Practical Aspects of Mutagenicity Testing

by Claes Ramel*

Although the test systems should continuously be evaluated and improved, we have today a battery of tests which must be considered sufficiently reliable for a practical screening of the mutagenicity of chemicals. It may be emphasized that these genetic tests are at least as reliable as other tests used in toxicology; as a matter of fact, they give information of the molecular mechanism of the effects rarely encountered in other toxicological test systems.

The mutagenicity tests, however, are reliable only as long as they are performed and evaluated correctly. The present meeting has clearly demonstrated that the mutagenicity tests are by no means free from complications; they can in fact hardly be performed in a proper way without a great deal of knowledge and experience.

Today we are to a great extent still discussing experiments with model substances but we will soon reach the stage when this experience has to be put into a large-scale practice for the actual evaluation of chemicals that we are exposed to in the environment. This leads to the important question—who is going to perform the tests?

The necessity of considering mutagenic hazards of chemicals is rapidly being recognized by industries and many industries do a good job in their testing for mutagenicity effects. There are, however, also many cases, when the testing is done by people with poor or no previous training and without sufficient understanding of the genetic problems involved.

The practical aspects of mutagenicity testing therefore does not only concern actual testing procedures. A question of almost equivalent importance is the training of geneticists for this work.

There are all reasons to believe that the need for competent scientists in this area will increase rapidly in the future. This need may in fact be further enhanced by the possibility of using mutagenicity tests also for at least a preliminary screening of carcinogenic actions of chemicals, as has been discussed during this meeting as well as at many previous occasions. It therefore is necessary to emphasize the responsibility of governmental authorities both in this and in other countries considering such a training program.

The organization of the routine mutagenicity testing probably will be solved in different ways in different countries. It can be assumed, however, that a great deal of this testing activity will be based on contracts with various laboratories, as it is generally done in the United States. A major point here is that some control be exerted that these laboratories fulfill a required standard. It is evident that such a control would be greatly simplified if this testing activity is centralized to highly specialized laboratories performing mutagenicity tests for all or large groups of industries in a country. In

*Wallenberg Laboratory, University of Stockholm, S–104 05 Stockholm, Sweden.

Sweden we have discussed the organization of such a laboratory, the responsibility for which would be shared by the government and industry. Another suggestion, along somewhat similar lines, has recently been brought up by the Swedish insurance companies. They have pointed to the possibility of arranging insurance policies with industries so the responsibility for mutagenic and carcinogenic hazards of chemical products is taken over by the insurance companies, which would set up specialized testing laboratories for this purpose. One advantage of such a solution might also be that different organizations are responsible for the production and for the testing of chemical products.

Discussion

Dr. E. Freese (*NINDS*): I want to thank Dr. Ramel for making his excellent case for training, and training grants. I want to say that the Environmental Mutagen Society sponsors such a training course under the direction of Dr. Legator. Unfortunately it still has not obtained the money. I think it should be clear that such training is much less expensive than badly performed contracts. There's unfortunately some silly regulations which prevent the money from being spent for training and we somehow should push to have these regulations overcome.

Dr. E. B. Lewis (*California Institute of Technology*): Dr. Ramel's comments reminded me that I had not referred to a nice summary on the drug-induced cancer problem by Frawmeige and Miller of the NCI, who have in a letter to the editor summarized all the literature on the important inductions of tumors with chemicals. In connection with what Dr. Ramel said about insurance companies, Frawmeige and Miller state that methods to link drug prescriptions with subsequent diagnoses of disease have been instituted as surveillance systems with drug toxicity at the Kaiser Permanente in San Francisco.

Dr. S. Abrahamson (*Univ. of Wisconsin*): I think you need two levels of support: one for training of personnel and one for long-term support for devising and continuing to devise the systems that you want to see developed. I don't think they can necessarily be tied to such agencies as contractual ones. They have to be supported at different levels and provide that kind of support over a long period of time so that you're not in danger of tooling up a team of technicians to develop systems and find out, six months later, that you've been wiped out, by the whim of some agency.