While Zahm and colleagues raise several important questions, it remains clear that the most important findings from the study by Thun et al. (1) remain unchallenged. Convincing evidence is presented that use of hair dyes is not related to any increase in total cancer mortality. Importantly, this study is based on 573,369 U.S. women aged 30 years or older (median age 56 years), and complete follow-up was achieved. Thus, bias and important confounding can be excluded. Further, for many cancers where previous studies had left uncertainty (e.g., breast cancer risk), Thun et al. add important additional data showing no relationship with hair dye use. In sum, the use of permanent hair dyes does not increase total cancer mortality, and the upper bound of the 95% confidence interval (i.e., 0.98) excludes any substantial association remaining unexplained. This determination is the primary health message and was reflected in the study title and subsequent media coverage. Given the complexity of risk communication, and directed as it was to the concerns of the audience as recommended by the National Research Council (2), the reassuring message was clear and concise.

The year 2000 goals specify areas in cancer prevention and detection, with the reduction of cancer incidence, morbidity, and mortality carrying the greatest potential. The targets include cigarette smoking reduction, dietary change, and improvements in early detection (3). Accordingly, the message that reduction in use of hair dye will not substantially reduce cancer mortality is an appropriate one. As Zahm and colleagues note, to achieve the goal of reduced cancer mortality, we must focus on exposures with high prevalence and clear causal links to cancer mortality (e.g., cigarette smoking and diet). It is not only appropriate, but it is also our social responsibility, to place our emphasis on exposures that will move us substantially closer to achieving the national goals. At the same time, further study of non-Hodgkin’s lymphoma and multiple myeloma is appropriate to advance our understanding of the biology and etiology of these conditions. However, the research should not be justified in terms of immediate public health benefit.

In sum, the important mortality data presented by Thun et al. (1) reassures women that the rising incidence of breast cancer is not attributable to hair dye use and that, conversely, changes in use of hair dye will not substantially contribute to changes in total cancer mortality. Reduction of hair dye use will not advance us toward the goal of reversing, by the year 2000, the steady rise in cancer deaths.

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References


Response

We agree with Zahm et al. that the rising incidence of non-Hodgkin’s lymphoma and multiple myeloma in the United States is important and is not completely understood and that hair dyes may contribute to these increased risks. We suspect, however, that hair dye use is, at most, a minor factor even for these cancers. While hair dyes are used much less commonly by men than by women (1-4), the incidence of non-Hodgkin’s lymphoma is higher among men than among women (Fig. 1) and has increased faster in absolute terms among men than among women since 1973 (5). Similar trends are seen for multiple myeloma, except that the incidence of multiple myeloma among African-Americans is approximately twice that of whites (5). Neither rela-
The specific association between the use of dark hair dyes and non-Hodgkin’s lymphoma and multiple myeloma (1,6) serves to focus scientific and public health concern on the subgroup of hair dyes in which aromatic amines and related nitro dyes are most concentrated. None of these studies conclusively prove that hair dye caused these cancers, since it is possible that ethnicity (7) or early greying might introduce a spurious association between dark hair dye use and some other underlying cause. Further, it remains uncertain whether the association with hair dyes, if causal, extends to semipermanent and temporary dyes [on which the American Cancer Society (6) had no information] or whether some lower level of risk is also associated with use of red and dark brown, as well as black dyes (1). Permanent hair dyes comprise 70% of the hair coloring market (8). Semipermanent dyes contain many of the same mutagenic compounds as permanent dyes (8) and are absorbed systemically (9); however, they are often used short-term (8) and were only weakly associated with non-Hodgkin’s lymphoma and multiple myeloma in the study by Zahm et al. (1).

Ongoing follow-up of Cancer Prevention Study II will, over time, provide additional data on these associations. A number of other, scientifically interesting research questions concern the absorption, biometabolism, and excretion of polycyclic aromatic hydrocarbons in hair dyes and coal-tar shampoos. In particular, valuable information could be obtained on factors that increase or decrease the absorption of these substances through the skin, their accumulation in lymphatic tissue, DNA adduct formation, and measurements of urinary excretion.

From the perspective of product safety, it is also very important that the Food and Drug Administration, the National Toxicology Program, and the manufacturers continue testing the constituents of hair dyes for carcinogenicity and that suspect carcinogens be removed from products. This process should not be postponed during the lengthy process of accumulating further epidemiologic evidence. The studies that have been completed thus far, although scientifically inconclusive, certainly warrant continuing efforts to improve the safety of these products.

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