



TRANSDISCIPLINARY TOBACCO USE RESEARCH CENTER

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UNIVERSITY OF MINNESOTA

Cancer Center

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transdisciplinary tobacco use research center

Research summary

To assess the degree of carcinogen uptake in infants aged 3 to 12 months, researchers at the University of Minnesota Transdisciplinary Tobacco Use Research Center (UMN TTURC) measured levels of total 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol (total NNAL) in the urine of infants exposed to ETS in their homes.

Results and policy implications

Of the 144 infants, 67 (46.5%) had detectable levels of total NNAL. The findings support the importance of instituting regulatory, economic, and public health policies (e.g., smoking bans, cigarette taxes, and anti-tobacco advertising) to protect infants, children and adults from the hazards of cigarette smoke exposure.

About umntturcresearchbrief

The UMN TTURC Research Brief presents timely information on emerging tobacco research from the University of Minnesota. The aims of UMN TTURC are to examine strategies for reducing tobacco toxin exposure, determine the most effective methods for treating smokers who are unable or unwilling to quit smoking, and outline public policy implications for interventions that reduce exposure to tobacco toxins.

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Environmental tobacco exposure in infants

Extensive epidemiologic data demonstrate that environmental tobacco smoke (ETS), otherwise known as secondhand smoke, causes lung cancer in non-smokers. (1) Most of these studies have been carried out in adults exposed to ETS either at home or in the workplace. The relationship between ETS exposure in childhood and cancer later in life is less clear. Tobacco carcinogen biomarkers can be used to investigate the plausibility of the connection between ETS exposure and cancer.

One of the most useful biomarkers for assessing exposure to ETS is total 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol (total NNAL) in urine. (2) While previous studies have assessed levels of total NNAL before birth, during childhood, and in adults (3-7), these biomarkers have not, heretofore, been measured in infants (children 12 months and younger). To assess the degree of carcinogen uptake in this population, researchers at the University of Minnesota Transdisciplinary Tobacco Use Research Center (UMN TTURC) measured levels of total NNAL in the urine of infants exposed to ETS in their homes.

Methods

Researchers quantified total NNAL in the urine of 144 infants who lived in homes where at least one person had smoked in the previous 7 days. The infants ranged in age from 3 to 12 months. Parental participants—all mothers who were occasional or daily smokers—gave researchers permission to collect urine samples from their children. The mothers also provided detailed information about their smoking patterns, their and other family members' tobacco use in the home and car, and all sources of ETS that the infant had been exposed to during the previous week.

Findings

Of the mothers who participated, 82% reported being daily smokers, and 72% indicated that they lived in households that had other smokers. Of the 144 infants, 67 (46.5%) had detectable levels of total NNAL. Researchers could not exclude uptake of tobacco-specific carcinogens from surfaces such as rugs and furniture. However, inhalation of ETS is the most likely source of urinary total NNAL.

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The number of cigarettes smoked in the home or car (by any family member) was higher when total NNAL was detected in the infants than when it was not detected. In those infants with detectable levels of NNAL, the levels were higher than in most other field studies of ETS exposure. This finding may be the result of the infants' proximity to the smoking mother. While these infant exposures could increase cancer risk later in the children's lives, further studies would need to be conducted to verify this connection.

Policy and health care implications

Smoking around an infant is typically the beginning of long-term exposure for that child to secondhand smoke. Parents have the greatest impetus to quit smoking when they learn they are going to have a baby. It is important for pediatricians and other health care providers to recognize this window of opportunity—as well as understand the hazards of ETS in infants—and introduce exposure-reduction strategies to mothers whenever appropriate. Such strategies can include not only helping mothers quit smoking but also suggesting that parents adopt a “no smoking” policy in their home and cars.

In addition to timely intervention by health care providers, regulatory, economic, and public health policies (e.g., smoking bans, cigarette taxes, and anti-tobacco advertising) are becoming valuable approaches for decreasing the overall prevalence of smoking—and thus decreasing ETS exposure in children. Our study supports the importance of instituting these measures to protect young and old from the hazards of cigarette smoke exposure.

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- For more information, please see Hecht SS, Carmella SG, Le K, Murphy SE, et al. 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone and its glucuronides in the urine of infants exposed to environmental tobacco smoke. *Cancer Epidemiol Biomarkers Prev* 2006;15(5):988-92.*