CORRESPONDENCE

Raynaud's phenomenon in workers exposed to vibration

Chronic exposure of hands to vibration is now a well described cause of Raynaud's phenomenon. According to Palmer *et al*, it is estimated that 220 000 cases of Raynaud's phenomenon are attributable to exposure to vibration in Great Britain.¹ These epidemiological data, based on a questionnaire, are considered to be reasonably accurate.² About 4.2 million workers are exposed to hand transmitted vibration but the real impact on health and the economy is unknown.³ More precise clinical data are therefore necessary before implementing a large preventive programme.

The hand-arm vibration syndrome encompasses a wide range of disorders as it is responsible for digital blanching and paraesthesiae.⁴ Different vascular problems—such as a pure vasospastic phenomenon, a digital organic microangiopathy, or an occlusive arterial thrombosis—can be found. A diffuse vibration neuropathy with involvement of mechanical skin receptors or carpal tunnel syndrome are also often associated.⁵ The relation between these neurovascular disorders is not clear but autonomic dysfunction in carpal tunnel syndrome can induce a Raynaud's phenomenon which is curable with surgery.⁶ The prognosis of these neurovascular troubles depends on the underlying problem and cannot be evaluated with a simple questionnaire. As no single test can reliably stage the vascular and neurological component, the use of a battery of tests is necessary. Digital capillaroscopy and plethysmography with nerve conduction studies are recommended as the basic tests. Cold provocation tests are effective for grading a pure vasospastic Raynaud's phenomenon but are less reliable in other forms of vibration-induced white finger, explaining why this test is not always well correlated with the vascular symptoms.^{7,8} Doppler and duplex studies are useful to assess the severity of an occlusive arterial disease.

Workers who use hand held vibrating tools are also exposed to diverse environmental and occupational factors accounting for the wide clinical spectra of the disease. Epidemiological studies have pointed out that the prevalence of vibration induced white finger is very wide, ranging from 0%–5% in warm climates to 80%–100% in northern climates.⁹ In the pure vasospastic Raynaud's phenomenon, exposure to cold is probably the most important triggering factor and cold protection the most effective preventive measure. In the case of digital blanching associated with carpal tunnel syndrome, other ergonomic factors—such as repetitive forceful use of the hands—are likely to play a dominant part and a workplace ergonomic modification is indicated.¹⁰ Hypothenar hammer syndrome is often associated with digital blanching in mechanics and carpenters, who need to stop repetitive hand trauma.^{11,12} For digital organic microangiopathy and diffuse vibration neuropathy, exposure to vibration is the only identified factor and this has to be stopped. In consequence, a detailed and precise clinical diagnosis with objective tests is important to

find the real cause of the vascular symptoms. Then the impact of exposure to vibration on health will be more precisely evaluated and prevention will be more effective.

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Palmer *et al* reply

We are grateful to Noel for his comments. Our study was undertaken in a community sample of over 22 000 subjects who were contacted by post to assess the public health impact of exposures to hand transmitted vibration (HTV).¹ We could not conduct detailed investigations about this, but postal questions on digital finger blanching are considered to diagnose Raynaud's phenomenon with an acceptable degree of validity, as judged by follow up medical interview.^{2,3} None the less, in the management of individual patients, the case for taking a more detailed clinical and occupational history and conducting a rigorous examination is well made.

We agree that it would be useful to supplement this community investigation with a more direct assessment of exposure and health effects in occupations found to be at particular risk according to our data.⁴ In some, such as professional gardeners, the risk of hand-arm vibration syndrome has been suspected, but research reports are sparse; and so the extra information would be useful in its own right, as well as serving as a further check on the validity of our findings.

We are less certain, however, about many supplementary routine clinical investigations. Our data imply that vibration induced white finger (VWF) is a common disorder in British

industry. Our enquiries, which extended to numbness and tingling in the digits and upper limb (including symptoms that disturb sleep or cause difficulty with buttons), indicate that the attributable burden of sensorineural disease is also high.⁵ By contrast, centres with the expertise to conduct batteries of tests are few in Britain. Moreover, many experts regard the clinical history to represent a gold standard for VWF outside legal situations,⁶ a view reiterated at the recent international workshop on diagnosis of injuries caused by hand transmitted vibration (Southampton, 11–13 September 2000, Palmer KT, Griffin MJ, personal communication). If so, in many day to day situations, clinical assessment should be sufficient to determine clinical management, with detailed investigations reserved for medicolegal adjudication and research (where they play an important part).

The view that VWF encompasses several discrete vascular abnormalities—such as vasospasm, thrombosis, and microangiopathy—is consistent with views expressed at the Southampton workshop. Epidemiological evidence is lacking on the relative importance of these disorders in populations exposed to HTV, and on their prognostic importance; but it may help to distinguish between them if it leads to a better understanding of risk factors or if it prompts different approaches to case management. We know of no rigorous evidence—such as randomised controlled trials—which supports this. Noel correctly states that further research is appropriate. But control of vibration at source remains the current mainstay of management for exposed workers at risk of finger blanching. Our data indicate that significant exposures to HTV (A(8)>2.8 ms⁻² rms) are common in British men,⁸ as are relevant symptoms,^{1,4,5} and highlight the occupations and industries which may be priorities for preventive action.⁷

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7 Palmer KT, Griffin MJ, Bendall H, *et al.* The prevalence and pattern of occupational exposure to hand-transmitted vibration in Great Britain: findings from a national survey. *Occup Environ Med* 2000;57:218–28.

BOOK REVIEW

Health and safety in laboratory animal facilities (Laboratory animal handbooks No 13). Edited by: M WOOD, M W SMITH. (Pp 249; £35.00.) 1999. London, UK: RSM. ISBN 1 85315 421 0.

This new book contains a wealth of up to date and practical information and advice within a relatively small volume of 249 pages. It follows the earlier *Safety in the animal house*, published as laboratory animal handbook number 5, in 1981. It is a very welcome addition to the literature on an important subject that is not well covered by other books. As the editors point out, there have been considerable changes in the design and function of animal houses over the past 2 decades. Animal houses are no longer simple holding facilities, they are often complex, with much modern equipment and capable of performing many functions. New concepts and techniques have been introduced into the care of laboratory animals, and legal controls over both health and safety and animal welfare have been greatly developed.

The book is divided into the following main sections: (1) introduction to health and safety in laboratory animal facilities; (2) allergenic hazards; (3) infectious hazards; (4) genetically modified (transgenic) animals; (5) chemical hazards; (6) radiation safety; (7) safety management; and (8) legal requirements. Each chapter is written by a different expert in the subject, and all are written with clarity and with excellent references lists.

The introductory chapter provides wide coverage of the subject and would be an excellent starting point for people new to this field. It is written in terms that have general applicability and is full of practical advice and instructions.

Allergenic hazards covers a very important subject, as laboratory animal allergy is the most widespread occupational health problem of those exposed to these animals. The chapter provides definitions, then goes on to describe epidemiology, diagnosis, and pathogenesis of laboratory animal allergy. The source of allergens from different animals is considered in detail, followed by a section on the measurement of airborne allergens, and finally a section on management and prevention of allergy. The chapter on infectious hazards is very comprehensive. It points out that the risks to users of animal facilities posed by infectious agents are of two kinds: those related to experimental infections; and those due to zoonotic disease. It goes on to describe the categorisation of infectious agents into hazard groups, then considers many examples of both experimental infections and zoonotic infections. The chapter details the infections of primates, rodents and lagomorphs, birds, and farm animals. It then describes measures for containment of infec-

tion, the use of safe practices, disinfectants, protective clothing, and vaccination of staff. It concludes with sections on health monitoring and risk assessment.

The chapter on transgenic animals is an interesting and worthwhile addition, followed by the useful and comprehensive chapters on chemical hazards and radiation. The chapter on safety management will be a particularly welcome guide through this complex subject. It describes the setting up of a safety management structure, then describes good laboratory practice, quality assurance, risk assessment, control of substances hazardous to health, training, documentation, and monitoring. The final chapter, dealing with legal requirements, is also an authoritative guide to the subject. However, unlike the preceding chapters, which are generally applicable, the legal requirements deal specifically with the United Kingdom.

This book, written and edited by experts with first hand practical knowledge of their subject, can be strongly recommended to all those concerned with laboratory animal facilities.

G A CULLEN

SOFTWARE REVIEW

The successful management of hand-arm vibration: interactive CD-ROM package. Edited by: HEALTH AND SAFETY EXECUTIVE. (Disks 2; £95 +VAT) 2000. Sudbury, Suffolk, UK: Health and Safety Executive. ISBN 0 7176 1713 0

As someone who managed, by chance, to miss the preview of the Health and Safety Executive's CD-ROM package on hand-arm vibration syndrome (HA VS) at several meetings, this two disk product came as a pleasant surprise. Much useful material is presented on the clinical features of HA VS, on the risks arising from various categories of vibratory tools, on the ingredients of a health surveillance programme, and on practical tips for mitigating risk—including the selection of equipment, the redesign of work processes, and risk minimisation by job rotation and training. There is also a helpful legal section, and many video clips citing practical solutions from British industry and interviews with patients and their occupational physicians. The second disk, in particular, will be of value to safety officers and occupational physicians who wish to make a presentation on this topic to managers and employees. The first disk, which draws on the same material, is designed to be more interactive and to provide more reference material. This is based largely on two existing HSE documents (*Hand-arm Vibration*¹ and *Vibration Solutions*²), but is richer in illustrative material and more visually appealing. The first disk also contains an excellent exposure calculator which simplifies the process of deriving and summing partial exposure values when tools are used in combination and obviates the need for the nomogram by which this was formerly calculated (also illustrated on the

disk, but in a rather frenetic fashion). In another excellent dialog box when individual tools are highlighted this results in the corresponding recommended "safe" use times being instantly displayed. The emphasis is on British standards of exposure assessment.

Some of the dialog boxes can be saved into a word processing package for later use, but many other useful lists cannot. A model questionnaire can also be downloaded, although the version which I saved and later retrieved was technically inadequate for use. I experienced a few other technical difficulties, including a few sound glitches; surprisingly, the quality of the video images was better on the second disk than the first, even when viewing identical passages; and I was frustrated by my inability to skip the introduction on a second viewing (although I am assured that this should be possible). I have a few other minor concerns: in particular, the picture illustrating blanched fingers was disappointing (I have better examples in my own slide library); and occasionally I found myself questioning the evidential basis of statements (for example, that the risk of HAVS can be reduced by taking sensible precautions, among which "eating properly" and "taking regular exercises" were listed). However, these few caveats do not detract from an otherwise excellent product. Generally, I found a wealth of accurate, comprehensive, and useful information on these disks. Are they worth the cover price of £95+VAT? Many employers and occupational health departments will think so, given the escalating costs of compensation and the inherent complexities of assessing and controlling risks from this common occupational hazard.

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- 1 Health and Safety Executive. *Hand-arm vibration*. London: The Stationery Office, 1994. (HS(G)88.)
- 2 Health and Safety Executive. *Vibration solutions: practical ways to reduce the risk of hand-arm vibration injury*. London: The Stationery Office, 1997.

NOTICE

5th Annual Conference on Self Directed Learning in General Practice.
24 April 2001. London, UK

Organised by the Open Learning Unit, University College London, and sponsored by the British Medical Journal. The conference will be organised around the themes of:

- Revalidation
- Web based learning resources for self directed learning.

The day will be based around small group workshops, with some offering hands on training in the use of on line learning resources. Places will therefore be strictly limited and allocated on a first come, first served basis.

For further details please contact Marcia Rigby on tel: 0044 (0)20 7288 3246; fax: 0044 (0)20 7281 8004; m.rigby@ucl.ac.uk A website is in preparation.