Glutaraldehyde induced asthma in endoscopy nursing staff

We read with interest the paper on glutaraldehyde and symptoms in endoscopy nursing staff. It is reported that there was an absence of objective evidence of the physiological changes associated with asthma. Peak expiratory flow (PEF) records from 17 cases were analysed by the OASYS-2 computer program, and three of these had OASYS-2 scores less than 2.5. These cases were thought not to show asthma because PEF diurnal variability was less than 15%. We have recently shown that increased diurnal variability is not found in most workers with occupational asthma. Part of the explanation may be that the acrophase (time of maximum PEF in a 24 hour period) in normal and asthmatic people occurs at around 1600 with a trough about 12 hours later. Any deterioration in lung function due to exposure in the workplace is superimposed on the normal circadian rhythm. Thus, if a worker starting work in the morning has a fall in PEF that continued throughout the day while at work, the maximum PEF occurring at the time of the acrophase might be reduced. This would tend to reduce the diurnal variability. Even in non-occupational asthma there is considerable overlap of PEF variability with that occurring in normal people. Use of non-linear PEF meters significantly underestimates variability in PEF but even when PEF readings are linearised, an absence of an increase in diurnal variability does not exclude asthma. An OASYS-2 score greater than 2.5 has a specificity of 94% for diagnosing occupational asthma. We suspect that, provided peak flow records were of adequate quality, the threshold used with OASYS-2 scores greater than 2.5 did indeed have occupational asthma. Since 1995, 29 cases of occupational asthma due to glutaraldehyde have been reported to the West Midlands, the West Midlands reporting scheme for occupational asthma. A study of 24 workers referred to the Occupational Lung Disease Clinic in Birmingham with respiratory symptoms temporally related to glutaraldehyde exposure found that 16 had a definite occupational effect evident on their PEF records. Five of eight workers with equivocal PEF records underwent specific bronchial provocation tests to 2% glutaraldehyde, all of which were positive as were three challenge tests in workers with suggestive PEF records. The challenge subjects included two in whom PEF diurnal variability was less than 10%. Of the subjects, seven out of 24 also had positive specific IgE to glutaraldehyde.

The sensitivity of serial PEF records in showing occupational asthma drops dramatically if less than three to four weeks of recordings are performed or if they are of inadequate quality—for example, less than four readings a day. We have found that objective evidence of asthma induced by glutaraldehyde can be obtained in a large proportion of workers with respiratory symptoms temporally related to exposure to glutaraldehyde when adequately sought after.

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Vyas et al reply

Anees et al raise a very important issue in terms of the physiological criteria on which a diagnosis of occupational asthma should be based and in particular the clinical significance of small work related declines in peak expiratory flow. We fully accept that a lack of an increase in diurnal variation does not exclude a diagnosis of occupational asthma. The pattern of peak flow measurements in occupational asthma quite often shows a marked difference in the mean peak flow on working days compared with days away from work without any increase in diurnal variation. Burge et al refer to the phenomenon of small work related changes in their publication and raise the question as to whether this represents asthma or other lung pathology. Their opinion at that time was that it could not be asthma. The authors' definition of contact urticaria answering positively to this test and postulate the same irritant airway response than the development of occupational asthma. Our paper is not intended to suggest that glutaraldehyde is not capable of inducing occupational asthma, for which there is convincing published evidence, in addition to our own personal experience.

Our paper reports the findings of an epidemiological survey of a large population of currently exposed endoscopy nurses and has shown that while respiratory symptoms occur in this group, the lung physiology and the immunology have not supported a suggestion of a high prevalence of occupational asthma at current exposure levels.


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The recent article by Vyas et al raises some concerns to which I would be grateful if they could respond.

(1) In the abstract one of the objectives is stated as finding the nature and incidence of symptoms experienced by a large sample of hospital endoscopy nurses. The study design is cross sectional and used an adapted version of the MRC questionnaire for respiratory symptoms. This study design normally records disease prevalence rather than incidence. It would be helpful to know if the questionnaire sought information on new symptoms in a given period in the past, or the presence of symptoms.

(2) For the purposes of the study, work related symptoms of contact dermatitis were defined as contact skin rash with any contact with glutaraldehyde. The control group was defined as contact urticaria answering positively to this test and postulate the same irritant airway response than the development of occupational asthma. The authors' definition of contact dermatitis would have resulted in staff with contact urticaria answering positively to this section. As such, the presence of IgE specific to latex could well be of importance as staff would have used latex gloves.

(3) Cross sectional studies are enhanced by the inclusion of ex-employees. In this study only 18 of 68 ex-employees participated in this study. All 18 were among 20% who had left within the last 5 years for health reasons. As such a selection bias exists and the interpretation of the frequency of work related symptoms in ex-employees should be cautious. Also, it is noted that eight of the 18 ex-employees continue to work as nurses and may experience work related symptoms from circumstances related to current workplaces rather than endoscopy suites. The absence of a control group of nurses working in areas...

The declared intention of the book is to present “...compact and efficiently the scientific basis to [sic] toxicology as it applies to the workplace and the environment”, and it succeeds at a practical level.

The editors and authors all come from the eastern half of the United States, which gives a particular cast to the topics covered, and particularly to the sources cited and the approach to the evaluation of data. They have still served the reader well by the breadth of the coverage and the clarity of the presentation.

The three main sections cover: the principles of toxicology; areas of concern including reproduction, carcinogenicity, the effects of metals, pesticides, solvents and natural toxins; and applications including risk assessment, occupational and environmental health, epidemiology, and the control of hazards in the workplace. Each topic is followed by a concise summary and a short, reasonably up to date list of references and suggested reading (not distinguished). There are some graphs, diagrams, and occasional illustrative sketches and grainy photographs.

The strong points of the book are its breadth in its chosen areas (although workplace related matters get more attention than environmental issues—for example, lead gets almost four times the space of dioxins) and clarity. Its weaknesses are the parochialism and the simplicity imposed by the coverage of many topics. Information and its evaluation are presented more as “givens” than as opportunities for arguments to illustrate principles and their modification in practice.

Although the book seems to be directed towards practical users of toxicological decisions it does not cover the sources of information, nor does it offer a guide even to the multifarious United States agencies involved; federal activities seem less important than state or local actions. Other countries and even international bodies with which the United States may cooperate are omitted.

None the less, this would be a useful book to have as a quick source of information and as a guide to some of the principles underlying the successful application of toxicology some of the time and in some circumstances. In a contrary way, it would be an ideal base for high level students to identify deficiencies in its very pragmatic approach to toxicology and to learn by remedying them with knowledge from elsewhere.

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CORRESPONDENCE

Personal exposure of children to nitrogen dioxide

We read with interest a recently published study on personal exposure of asthmatic children to nitrogen dioxide (NO₂), relative to concentrations in outdoor air.1 In their results, the authors did not find: “...significant correlation ... between each child’s weekly mean personal exposures and mean outdoor concentrations for the corresponding periods”; “...marked evidence of seasonality” on personal exposure.

They concluded: “... at low concentrations, changes in NO₂ in outdoor air ... contribute little to variations in personal exposure...” We think these conclusions cannot be drawn from the method used to evaluate outdoor concentrations. Besides, we report different findings on a seasonal trend at higher concentrations of personal exposure.

We performed a study to evaluate the annual distribution of personal exposure to NO₂ in school children of Novara, a small city in north west Italy (about 110 000 inhabitants) and to study determinants of this exposure, as in those reported by Linaker et al.2

We measured personal exposures of children to nitrogen dioxide (NO₂) and to study determinants of this exposure, as in those reported by Linaker et al.2

The relative risk for these variables was estimated with a multiple regression model (ANOVA) and Tukey’s tests. Infor-

The only factor associated with increased personal exposure was to live along busy streets, and then only for children from different occupations away from home, re-

The annual average of 6200 measure-

The relative risk for these variables was estimated with a multiple regression model (logit). The annual average of 6200 measures of NO₂ was 42.7 µg/m³ with a significant difference between seasons, and higher values in winter. The only factor associated with increased personal exposure was to live along busy streets, and then only for children from different occupations away from home, re-

Moreover the hormone profile of a low testosterone/gonadotropin ratio is established partially, hormonally mediated consequences—such as associated with many illnesses in men—of resulting oxi-

While the seasonal difference was clear. We think that our results depend on the habits of most children to spend many hours every day in many different occupations away from home, re-

Secondly, we think that only one measure-

Finally, at higher concentrations of NO₂ exposure, as in those reported by Linaker et al.,3 the seasonal changes in concentration in outdoor air contribute significantly to varia-

On the other hand, the role of risk factors present at home, and the differences between children are not clear. We think that our results depend on the habits of most children to spend many hours every day in many different occupations away from home, re-

The only factor associated with increased personal exposure was to live along busy streets, and then only for children from different occupations away from home, re-

Moreover the hormone profile of a low testosterone/gonadotropin ratio is established partially, hormonally mediated consequences—such as associated with many illnesses in men—of resulting oxygenase and bone fractures in men.13 So I suggest that the suboptimal bones of men in these two forms of occupation (deep water diving and operating high performance aircraft) are, at least partially, hormonally mediated consequences of these forms of non-occupational exposure. The point should be investigated.

Moreover the hormone profile of a low testosterone/gonadotropin ratio is established as associated with many illnesses in men12 as exposure to deleterious chemicals—for example, the nematocide DBCP14 and dioxin15—and to non-ionising radiation.16 So the question arises: what is the medical importance of this hormone profile in men who are in the workforce or who are serving members of the armed forces and who seem to be clinically well? Does it indicate immunological compromise?

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L. A PALIN M BINOTTI G BONA M PANELLA


9 Rockert HOE, Damber J-E, Janson PO. Testicular blood flow and plasma testosterone concentra-


10 Rockert HOE, Haglid K. Reversible changes in the rate of DNA synthesis in the testes of rats after daily exposure to a hyperbaric environ-


19 Greaves K, Cox C, Schrader SM, et al. Semen quality and hormone levels among radiofre-


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19 Greaves K, Cox C, Schrader SM, et al. Semen quality and hormone levels among radiofre-

CORRECTION

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The last sentence should read: The presence of a control group of nurses working in areas without exposure to gluteraldehyde would have been of help in interpreting the results obtained.

BOOK REVIEWS


For graduate students trying to move beyond a basic understanding of the effects of air pollution on our health and urban environment, a book such as this is greatly needed. The volume of literature on that subject and its level of complexity is huge, and the gulf between it and basic texts is growing rapidly. This book seeks to bridge that gulf by tackling the key issues in the field of air pollution research.

A collection of work by people with expertise in each of the chosen fields, this book succeeds to varying degrees with its aim, with some chapters succeeding to a greater extent than others. Statistical issues in analysis of air pollution time series are complex indeed, and Hurley succeeds in demonstrating these complexities without making them seem intimidating. Maynard also provides a very clear introduction to the effects of non-biological particles on health, which gives readers a clear understanding of causality in epidemiological studies, and introduces the issues surrounding the key question as to who dies during episodes of particulate pollution. Cancer and air pollution is another difficult area dealt with skilfully by Rushton. People without an epidemiological background are introduced to the concepts of epidemiological studies, and confounding in particular. Other highlights are the lucid discussions of mechanisms of toxicity of gaseous pollutants, and an introduction to the concept of risk measurement and management at the population level.

Other contributions did not seem to work so well. The introductory chapter would not give a reader new to the field a clear picture as to how composition, sources, and levels of air pollution have changed, and the discussion of alternative fuels was dominated by discussion of regulations in the United States and took a long time to get down to business. The final chapter about information resources gives a basic introduction on where to find information, but essentially is a list of where to find information on any subject—an advanced reader would possibly be better served by introducing key elements against which studies in this field can be critically appraised.

Inevitably, there are some terms that are not explained by the authors, which would make some sections difficult to understand for people from a different scientific background to that of the authors. Addition of a glossary would have helped. The ordering of the chapters seemed at times to be illogical but good editing means that all sections are relatively easy to read and follow. The print quality of some of the figures is poor, which is a shame, because there are relatively few of them.

Overall, this book succeeds at a very difficult task. A graduate student will leave this little volume neither overwhelmed by the complexity of the subject, nor seeing as simple the task of unravelling the vast and growing body of knowledge in the field of air pollution research. In that, the book succeeds, and I would recommend it to my research students as a way into this fascinating subject.

S WALTERS
This is a comprehensive occupational hygiene textbook written from a North American perspective. There are 67 chapters in four separate volumes, a total of 3453 pages covering everything from hazard recognition to control of emissions from industrial processes. Each volume is available separately although there is a discount for those who decide to purchase the four volumes together.

The first edition of Patty’s industrial hygiene was produced over 50 years ago, with each subsequent edition being produced at about 10-year intervals. The scope of the work has continued to expand as occupational hygienists have become involved with a wider range of problems. This edition brings together a diverse range of material that it is likely that any professional hygienist, but they provide such a comprehensive source of information. This book has chapters on biohazards are both new to this edition of Patty’s industrial hygiene. Much of the material in the section on physical agents is specific to the United States, for example the use of 5 dB adjustment for noise exposure rather than 3 dB, which is used in Europe. There is also extensive reference to specific sections within United States legislation and guidance. The revised chapter on non-ionising radiation has not been included in the paper version book and we are left with a one page addendum to the chapter written for the fourth edition to describe the research on the potential adverse effects of low frequency magnetic fields and cellular telephones. An editorial note suggests that a revised chapter may be included in the CD-ROM version of the book.

Volume 2 comprises sections on physical agents (seven chapters), engineering control plus personal protective equipment (six chapters) and biohazards (two chapters). The chapters on biohazards are both new to this edition of Patty’s industrial hygiene. Much of the material in the section on physical agents is specific to the United States, for example the use of 5 dB adjustment for noise exposure rather than 3 dB, which is used in Europe. There is also extensive reference to specific sections within United States legislation and guidance. The revised chapter on non-ionising radiation has not been included in the paper version book and we are left with a one page addendum to the chapter written for the fourth edition to describe the research on the potential adverse effects of low frequency magnetic fields and cellular telephones. An editorial note suggests that a revised chapter may be included in the CD-ROM version of the book.

Volume 3 contains 18 chapters on legal, regulatory, and managerial aspects of occupational hygiene practice. Most of this volume is specific to United States legislation, although three chapters are of more general interest: pharmacokinetics and unusual work schedules, the biological basis of occupational exposure limits, and a chapter on biological monitoring. The chapter on pharmacokinetics and unusual work schedules by Dr Dennis Paustenbach is a particularly useful review of this topic that is accessible to the general reader and provides practical advice about how to evaluate the risks for people who have to work very long periods or non-standard shift patterns.

Volume 4 has a further 16 chapters that cover specialised areas and associated professional topics. This book has chapters on occupational health nursing, epidemiology, ergonomics, occupational safety, fire and explosions, indoor air quality, air pollution, and hazardous wastes.

There is an uneven feel to these books, with the consequence that the reader is uncertain of what to expect before beginning a chapter. The level of the material varies from straightforward introductory standard to complex discussions of specific technical issues—for example, there is a long chapter on the statistical interpretation of monitoring data. Some chapters—such as the one dealing with man-made mineral fibres—seem ill conceived because the material is unlikely to be relevant a few years from now. Several of the chapters use imperial units, others have either SI units or a mixture of systems, which in my opinion serves to confuse the reader. Each chapter has an extensive bibliography, but there is no standardisation of the format of the citations. A minor but annoying point when the content of a reference is not apparent from the material quoted.

One major omission is a discussion of the recent developments in assessment and control of dermal exposure. This is an area of occupational hygiene practice that has seen considerable research efforts, both to develop new techniques to measure hazardous substances contaminating the skin and to evaluate the effectiveness of gloves and clothing in protecting people at work. Otherwise these books are a comprehensive source of information about occupational hygiene in the United States. For European occupational health practitioners there are many individual chapters that are both interesting and informative. However, overall these books are not good value for money for people working outside North America.