LETTERS TO THE EDITOR

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Variation within global cigarette brands in tar, nicotine, and certain nitrosamines: analytic study

EDITOR,—While the content of food, pharmaceutical products, drugs, and many other consumer goods are tightly regulated by governments, tobacco products, surprisingly, are not.

Tar and nicotine yields of cigarettes have progressively, but not universally, appeared on cigarette packets and advertising since 1967. These figures have been used to justify terms such as "light" and "mild" in descriptive advertising. In 1981 a US public health report concluded: "the preponderance of scientific evidence strongly suggests that the lower the "tar" and nicotine content of the cigarette, the less harmful would be the effect."[1]

Some early reports concluded, plausibly, that a decrease in lung cancer mortality could be ascribed to smoking reduced tar cigarettes, although more recent data[2] suggest that there is little if any difference in the long term outcome of smoking "low tar" as against "regular" cigarettes. Further there has been an increase in adenocarcinoma relative to squamous carcinoma, more pronounced in women than men, and this may be caused by the increases in tobacco specific nitrosamines in cigarettes plus more intense (compensatory) smoking and deeper inhalation associated with modern cigarettes.[3 4]

We decided to test three global brands (Camel, Lucky Strike, and Marlboro) for consistency of tar and nicotine yields and for two tobacco specific nitrosamines, 4 - (methylnitrosamino) - 1 - (3-pyridyl) - 1 - butanone (NNK), and N-nitrosonornicotin (NNN). The former is a powerful lung adenocarcinogen, regardless of route of administration, and the latter is an established oesophageal carcinogen in animals. The methods used have been described by Hoffmann.[5 6]

The cigarettes were purchased in 29 countries by volunteers (the International Cigarette Variation Group), who purchased the premium example available, which were, in most cases, filtered. No "light", "mild", "menthol" or other variants were purchased. Forty cigarettes of each brand were analysed at the Institute of Carcinogenesis in Moscow. Not all brands were available in each country and it is not known whether those purchased were locally produced, imported or smuggled, or how long they had been stored before sale. This is not a representative sample—the cigarettes were acquired as they would be by the person in the street. Our aim was to investigate international variation.

The results of the tar and nicotine testing were unremarkable. Generally they conformed to the packet statement (where present). Tar yield ranged from 10.6 mg/cig to 15.7 mg/cig for Camel, 11.8 mg/cig to 20.4 mg/cig for Lucky Strike, and 8.4 mg/cig to 15.9 mg/cig for Marlboro. Nicotine yield ranged from 0.85 mg/cig to 1.3 mg/cig for Camel and Lucky Strike, and 0.68 mg/cig to 1.25 mg/cig for Marlboro.

Differences in nitrosamine yields were substantial. There is a threefold difference between the lowest and highest yields of NNK for Camel, a fivefold difference for Lucky Strike, and ninefold for Marlboro (fig 1). NNK and NNN yields are highly correlated (correlation 0.88, 95% confidence interval 0.83 to 0.93), so only NNK is shown in the figure.

We have shown that a three- to ninefold variation in carcinogen dose can be given to the smoker, without any warning, in products that are trademarked and globally advertised. In 1998[7] some of us proposed the setting of upper limits on such carcinogens by establishing the market median as an initial upper limit. Clearly lower nitrosamine cigarettes can be, and are, produced, and there is no excuse for the wide, within brand, variations described here.

We see these results as a compelling and urgent argument for government regulation of carcinogen concentrations in cigarettes. Obviously such regulation should go beyond carcinogens to other toxic, modifiable substances, and to nicotine.

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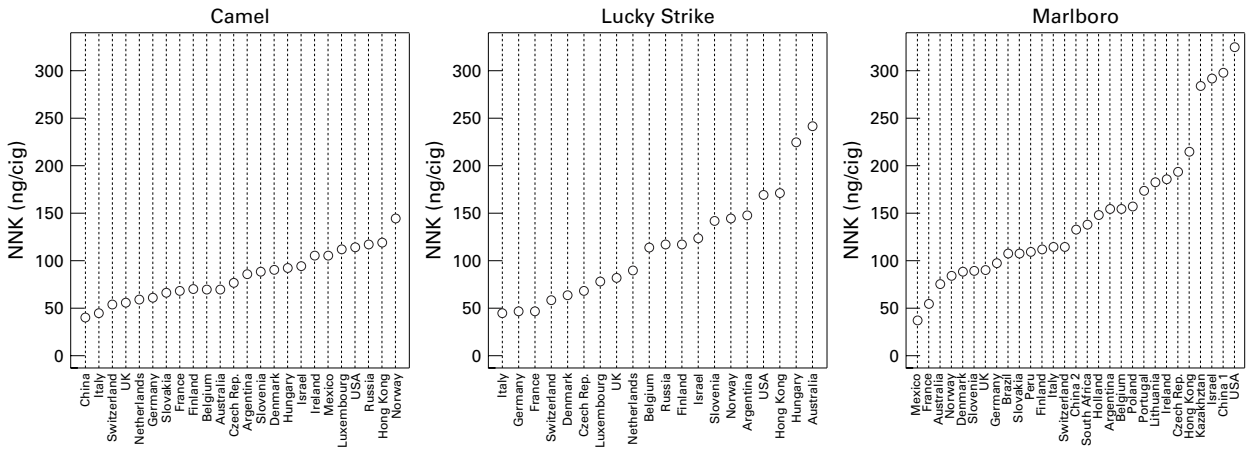

Figure 1 Results of testing for NNK yields from three brands of cigarettes in various countries.