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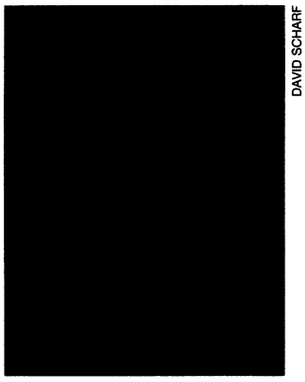
LETTERS

Right face

Employment opportunities for recipients of the Ph.D. in the area of communication sciences and disorders are "actually increasing." Methylene chloride is said to be a "multispecies" carcinogen, in contrast to earlier statements. Small-scale, basic research in plasma science is in need of, and soon to receive, increased funding. The benefits of providing better science education for American students are emphasized in two letters. Steps leading to the approval of human gene therapy trials in New Zealand are discussed. Restrictions on foreign scientists who wish to study in the United States are pondered. And will the real instigator of hookworm disease in humans please stand up? (Right, hookworm.)



DAVID SCHARF

Communication Sciences: A Thriving Discipline

Recent issues of *Science* and *Academe* have highlighted the fact that opportunities for young scientists wishing to follow traditional academic careers are dwindling in most fields of study. While the reasons for these reduced opportunities may be debatable, the reality cannot be ignored. The Council of Graduate Programs in Communication Sciences and Disorders would like to make the academic community aware of the fact that we represent one discipline in which employment opportunities in academia are actually increasing, with full employment of doctoral-level personnel anticipated well into the next century.

The discipline of communication sciences and disorders includes the professional practice domains of speech-language pathology and audiology, as well as the speech, language, and hearing sciences. The discipline has a strong, interdisciplinary research base, which includes the neurosciences. Academic employment opportunities are greatest for those who typically receive clinical-professional training at the master's level and research training at the doctoral level. However, the contributions of scholars whose education and research activities address aspects of communication sciences are welcome and indeed necessary for maintenance of the vitality of the discipline.

Barbara B. Shadden
President,
Council of Graduate Programs in Communication Sciences and Disorders,
Post Office Box 26532,
Minneapolis, MN 55426, USA

Methylene Chloride

Contrary to reporting from the Society of Toxicology annual meeting [J. Kaiser, "Methylene chloride's cancer tricks," Meeting Briefs, 12 Apr., p. 200] that methylene chloride (dichloromethane) is a "mouse-only" carcinogen, this high-volume clastogenic and mutagenic chemical also causes tumors in several strains of rats, and epidemiologic evidence exists regarding elevated carcinogenic risks to workers, particularly for the liver, bile ducts, and brain (*1*). In both male and female mice, methylene chloride induced cancer of the liver and of the lungs (*2–6*).

In follow-up mechanistic and tumor progression studies, mice exposed to only 2000 parts per million of methylene chloride for 26 weeks or longer showed eventual lung and liver cancers in the absence of overt cytotoxicity (*6*) and under circumstances in which there was no demonstrable sustained enhanced cell proliferation (*7*). Significantly, these studies demonstrate that methylene chloride is a more potent inducer of lung tumorigenesis than of liver tumorigenesis, and assessments of human cancer risks should be based on the lung carcinogenic data (*8*). The genetic alterations observed in mouse lung tumors are comparable to those that have been detected in human pulmonary adenocarcinomas, suggesting that similar mechanisms of tumorigenesis are operating in murine and human lungs (*9*). Thus, to consider mice more sensitive than or distinct from humans is a poor assumption.

In four independent studies, methylene chloride induced tumors of the mammary gland in Fischer 344 rats (*2, 4*) and Sprague Dawley rats (*10–12*). Atypically (*13*), tu-

mors of the mammary gland were observed in both genders of rats. Additionally, other tumor increases occurred in the skin (*2*), neck (*3, 5*), salivary glands (*10*), and in the category "total tumors" (*11*). Obviously then, methylene chloride is a multispecies, multistrain, both-gender, multiorgan, dose-related carcinogen, clastogen, and mutagen that should be considered as a carcinogenic risk for exposed humans.

James Huff
John Bucher
J. Carl Barrett
National Institute of Environmental Health Sciences,
Research Triangle Park, NC 27709, USA
E-mail: huff1@niehs.nih.gov

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Focus on Basic Plasma Science

In the article "Fusion plan gathers steam" describing the U.S. House of Representatives Energy and Environment Subcommittee hearing on restructuring the fusion energy program (22 Mar., p. 1660), Andrew Lawler quotes me as "warn[ing] that the lack of small-scale university fusion experiments is keeping young people from entering the field." While this statement is likely correct, it was not part of my written testimony nor my remarks at the hearing. As co-chair of a recent National Research Council (NRC) study, *Plasma Science: From Fundamental Science to Technological Applications* (National Academy Press, 1995), I focused my remarks on small-scale *basic* research in plasma science. Of all of the areas considered in the NRC study, this was found to be the area of plasma science most in need of support. Because the fusion program is the largest nondefense user of plasma science, the study recommended that the program provide increased support for research in the underlying basic science.

Rather than being a critic of the new Department of Energy (DOE) program, I am pleased to say that both the report of DOE's Fusion Energy Advisory Committee, and the testimony of Martha Krebs at the hearing, indicate that they recognize the need to increase support for basic plasma science. Krebs, director of the Office of Energy Research, outlined DOE's plans to significantly increase funding for basic plasma science, beginning in fiscal year 1997, which will be an important step in remedying the current situation.

Clifford M. Surko*
Department of Physics,
University of California, San Diego,
La Jolla, CA 92093–0319, USA

*Co-chair, National Research Council Panel on Opportunities in Plasma Science and Technology