Book Reviews

Alternatives to Animal Testing. Edited by Ronald E. Hester and Roy M. Harrison. The Royal Society of Chemistry, Cambridge, U.K. 2006. xi + 123 pp. 16 × 24 cm. ISBN 0-85404-211-3. £45.00.

This volume of the Issues in Environmental Science and Technology series addresses a topic of vital concern not only to those professionally involved with chemicals and their effect on human health but also to those concerned with animal welfare and to the public in general. Animal experimentation is a sensitive and controversial issue. The development of new methods that avoid, refine, or reduce the use of animals in evaluating the safety of chemicals intended for human use is clearly a most practical, humane, and economic goal.

The first chapter is "General Overview of the Safety Evaluation of Chemicals". Society demands that chemicals affecting humans be "safe". Thus, all substances intended for use as therapeutic agents, veterinary medicines, cosmetics/personal care products, food additives, insecticides, fungicides, etc. must be evaluated as being safe before they can be marketed. Toxicological risk assessment is generally obtained from physicochemical information, animal testing, and (where available) human data. The kinds of testing and their evaluation are controlled by detailed governmental legislation and regulatory requirements. Research is needed to evaluate regulatory-required animal tests and the possibility of replacing them with nonanimal alternatives. Unfortunately, a substantial amount of time is generally required to achieve international agreement that a test is unnecessary or that it can be replaced with a newer test. Thus, it is appropriate that there exists strong support for alternative testing.

The next chapter, "International Validation and Barriers to the Validation of Alternative Tests", describes some of the consequences of a system proposed by the European Commission for the Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) and related U.S. legislation to evaluate the safety of all chemicals. REACH involves 30 000 existing chemicals and could require as many as 3.9 million animals for its implementation. This has prompted a major effort toward the development of nonanimal tests, e.g., ones employing cell or tissue preparations, computer modeling systems based on quantitative structure−activity relationships, and biokinetic modeling, to replace the animal tests. These tests and their validation, i.e., an accepted process for establishing the relevance and reliability of a test method, are considered.

The following chapter, "In Vitro Testing for Endocrine Disruptors", describes a number of in silico and in vitro tests for evaluating the safety of a particularly important class of chemicals, i.e., ones that simulate or block the effects of endogenous sex steroid hormones.

The fourth chapter, "Intelligent Approaches to Safety Evaluation", suggests a tiered approach to evaluate the safety of chemicals. This approach emphasizes maximum use of existing data, predictive information based on similar structures, alternatives to animal testing, data waivers to omit some studies, preliminary risk assessments, use of expert reports, and coordination with governmental regulators.

The final chapter, "Alternative Tests and the 7th Amendment to the Cosmetic Directive", describes methods for assessing the risk of cosmetic products. It is considered plausible that nonanimal tests may be developed to evaluate various toxicity, irritation, sensitization, mutagenicity, carcinogenicity, and other harmful properties of substances intended for cosmetic use.

The five authoritative and detailed chapters that comprise this book are written by experts in the field who describe the progress made in applying the three R actions, i.e., *r*educing the use of animals, *r*efinement of procedures that reduce pain and distress, and *r*eplacement of animals with alternative tests. The book presents a state-of-the-art description of the evaluation of the safety of chemicals, difficulties with internationally accepted validation, barriers to the acceptance of nonanimal tests, and possible future directions. Each chapter includes a timely list of references, and the book concludes with a detailed subject index.

The book treats an important topic with broad humane, economic, legal, scientific, and political implications. It is important reading for all involved with pharmaceuticals and cosmetics.

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