Book Reviews

NATIONAL ACADEMY OF SCIENCES, NATIONAL ACADEMY OF ENGINEERING and INSTITUTE OF MEDICINE
Drinking Water and Health
National Academy Press, Washington, DC, 1989; 268 pp., $25.75

This, the ninth volume in the series issued by the Safe Drinking Water Committee of the Board on Environmental Studies and Toxicology of the National Research Council, USA, deals with two important topics of current interest that are associated with the toxicological risks of chemical contaminants in drinking water. The first topic focuses on the possible uses of DNA adducts in evaluating health risks from chemicals; and the second examines the issue of human exposure to multiple toxic chemical contaminants present in drinking water. Additionally, this volume contains a comprehensive cumulative index of all the nine volumes in the series. Each of the two topics dealt with is prefaced with an executive summary and contains conclusions and recommendations for further research.

The section on DNA adducts is divided into two parts: the first deals with the biological significance of DNA adducts and protein adducts, and the second part describes and evaluates assay systems developed for detecting and measuring these adducts formed in the body. Studies in laboratory animals and human cancer patients on chemotherapy treatment have indicated that DNA adducts can provide useful dosimetric information on estimates of carcinogen exposure, exposure to the target tissues and sometimes on mutagenicity and carcinogenicity. For example, in rats, correlations have been observed between DNA adduct formation and exposure, hepatocyte initiation and liver cancer development in experiments with diethylnitrosamine, aflatoxin B1, 2-acetylaminofluorene and N-methyl-4-aminobenzene. Thus, the use of DNA adducts could be valuable in dose-response evaluation. This chapter describes what is known about the mechanisms and rates of DNA adduct formation and removal, and discusses the significance of adduct position on the DNA, and the correlation of adducts of certain specific compounds with toxic effects. In addition, protein adducts are discussed as possible markers of chemical exposure. Brief but useful information is provided on site relevance on DNA adduct formation and the various forms of adduct resulting from alkylation, base mispairing, hydrolysis and cross-linking reactions. Furthermore, examples are given of the relevance of these DNA lesions in tumorigenesis in animal models and in studies in humans.

The section on DNA adduct technology describes a number of physicochemical methods and immunoassays that are available and appropriate for measuring DNA adduct and protein adduct formed by various genetically toxic agents. A useful survey is provided of the general use of DNA and protein adduct measurements in risk assessment and in human monitoring and epidemiological studies.

The second topic covered in this volume is a report on possible strategies for the risk assessment of multiple chemical exposures. Although almost nothing is known about how chemicals interact when they are ingested by humans as mixtures, interactions that could have adverse health effects must be considered in any assessment of the quality of drinking water. As many as 2000 chemical contaminants have been detected since 1974 in drinking water, a grouping of chemicals is suggested along the following lines:

(i) contaminants that are carcinogenic;
(ii) systemic contaminants that have similar toxic endpoints can be treated as having additive effects, under most conditions;
(iii) chemicals that might be biotransformed to similar metabolites with similar reactivity and stability;
(iv) contaminants with structural similarity, which might imply similar biological responses.

The report addresses a number of important issues in the context of the health assessment of chemical mixtures. The first deals with the importance of pharmacokinetics in the assessment of health risks associated with multiple chemical exposure. The current Environmental Protection Agency (EPA) approach to health risks from non-carcinogenic chemicals is reviewed in the next section. The following two sections consider biological issues of exposure to organophosphates, carbamates and volatile organic compounds. This is followed by a discussion of assumptions underlying the EPA's risk assessment methods for carcinogens. Specific research proposals are given in each of these sections and are summarized in the section giving the final conclusions and recommendations for research.

This volume, the product of the deliberations of eminent experts drawn from widely divergent fields, is highly recommended for scientists interested in the risk assessment of chemicals in the human environment.

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GARY A. BOORMAN, SCOT L. EUSTIS, MICHAEL R. ELWELL, CHARLES A. MONTGOMERY, JR. and WILLIAM F. MACKENZIE (eds)
Pathology of the Fischer Rat. Reference and Atlas
Academic Press, New York, 1990; 580 pp., $125

This atlas and reference text on the pathology of the Fischer 344 rat was compiled by 39 authors and extends over 35 chapters and 580 pages. Given the amount of work that must have been entailed in finalizing the text, it is not surprising that five editors were needed.

The book is primarily a working manual for toxicological pathologists. It adopts the classical 'organ by organ' and 'system by system' approach to presentation, with a final chapter covering tumour incidences in the Fischer 344 rat taken from NTP historical data. The introduction to each chapter is followed by a discussion of the embryology, anatomy, histology and physiology of each organ or system. There then follows a detailed consideration of congenital, degenerative, inflammatory and vascular lesions, as well as hyperplastic, neoplastic, miscellaneous and toxicological lesions, with a bibliography that the editors admit is not meant to be exhaustive. Although the bibliography is not complete, in terms of size limitation this works well, as the key references are included.

A particular strength of the text is the careful editorial standardization of the chapters for style and fluency, with emphasis on the historical explanation of some of the more confusing terms that have arisen in the histopathological classification of tumours, such as 'neoplastic nodule' in the liver. This makes the book required reading for regulatory toxicologists, who are probably even more confused by such nomenclature and changes to it, than are histopathologists. Many experimental pathologists, who are not necessarily morphologists, will also find very useful the clear and simple explanation of the morphological terminology used by pathologists to describe lesions.

The chapter on the brain was particularly enjoyable, beginning with side-by-side presentations of line drawings and low-power photomicrographs for comparison of the brain at the levels prepared for examination. This is especially helpful for the reader who is trying to grasp the basic anatomy and histology of the brain prior to examining lesions (or artifacts!).

The most important feature of this reference and atlas is the photomicrographs. Here, it must be acknowledged that the
BOOK REVIEWS

A. K. ARMITAGE (ed.) Other People's Tobacco Smoke Galen Press, Beverly, 1991; 192 pp., £12.95

‘Other people’s tobacco smoke’ is an emotive and political subject and it is not surprising to find, at the start of this volume, that the tobacco manufacturers Philip Morris are acknowledged for their support. Although the contents of any volume on this subject produced by either the industry or by ‘Action on Smoking and Health’ are predictable, criticism of source rather than content is the antithesis of science; it is therefore necessary to examine the data offered. Thus, although it now seems to be officially accepted that other people’s smoke is health damaging as well as being irritating and aesthetically objectionable, it is well worth examining the data on which these conclusions are drawn. The contents of this book certainly do just that and provide a reasonable source book on the evidence for adverse effects of environmental cigarette smoke (ETS) and provide some of the arguments weakening that evidence.

To the applied toxicologist, ETS is only one example of low-level exposure to a material whose high dose effects are well known and uncontroversial. In this case, however, a number of eminent epidemiologists have concluded that the low-level effects for at least the wives of smokers are quantified and that this enables extrapolation to other exposures. Some of the authors in this volume are sceptical of these conclusions and go a long way to justify their scepticism.

In addition to chapters on the specific health effect of smoking, others deal with indoor air quality and the social science aspects of the subject. Bernice Martin describes the sociology of the campaign against tobacco smoke and Petr Skrabanek brings his not insignificant wit to bear on society’s attitudes to smoking. The former author is new to me but I have previously enjoyed Dr Skrabanek’s thoughts on several other subjects.

Over all, if you enjoy controversy and are able to read unorthodox opinions I recommend this book, although in some institutes (not known for their open minds on this subject) it may have to be read in a plain brown cover.

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J. M. FACCINI, D. P. ABBOTT and J. J. PAULUS
Mouse Histopathology. A Glossary for Use in Toxicity and Carcinogenicity Studies Elsevier, Amsterdam, 1990; 225 pp., 225 G

The authors state in the introduction to this book that it is intended as a companion to ‘Rat Histopathology’ by Greaves and Faccini (1984). Both books also are intended to be bench references for toxicological histopathologists, with the emphasis on description and identification of lesions found in rodents. This text is a classification of the natural background lesions that have been found in control CD-1 mice, used in studies at the Centre de Recherche, Pfizer, Amboise, France, and is subtitled ‘A glossary for use in toxicity and carcinogenicity studies’.

The eleven chapters cover the integumentary, haematopoietic and lymphatic, musculoskeletal and soft tissue, cardiovascular, digestive and nervous and special sense organ systems, as well as the respiratory, urinary, female and male genital tracts and the endocrine glands.

The chapter on the digestive system uses a rather old reference to viral diseases (Seamer, 1967), which contains a section on the non-existent lethal intestinal virus of infant mice, now known to be mouse hepatitis virus. There are also irritating, rather than serious, proof-reading errors, such as cencephalomyocarditis virus being abbreviated to EIMCV rather than the usual EMC, and coronavirus is misspelt.

The section on infections of the respiratory tract also could be improved. K virus is so rare as to not need including. However, reference to Pasteurella pneumotropica which is not only very commonly isolated from mouse colonies but is also well documented to be an opportunistic chronic infection, usually in conjunction with Mycoplasma pneumoniae or Sendai virus, is omitted.

Some of the nomenclature used for tumours also seems controversial. To describe mesothelioma as mesenchymal sarcoma in parentheses is confusing. There are sarcomatous, epithelial and mixed types of mesothelioma. It was noticeable that the one shown was epithelial. The term mesenchymal sarcoma would have been better omitted.

The section on neoplastic lesions of the bile duct includes in the subheading the term cholangiosarcoma. The authors go on to say that tumours of this possible type (poorly differentiated with anaplastic elements but with ducts composed of columnar epithelial cells) are very rare and may not be pure cholangiosarcomas. Such tumours could be described equally well as possible cholangiocarcinomas. Other authors have avoided this term, and perhaps it would have been better to omit it as part of a subheading in a glossary if there is such uncertainty about the existence of this tumour type.

This book would have been of greater interest to toxicological histopathologists had it included more comparative pathology of treatment-induced lesions and tumours. This could be seen clearly where neoplastic lesions of the urinary bladder were discussed. The natural lesion described as an epithelial proliferation in the bladder wall could be confused at the LM level with the chemically or chronic irritation-induced smooth muscle tumour seen in mice, sometimes referred to as a ‘vegetative lesion’. Although this is an important distinction in terms of comparative pathology, the discussion of any such confusion in diagnosis is outside the scope of the book if induced lesions are not included.

The price of £70 (approx.) seems rather high compared to some of the more recently published books on toxicological histopathology, such as the excellent ‘Atlas of Experimental Toxicological Pathology’ by Gopinath, Prentice and Lewis (£75 approx.), ‘Colour Atlas of Neoplastic and Non-neoplastic Lesions in Aging Mice’ by Frith and Ward (£74 approx.) or the definitive ‘Pathology of the Fischer rat’ by Boorman, Eisner, Elwell, Montgomery and MacKenzie (£80 approx.).