

It is now generally recognized and accepted that 80-90 percent²⁴ of the cancer deaths in the U.S. are due to environmental causes, including industrial chemicals, pollution, diet, reproductive behavior, and various elements of life-style and culture. These cancer determinants and/or antecedents concern and affect humans in unique ways, and it is pointless to try to study them in any animal model system. It is not effective to put human cells in animal systems or to use primates as hosts, since the biochemical, neurological and psychological environment of the model is "completely different" from that of the human being.

Bross also points out that scientists have traditionally believed that "mice are miniature men," and that technical jargon often interferes with rational logic. Statistical correlations involving animal models to predict the success or failure of drug regimens in humans are "statistically invalid," he believes, since reports are often selectively chosen, or handpicked, to prove or disprove any hypothesis. He describes these efforts as "amateur numbers games," and physicians and scientists as people who "don't understand statistics."²⁵

So biomedical science perpetuates an enormous deception by its blind tradition and by its unquestioning faith in its own flawed reasoning and methods of evaluation. Perhaps scientists should heed the warning given to all statistics students by Mark Twain who said, "There are lies, damned lies, and statistics."

The Nude Mouse: Example

The great majority of the 100 million mammals killed every year are rodents, specifically rats and mice. The mouse, especially, is a favorite in cancer research, since it can be quickly bred as a uniform genetic strain, is easy to maintain, and easy to kill. Its use as a laboratory animal is traditional and an established database exists using data from uniform mouse strains.

One method used in the attempt to establish a physiological correlation between mice and men involves a unique strain of mice which lack the thymus gland. This gland is important in the development of cell-mediated immune reactions, which are vital for the rejection of foreign cells and may be important in protecting against cancers. Biomedical scientists can transplant human can-

cers into these mice "successfully," meaning that the "human" cancers grow unimpeded in the mouse tissue.

The following illustrates the use of the nude mouse as a host for human cancers: Tumor cells are transplanted into the mouse's kidney; their malignancy is measured by the number of cells per injection necessary to produce a tumor. The nude mice are finally killed and autopsied to monitor the growth of the imposed cancer.

Such cancer research, whether performed on the nude mouse, on any other mouse strain, or on other rodent or mammalian species, is subject to question. Most mouse cancers arise in bone, connective tissue or muscle (sarcomas), while most human cancers arise in lining membranes (carcinomas). These species variations may be extremely significant; thus, to avoid problems of extrapolation between species, cancerous tissue would be better studied in cell and tissue culture. The mechanisms of cell growth can be more easily determined, as well as the effects of potentially useful substances on the cells. Furthermore, since cancer is considered to be many separate diseases, it is important to study tissue from the species which naturally develops the diseases; i.e., human tissue.

David Salsburg of Pfizer Chemical Laboratories recently analyzed the data from a widely used test to detect chemicals which can cause human cancer. Known as the Lifetime Feeding Study in Mice and Rats, the procedure is a carcinogenic bioassay for human carcinogens, and involves feeding the rodents very high doses of suspect substances. After the animals die, the pattern of tumors in the dosed animals is compared with those of control animals which did not receive the compounds. Salzberg's analysis of the data found no more than 50 percent validity.²⁶ This is just one illustration of the questionable validity of using animal models to study cancer in humans.

Similar anomalies have been noted in other rodent studies, specifically in those determining the carcinogenic nature of certain pesticides. It was concluded at the Joint Meeting of the Food and Agriculture Organization and the World Health Organization on Pesticide Residues in 1981 that carcinogenicity in the mouse should be rejected as predictive of potential hazard to man. This determination resulted from a recognition of the irrelevance of long-term animal carcinogenicity

²⁴Wynder, E.L. and Gori, G.B., *Journal of the National Cancer Institute*. (1977), 58:825.

²⁵Bross, D.J., *Op. Cit.*, p.5.

²⁶Salsburg, D., *Fundamental and Applied Toxicology* (1983) 3: p. 63-67.