conjunctival irritation

- \* headache

- \* wheezing (bronchial constriction)

- \* exacerbation of chronic respiratory conditions

and in Infants and Children

- \* asthma onset

- \* increased severity of, or difficulty in controlling, asthma

- \* frequent upper respiratory infections and/or episodes of otitis media

- \* persistent middle-ear effusion

- \* snoring

- \* repeated pneumonia, bronchitis

Diagnostic Leads

- \* Is individual exposed to environmental tobacco smoke on a regular basis?

- \* Test urine of infants and small children for cotinine, a biomarker for nicotine

Remedial Action

While improved general ventilation of indoor spaces may decrease the odor of environmental tobacco smoke (ETS), health risks cannot be eliminated by generally accepted ventilation methods. Research has led to the conclusion that total removal of tobacco smoke — a complex mixture of gaseous and particulate components — through general ventilation is not feasible.<sup>3</sup>

The most effective solution is to eliminate all smoking from the individual's environment, either through smoking prohibitions or by restricting smoking to properly designed smoking rooms. These rooms should be separately ventilated to the outside.<sup>4</sup>

Some higher efficiency air cleaning systems, under select conditions, can remove some tobacco smoke particles. Most air cleaners, including the popular desktop models, however, cannot remove the gaseous pollutants from this source. And while some air cleaners are designed to remove specific gaseous pollutants, none is expected to remove all of them and should not be relied upon to do so.

(For further comment, see pg. 21.)

## Comment

Environmental tobacco smoke is a major source of indoor air contaminants. The ubiquitous nature of ETS in indoor environments indicates that some unintentional inhalation of ETS by nonsmokers is unavoidable. Environmental tobacco smoke is a dynamic, complex mixture of more than 4,000 chemicals found in both vapor and particle phases. Many of these chemicals are known toxic or carcinogenic agents. Nonsmoker exposure to ETS-related toxic and carcinogenic substances will occur in indoor spaces where there is smoking.

All the compounds found in "mainstream" smoke, the smoke inhaled by the active smoker, are also found in "sidestream" smoke, the emission from the burning end of the cigarette, cigar, or pipe. ETS consists of both sidestream smoke and exhaled mainstream smoke. Inhalation of ETS is often termed "secondhand smoking", "passive smoking", or "involuntary smoking."

The role of exposure to tobacco smoke via active smoking as a cause of lung and other cancers, emphysema and other chronic obstructive pulmonary diseases, and cardiovascular and other diseases in adults has been firmly established.<sup>5,6,7</sup>

Smokers, however, are not the only ones affected. The U.S. Environmental Protection Agency (EPA) has classified ETS as a known human (Group A) carcinogen and estimates that it is responsible for approximately 3,000 lung cancer deaths per year among nonsmokers in the United States.<sup>8</sup> The U.S. Surgeon General, the National Research Council, and the National Institute for Occupational Safety and Health also concluded that passive smoking can cause lung cancer in otherwise healthy adults who never smoked.<sup>9,10,11</sup>

Children's lungs are even more susceptible to harmful effects from ETS. In infants and young children up to three years, exposure to ETS causes an approximate doubling in the incidence of pneumonia, bronchitis, and bronchiolitis. There is also strong evidence of increased middle ear effusion, reduced lung function, and reduced lung growth. Several recent studies link ETS with increased incidence and prevalence of asthma and increased severity of asthmatic symptoms in children of mothers who smoke heavily. These respiratory illnesses in childhood may very well contribute to the small but significant lung function reductions associated with exposure to ETS in adults. The adverse health effects of ETS, especially in children, correlate with the amount of smoking in the home and are often more prevalent when both parents smoke.<sup>12</sup>

The connection of children's symptoms with ETS may not be immediately evident to the clinician and may become apparent only after careful questioning. Measurement of biochemical markers such as cotinine (a metabolic nicotine derivative) in body fluids (ordinarily urine) can provide evidence of a child's exposure to ETS.<sup>13</sup>

The impact of maternal smoking on fetal development has also been well documented. Maternal smoking is also associated with increased incidence of Sudden Infant Death Syndrome, although it has not been determined to what extent this increase is due to in utero versus postnatal (lactational and ETS) exposure.<sup>14</sup>

Airborne particulate matter contained in ETS has been associated with impaired breathing, lung diseases, aggravation of existing respiratory and cardiovascular disease, changes to the body's immune system, and lowered defenses against inhaled particles.<sup>15</sup> For direct ETS exposure, measurable annoyance, irritation, and adverse health effects have been demonstrated in nonsmokers, children and spouses in particular, who spend significant time in the presence of

smokers.<sup>16,17</sup> Acute cardiovascular effects of ETS include increased heart rate, blood pressure, blood carboxyhemoglobin; and related reduction in exercise capacity in those with stable angina and in healthy people. Studies have also found increased incidence of nonfatal heart disease among nonsmokers exposed to ETS, and it is thought likely that ETS increases the risk of peripheral vascular disease, as well.<sup>18</sup>

## References

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