LETTERS

Medical Exchanges

Secretary of Health, Education, and Welfare Joseph Califano's efforts to decrease the supply of physicians may have even further repercussions than suggested in R. Jeffrey Smith's article (News and Comment, 16 Feb., p. 630) because the asserted oversupply of physicians is being used as an argument to further discourage foreign medical study by Americans and will doubtless serve as an argument for further increasing the stringency of visa issuance to physicians from other countries. As with most efforts to artificially limit people's choice of occupation, there is a serious chance of throwing out the baby with the bath water. The baby in this case is the mass of physicians from Europe and elsewhere who are as fully qualified as American physicians who would come to the United States for residencies, research, or other training but who will be unable to do so because of visa and licensing difficulties. American medicine has benefited enormously from nonimmigrant medical exchanges; at one time it was even modish for Americans to train abroad. The vigilantes of medicine who would eliminate those underqualified physicians who hope to reap the profits of fee system medicine may also serve to isolate American medicine from the free exchanges of skills and information that have been so important to all concerned in the past. I have no doubt that medical care can only benefit from carefully scrutinizing each practitioner, but with the understanding that other countries have succeeded in producing physicians as qualified as our own.

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"Low-Risk" Cigarettes: The Debate Continues

In her article of 1 September 1978 (News and Comment, p. 795), Jean L. Marx quotes briefly from our previous letter to *Science* regarding Gio B. Gori's article (17 Dec. 1976, p. 1243) on "low-risk cigarettes." A later article (*1*) builds on the erroneous statistical foundation of the first and includes a misleading table of "critical levels" for low tar and nicotine cigarettes.

Gori's fundamental conceptual error is equating a (incorrectly computed) lack of statistical significance with the absence of a substantive effect. This is stated by Gori and Lynch (*1*, p. 1256): "The inability to verify this reduced risk might lead to its being considered socially tolerable." By their analysis the risk to the smoker of "critical levels" of cigarettes may be up to 100 percent greater than the risk to the nonsmoker.

In the *Science* article the statistical methodology to which we objected is contained in reference 45. We set forth here some of the methodological errors we believe were made in the handling of Harold A. Kahn's data (*2*) relating the relative risks of cancer of the lung and bronchus to the number of cigarettes smoked per day.

1) The expression for R (Gori's equation 2) refers to the risk to a smoker of X cigarettes per day relative to the nonsmoker (0 per day), that is, R is the "relative risk." His equation 2 gives $R = 1.388$ when $X = 0$. This says that the risk of a person who smokes zero cigarettes per day (surely a nonsmoker) is 38.8 percent greater than the risk to a nonsmoker! Anyone capable of doing arithmetic should be disturbed by this result and should look with suspicion upon any conclusions drawn from an equation which yields such an answer.

2) In fitting his equation, Gori (*3*) graphs the relative risk for smokers of one to nine cigarettes per day versus ten, rather than the traditional class interval midpoint—five. He similarly graphs other points at the upper boundary of the interval of cigarette usage. That is, his graphing technique says that the average number of cigarettes consumed per day by persons who consume one to nine cigarettes per day is ten. This has the effect of greatly underestimating the risk of smoking any given number of cigarettes, that is, underestimating the slope of the dose-response curve.

3) Gori fits a quadratic equation to these data where a straight line is appropriate (that is, the quadratic coefficient in his equation is not significantly different from zero and hence should not be included). This inflates the variability of the interpolated values of the relative risk thereby increasing the estimate of number of cigarettes which may be smoked without a "significant" effect. In fact, for the properly fitted straight line and the correct "significance" computations, any number of cigarettes, however small, will yield a "significant" increase in cancer risk. The true "critical" daily number of cigarettes is zero.

The straight line that best fits these data has the equation $R = 1 + 0.53\ X$,