

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 to the pollutant." We think that 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. Exposure to NO₂ was measured with passive samplers (Palmer's tubes) in 310 school children aged 5-14 years. The children wore the tubes for 5 days a week, in each season of the year.

The possible differences in personal measurements were assessed by analysis of variance (ANOVA) and Tukey's tests. Information about the sources of potential exposure was collected by a questionnaire. The relative risk for these variables was estimated with a multiple regression model (logit). The annual average of 6200 measurements 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 playschool (3-6 years). Even if the designs of two studies are different, at this point it is possible to make some comparisons.

Firstly, at higher concentrations of NO₂ exposure, as in those reported by Linaker *et al.*,¹ the seasonal changes in concentration in outdoor air contribute significantly to variations in exposure within individual people. 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, reducing the individual differences caused by domestic sources of NO₂.

Secondly, we think that only one measurement station, as used by Linaker *et al.*,¹ is inappropriate to evaluate the real impact of outdoor concentrations on personal exposure, because outdoor concentrations of pollutants are, in our and in other studies,^{2,3} related to traffic density in each street.

L A PALIN
M BINOTTI
G BONA
M PANELLA

Dipartimento di Scienze Mediche,
Facoltà di Medicina e Chirurgia di Novara,
Università del Piemonte Orientale, Cattedra di Igiene,
Via Solaroli 17, 28100 Novara, Italy

Correspondence to: Dr M Panella
panella@med.unipmn.it

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The bones and hormones of deep water divers and pilots of high performance aircraft

I have hypothesised that paternal hormone concentrations around the time of conception partially control the sex ratio (proportion male) of resulting offspring. Low concentrations of the testosterone/gonadotropin ratio are associated with subsequent daughters.¹ Such low offspring sex ratios have been reported by operators of high performance aircraft²⁻⁴ and deep water divers.⁵⁻⁶ In accordance with my hypothesis, low testosterone/gonadotropin ratios in men have been reported in association with changes in gravitation (as are experienced by operators of high performance aircraft)⁷⁻⁸ and strongly suspected in association with changes in atmospheric pressure (as are associated with deep water diving).⁹⁻¹⁰ It is now clear that high performance aircraft pilots are at increased risk of degenerative lesions of the cervical spine¹¹ and that deep water divers are also subject to skeletal degeneration.¹²⁻¹³ Low testosterone concentrations are an established risk factor for osteoporosis and bone fractures in men.¹⁴⁻¹⁵ 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 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 men¹⁶ as is exposure to deleterious chemicals—for example, the nematocide DBCP¹⁷ and dioxin¹⁸—and to non-ionising radiation.¹⁹ 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?

W H JAMES

The Galton Laboratory, University College London,
Wolfson House, 4 Stephenson Way,
London NW1 2HE, UK

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NOTICE

International course "Principles and methods of epidemiologic research" by K J Rothman. 27-31 October 2002. Lunteren, The Netherlands.

Topics:

- Causation and inference
- Epidemiological measures
- Cohort and case-control studies
- Principles of study design
- Effects of confounding and misclassification
- Principles of epidemiological data analysis
- Stratified analysis
- Evaluation of interaction
- Matching
- Epidemiological analysis with multivariable models
- Multiple exposure levels.

Enrollment is open to researchers having basic knowledge of epidemiology and biostatistics and at least some working experience. Closing date for enrollment is June 14, 2002. Course fee: Euro 1 150 (including accommodation and meals).

For further information please contact: Ms Astrid van Alst, course secretary, Department of Epidemiology and Biostatistics (252), UMC Nijmegen, PO Box 9101, NL 6500 HB Nijmegen, The Netherlands. Tel + 31 24 3619132; Fax + 31 24 3613505; email: A.VanAlst-mie.kun.nl

CORRECTION

Gluteraldehyde induced asthma in endoscopy nursing staff. E WACLAWSKI. 2001;58:544.

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

The urban atmosphere and its effects. Edited by: BRIMBLECOMBE P, MAYNARD R. (Pp 374; .) 2001. London: Imperial College Press. ISBN 186094 064 1

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.

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Patty's industrial hygiene, Volumes 1–4, 5th edition. Edited by: HARRIS RL. (Pp 3453; £577 for all four volumes, £166 each if purchased separately.) 2000. Chichester, West Sussex, UK: John Wiley and Son. ISBN 0 471 29784 4

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 updated material that was previously published in *Patty's industrial hygiene and toxicology* and *The theory and rationale of industrial hygiene*. These books are mainly intended as a reference source for the professional occupational hygienist, but they provide such a diverse range of material that it is likely that anyone involved with occupational health would find much of interest within them.

Volume 1 comprises 18 chapters that deal with recognition and evaluation of hazardous substances. There are seven new chapters with the remainder updated to a greater or lesser extent. The new sections include contributions on occupational dermatitis, aerosol science, endocrine disrupters, and multiple chemical sensitivity. The remaining parts cover basic toxicology and measurement of hazardous substances.

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.

J CHERRIE

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