

*Letter to the Editor*

Correspondence re: Debra T. Silverman *et al.* Motor Exhaust-related Occupations and Bladder Cancer. *Cancer Res.*, 46: 2113-2116, 1986<sup>1</sup>

Bladder cancer has been reported to occur more commonly than expected among truck drivers, and exposure to motor exhaust, specifically from diesel engines, has been hypothesized to be mainly responsible for this phenomenon in an article in this journal (1) and elsewhere (2, 3). Long-distance truck drivers are more likely to be exposed to diesel emissions than other truck drivers. They may differ from other truck drivers in a number of ways as well.

We conducted this ad hoc survey (4) to see how certain aspects of the trucker's life-style might confound the relationship between diesel smoke exposure and bladder cancer. All interviews were conducted at the Garden State Truck Stop in Bloomsbury, NJ. The interviews were carried out on weekends between May 1985 and June 1986. Truck drivers were asked to answer questions on their life-styles as they entered the truck stop restaurant. Five % refused; 206 were interviewed. The interview took 20 min. It included questions on smoking, coffee drinking, diet, use of drugs to keep awake, and number of days spent at home. We compared these truck drivers with white males interviewed through the Health Information Survey of the National Cancer for Health Statistics, male participants of the National Health and Nutrition Examination Survey (NHANES), and hospitalized controls without tobacco-related diseases from our ongoing case/control studies interviewed between 1981 and 1985 (5, 6).

The truck drivers were all white males ages 25 to 60 years. Eight % had completed college, 76% were current smokers, and 10% were exsmokers. These percentages compared with 45% smokers and 28% exsmokers among men of comparable ages seen in the Health Information Survey (5) and 32% smokers and 37% exsmokers seen in our hospital controls. Over 50% of the truck drivers smoked more than 35 cigarettes/day compared with only 20% of men in the general United States population and 33% in our controls.

Ninety % of the truck drivers drank three or more cups of coffee per day; nearly 70% drank six cups per day or more. The proportions drinking more than three or six cups per day are twice as high as any of the comparison groups. Slightly less than half drank in excess of 20 cups of coffee per day, and 23% drank more than 20 cups. We have no comparable data for the controls.

The truck drivers were heavy consumers of dairy products. Roughly 60% reported eating two or more eggs per day. This amount can be compared with the National Health and Nutrition Examination Survey, in which no one reported eating two or more eggs per day. Over 30% of the truckers ate cheese every day compared with 10-13% in NHANES II.

Eighty-four % of these truck drivers spent fewer than 1 week per month at home. Over 40% of them reported using amphetamines for more than 1 year. We could not obtain reliable information on frequency of use. In the absence of appropriate controls, any comparisons with the general population are uncertain.

In this limited investigation, it seems clear that long-distance truck drivers may have rather unusual life-styles. They smoke

heavily, drink coffee in large quantities, eat excessive amounts of fatty foods and dairy products, and appear to keep themselves going frequently with pep pills. Before bladder cancer can be attributed to some occupational exposure, it is important to eliminate other potential risk factors as causes. Cigarette smoking, for example, is an established risk factor for bladder cancer (7-10). Crude adjustment for cigarette smoking may not be sufficient for a group of individuals who smoke as heavily as do truck drivers. It is likely that within each category, they rank higher than controls, and finer stratification may be necessary.

The remarkable differences between truck drivers and others in the amount of cigarettes smoked could account for a 2-fold or greater excess of bladder cancer among truck drivers. Insufficient control in analyses could "contaminate" an occupational effect. Most studies have suggested that any increased occupational risk may be of this magnitude or smaller (2). Besides the amount of cigarettes smoked, we may want to consider if truck drivers smoke higher-tar cigarettes than the general population.

We may also want to consider the possible role of high-fat diets in bladder carcinogenesis. Bladder cancer correlates positively with fat intake on the basis of international comparisons (11). The bladder cancer rate is quite low among Japanese males who have a high prevalence of cigarette smoking but a low fat consumption (12).

In general, as stressed in a recent workshop on Weak Associations in Epidemiology, we need to consider carefully confounders, potential biases, and problems of subgroup analysis as well as evaluate biological plausibility before regarding a finding to be causative in nature (13).

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Ernst L. Wynder<sup>2</sup>  
Sandra Miller  
American Health Foundation  
New York, New York 10017

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<sup>2</sup>To whom requests for reprints should be addressed, at American Health Foundation, 320 East 43rd Street, New York, NY 10017.