Trauma Research

Constance Holden states in her article "Academy proposes a federal trauma center" (News and Comment, 7 June, p. 1180) that "Surprisingly, the committee did not find any trauma research worth mentioning going on in the Department of Defense."

The committee that prepared the report did not review research on trauma by agency but rather by research area, for example, biomechanics or epidemiology. Nevertheless, we believe the important role played by the Department of Defense (DOD) was recognized. The report, *Injury in America: A Continuing Public Health Problem*, lists DOD along with the Department of Transportation and the National Institutes of Health as agencies that now perform research on injury (on page 17), uses references to work performed in DOD, and in discussing which federal agencies should be considered for an injury control center says, "DOD is the only agency that might currently have extensive programs in all the fields of research needed." An additional indication of the recognition of DOD research in this area is the fact that Colonel Robert R. McMeekin, director of the Armed Forces Institute of Pathology, served as a member of the committee.

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Ultrasound Effects

In defending their attempt (Reports, 15 Mar., p. 1349) to replicate the experiments of Liebeskind *et al.* (*1*) on the effects of ultrasound frequencies on sister chromatid exchanges (SCE's) in human lymphocytes, Miller and Ciaravino (Letters, 10 May, p. 649) erroneously present our work as supporting the hypothesis that ultrasound has no effect on SCE's. Our initial report (*2*) indicated small but significant increases in SCE's in phytohemagglutinin-stimulated human lymphocyte cultures (six independent experiments). The paper from which Miller and Ciaravino cite nonsignificant χ^2 tests out of context (*3*) was clearly described by us as reporting the results of a pilot study to determine whether synergistic effects of ultrasound and mitomycin C should be included in a more comprehensive experimental design: "This study was not designed to exclude ultrasound as an agent capable of inducing sister chromatid exchanges" (*3*, p. 994). Furthermore, the trend of increased SCE's in cells exposed to either ultrasound or ultrasound plus mitomycin C was present, although sample sizes in this study were much too small for any conclusions to be made. In both of these papers, as well as in a recent review (*4*), I have expressed the opinion that the question of possible bioeffects of ultrasound is still unresolved. In particular, the data available do not allow us to exclude the possibility that ultrasound can exert effects on DNA as measured by increased SCE frequencies. Although the work of Ciaravino *et al.* is reassuring and will be helpful in elucidating this question, it is also likely that their negative results "may be coincident with some subtle yet unidentified procedural factor," their explanation for the positive results reported by Liebeskind *et al.* (*1*).

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Computing and Sociology

In their article "Some computer-based developments in sociology" (26 Apr., p. 428), David R. Heise and Roberta G. Simmons cite a number of statistical techniques that are now routinely used for the analysis of sociological data. The techniques mentioned in their article share the common conceptual basis that certain explicit assumptions are made regarding the form of the model (linear, quadratic, and so forth) and regarding the nature of the errors (normality, Poisson, and so forth). These assumptions are then used in conjunction with an estimation procedure, such as maximum likelihood or Bayes, to define an objective function to be optimized or integrated. The complexity of this objective criterion, as a function of meaningful parameters, necessitates the use of a powerful computer.

The advent of powerful computing has also led to the development of conceptually novel statistical methodology, of which bootstrapping (*1*), projection pursuit (*2*), cross-validation (*3*), modified likelihood (*4*), and classification and regression trees (*5*) are examples. The contribution of these techniques is to relax the stiff assumptions made by more "classical" methodology at the expense of an increase in computation. An early overview of related methodology for a general scientific audience can be found in (*6*).

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Crisis in Engineering

There is but modest comfort to be taken from the "abatement" of the crisis in engineering summarized by Constance Holden (News and Comment, 24 May, p. 973) from the National Research Council (NRC) report *Engineering Education and Practice in the United States*. The engineering profession as a whole is in rather good shape at present. The crisis in engineering *education*, however, continues despite significant but inadequate steps taken to ameliorate it. It is a crisis of quality of education caused by the great shortage of highly qualified faculty in just about every engineering undergraduate program (not primarily graduate programs, as Holden reports) and a corresponding shortage of modern instructional laboratory equipment. Perhaps it is inappropriate to label a problem that has been acute for 5 years as a "crisis," but not in a historic context. Unless more is done, as outlined in the NRC report, the nation will pay dearly for the inadequacies of the education provided to the vast majority of its brightest undergraduates, on whom the future economic viability and defense capability of this nation will depend so strongly.

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Erratum: In a listing of the new foreign associates of the National Academy of Sciences (News and Comment, 17 May, p. 826), the name of Pierre Chambon, Biochemistry, Institut de Chimie Biologique, Faculté de Médecine, Strasbourg, France, was inadvertently omitted.