The Simmons data derive from a review paper by K. L. Melmon (*1*), who cites five research studies to substantiate his figures (*2–5*). The first of these, the work of Seidl *et al.* at the Johns Hopkins Hospital, has been cited elsewhere (*7*) as the basis for a national projection of 1.5 million drug-caused admissions. Seidl *et al.* had reported that 5 percent of patients were admitted *with* a drug reaction; a later study by the same group showed 1.7 percent of admissions *because* of a drug reaction (*8*).

In the Johns Hopkins studies (*2*, *8*), these percentages represent admissions to medical wards. Since 20 percent of admissions to Johns Hopkins are to medical services, about 0.4 percent of all patients are admitted to that hospital primarily because of drug reactions. It is unlikely that the experience of a major teaching hospital and referral center like Johns Hopkins can be extrapolated to all hospitals. But doing so would give a figure closer to 150,000 than 1.5 million. The inflationary factor thus appears to be at least 10.

There are similar problems with Simmons' claim that "once in hospital, between 18 and 30 percent of all patients have a drug reaction." Melmon cites two sources for such an estimate: Seidl *et al.* (*2*) report that 13 percent had drug reactions while hospitalized to which Melmon adds the 5 percent with reactions present on admission to get 18 percent. Hoddinott *et al.* (*3*) report that 15 percent of patients had probable drug reactions to which Melmon adds another 15 percent with forgotten doses and other errors in drug administration to get 30 percent.

Again, both these studies were done on *medical* wards. It is as wrong to say that 13 or 15 percent of *all* hospitalized patients have a drug reaction (although this may be true for one ward) as it would be to say that 100 percent of all hospital patients are pregnant, because this may be true for one ward. Perhaps it is more important to note that no reaction-incidence study has yet screened out those minor symptoms which are known to occur as "adverse nondrug reactions" (*9*) in people who take no medication. A placebo-controlled study might yield more realistic figures.

The source material also fails to support the estimate that, for patients with drug reactions, "the length of their stay is about doubled as a result." The authors cited by Melmon to back up this claim (*2–5*) all agree that there is a positive correlation between length of hospital stay and number of drug reactions observed; but all also agree that very likely "the long hospital stay was the factor predisposing to the occurrence of adverse episodes" (*4*) and not the other way around.

Finally, these excessive estimates tend to link the adverse reaction problem with the introduction of new drugs. Actually, surveys of drug reactions show that it is the older drugs, such as quinidine, digitalis, and insulin, used in medical practice for over 30 years, which are most often found at fault (*5*). Advances in drug technology may thus help reduce the real incidence of undesired side effects from medical treatment.

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Another Scientist in Congress

Constance Holden (News and Comment, 18 May, p. 720) writes that there is only one scientist in Congress—Mike McCormack (D–Wash.). Another scientist in Congress is James G. Martin (R–N.C.), who was, until his election to the House of Representatives last fall, associate professor of chemistry at Davidson College.

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Taxation and Energy Conservation

The letter from P. de Haen concerning conservation of gasoline (13 Apr., p. 137) deserves comment. European governments tax automobiles on the basis of *taxable* horsepower, which is a meaningless number calculated from

piston displacement. The tax was designed (at the beginning of the century), and works in practice, as essentially a property tax, and I would therefore dispute any claim that European governments have superior wisdom in matters of energy conservation.

The *actual* horsepower that can be obtained from a given piston displacement can be anywhere between 30 and 150 horsepower per liter of displacement (and even more for motorcycle engines), depending on the sophistication of design, and therefore taxable horsepower bears no relation to actual horsepower. In addition, gasoline mileage obtained on the road depends very little on engine horsepower (actual or taxable), but on factors such as gross vehicle weight, overall thermal efficiency of the engine with all accessories (for example, power steering or air conditioning), efficiency of power transmission to the driving wheels (which is noticeably less with automatic transmission than with manual), average speed, and, last but not least, presence or absence of smog controls, and driving habits (the proverbial "lead foot").

In this connection, crash-safety standards increase vehicle gross weight, and smog controls reduce the thermal efficiency of the engine; thus both factors tend to increase gasoline consumption per mile traveled. In this way energy conservation comes into direct conflict with safety and environmental considerations, and we are no longer faced with an either-or proposition, but with a much more difficult question of trade-off: How much increased energy consumption is the crash-safety and smog control worth?

On the whole, taxation calculated from piston displacement has had an inhibiting influence on engine design, and for this reason the Europeans have not been too keen on smog control (not to mention the noise factor) at home, for it is difficult to put effective smog (and noise) controls on a small-displacement engine and still have some power left (for example, I understand that Renault is pulling out of the North American market after 1975 largely for this reason).

If we have to tax automobiles in order to conserve fuel, let us avoid dictating design criteria (piston displacement, horsepower, number of wheels) and simply tax by vehicle weight, or tax fuel directly; in the latter case we probably cut down on unnecessary travel as well. If we tax fuel directly or tax by vehicle weight, we will likely end up with smaller cars using less gasoline, but if we insist on "zero pollution" and "total safety," we will end up driving 5-ton battering rams getting 1 mile to the gallon.

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Highway Salting

A report entitled "Release of mercury from contaminated freshwater sediment by the runoff of road deicing salt" of which I was a coauthor, appeared in *Science* in 1972 (10 Mar., p. 1142). The results showed that the addition of sodium or calcium chloride to artificially contaminated sediments increased the relative amount of mercury in the water in equilibrium with the sediments by two to five or more orders of magnitude.

Since that report was published, I and others have shown that increasing concentrations of chloride do indeed result in the release of mercury but that the amount of mercury released is dependent on the type of sediment, the *p*H, redox conditions, and the chemical form of the mercury. In naturally contaminated sediments, the mercury has generally been bound very strongly, and little release has occurred.

Unfortunately a number of environmental groups have cited the report as a strong argument against the use of road deicing salt. In view of the fact that mercury, except when associated with an unusual industrial pollution activity, is not present in significant amounts in most sediments, and because the amount of mercury that might be released by chlorides depends on a specific set of conditions which may not occur in the natural environment, I do not believe the contents of the report can be used as a reason for banning highway salting.

More comprehensive studies under realistic field conditions are needed in research involving the environmental sciences. Extrapolation of laboratory data to field conditions can often lead to inaccurate conclusions.

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