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ASSESSMENT OF PERSONAL EXPOSURES TO ENVIRONMENTAL TOBACCO SMOKE IN BRITISH NONSMOKERS

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Environmental Tobacco Smoke (ETS) exposure of 255 nonsmoking subjects was assessed by several methods. Each subject wore a personal air sampler for 24 h, answered a questionnaire about air quality and ETS exposure, and provided saliva samples for cotinine analysis before and after the monitoring period. The study was conducted in the Leeds and Harrogate areas of northern England. Median exposure to ETS particles was below the detection limit of 4 μg m^{-3}. Median exposure to nicotine was 0.5 μg m^{-3} and median saliva cotinine levels were 0.7 ng mL^{-1} and 0.6 ng mL^{-1} for the pre- and post-cotinine samples. Median exposure to particles from all sources was 142 μg m^{-3}. Approximately 80% of subjects assessed their ETS exposure as none or low. On average, the home made the greatest contribution to ETS exposure, followed by leisure, and then work. Travel was a minor contributor to exposure. Overall, subjects with a partner who smoked were exposed to more ETS than subjects with no partner or a nonsmoking partner. However, there was considerable overlap in the exposures of individuals within these groups. Where subjects assessed their ETS exposure as none or low, this was generally supported by the direct measurements of exposure. However, for exposure assessed as moderate or high there was a wide range in the corresponding direct measurements. There was a moderate correlation between exposure to nicotine and exposure to ETS particles (R^2=0.66), but poor correlation between nicotine exposure and saliva cotinine levels (R^2=0.07 for pre- and R^2=0.13 for postcotinine samples). Overall, ETS made only a small (median 2.5%) contribution to particles from all sources as collected by the personal monitor. Exposure to ETS particles did not correlate (R^2=0.04) with exposure to particles from all sources. Out of 327 volunteers recruited as nonsmokers for this study, 53 (16%) were identified as likely smokers by saliva cotinine levels or detailed questioning.

INTRODUCTION

Two main approaches have been used in the past to assess whether there is any risk associated with exposure to ETS. One is based on epidemiology and the other based on the quantities of smoke constituents to which nonsmokers are exposed.

A criticism of published epidemiological studies of ETS is that almost all failed to include a direct measurement of exposure level (Coultas et al. 1989). Although spousal smoking has frequently been used as an index of exposure in these studies, the accuracy of this approach has been questioned (Koo et al. 1987). Therefore, it is important to determine how well reported spousal smoking correlates with directly measured exposure. It is also important to determine how well ETS exposure can be predicted by questionnaire or by measurements of saliva cotinine since these approaches are also used as an alternative to direct measurements of exposure. In the case of cotinine measurements, consideration must be given to threshold levels (Etzel 1990) in order to exclude smokers from ETS exposure evaluation. There have been various definitions of a regular smoker. The EPA for example defined regular smokers as those having more than 30% of the average cotinine level found for smokers.

Most of the information about the quantities of smoke constituents to which nonsmokers may be ex-