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ated with chronic bronchitis.¹¹ This may explain our finding of an association of symptoms with employment in production jobs but not with self reported exposure to dust.

All of the subjects in this study who reported grade I byssinosis were employed in the production areas of the cotton mill (table 2). The symptom of increased cough with return to work after two days off may also occur in byssinosis, but is not a defining symptom. The low frequency of reported byssinosis symptoms may have been affected by the rotating shift schedules of production workers in these mills complicating the reporting of these symptoms. The time off during the weekly break (48 hours) is less than the usual weekend break (about 60 hours) of British cotton textile workers in whom these symptoms were originally described, and might reduce the severity of symptoms reported on returning to work.

Previous investigations of respiratory health in cotton textile workers have included analysis of the role of active smoking, but have not evaluated the role of other potential determinants of respiratory symptoms. To our knowledge, no previous studies have examined the contributions of air quality in both the work environment and home environment to respiratory illness in the same group. Our study concurrently assessed domestic passive cigarette smoking and the use of coal burning heating and cooking stoves in the same population. The ability to assess these multiple determinants of symptoms may have been possible in part because the women were all non-smokers, because of their homogeneity in age and socioeconomic state, and because of the large sample size. Each of these environmental factors—occupational exposure, home passive smoke, and home coal heating—contributed significantly to the chronic respiratory symptoms found.

Exposure to cotton, even in modern mills, leads to an increase in prevalence of respiratory symptoms, in non-smokers as well as smokers. These symptoms may be associated

with increased risk of chronic obstructive pulmonary disease. Hence, efforts to control dust exposures in the modern cotton textile industry remain important.

This work was supported in part by NIOSH R01 OH02421, NIEHS ES00002, and NHLBI/Division of Lung Diseases Preventive Pulmonary Academic Award HL02316.

- 1 Sherman CB, Xu X, Speizer FE, Ferris BG, Weiss ST, Dockery DW. Longitudinal lung function decline in subjects with respiratory symptoms. *Am Rev Respir Dis* 1992;146:855-9.
- 2 Dockery DW, Ware JH, Ferris BG Jr, et al. Distribution of forced expiratory volume in one second and forced vital capacity in healthy, white, adult never-smokers in six U.S. cities. *Am Rev Respir Dis* 1985;131:511-20.
- 3 Xu X, Christiani D, Dockery D, Wang L. Exposure-response relationships between occupational exposures and chronic respiratory illness: a community-based study. *Am Rev Respir Dis* 1992;146:413-8.
- 4 DHHS. *The health consequences of smoking for women. A report of the Surgeon General*. Rockville Maryland: US Department of Health and Human Services, Public Health Service, 1980.
- 5 Christiani D, Eisen EA, Wegman DH, Ye Tt, Lu Pl, Gong Zc, Dai Hl. Respiratory disease in cotton textile workers in the People's Republic of China. *Scand J Work Environ Health* 1986;12:40-5.
- 6 Committee on Byssinosis, Division of Medical Sciences, Assembly of Life Sciences, National Research Council. *Byssinosis: clinical and research issues*. Washington: National Academy Press, 1982.
- 7 Ferris BG. Epidemiology standardisation project. *Am Rev Respir Dis* 1978;118 (suppl); 1-120.
- 8 Breslow NE, Day NE. *Statistical methods in cancer research*. Lyons: International Agency for Research on Cancer; World Health Organisation, 1980; 192-246.
- 9 Cox DR, Snell EJ. *Analysis of binary data*. New York: Chapman and Hall, 1989.
- 10 Roach SA, Schilling RSF. A clinical and environmental study of byssinosis in the Lancashire cotton industry. *Br J Ind Med* 1960;17:115.
- 11 Kennedy SM, Christiani DC, Eisen EA, Wegman DH, Greaves IA, Olenchock SA, et al. Cotton dust and endotoxin exposure-response relationships in cotton textile workers. *Am Rev Respir Dis* 1987;135:194-200.
- 12 Merchant JA, Kilburn KH, O'Fallon WM, Hamilton JD, Lumsden JC. Byssinosis and chronic bronchitis among cotton textile workers. *Ann Intern Med* 1972;76:423-33.
- 13 Merchant JA. Byssinosis, in Merchant JA, Boehlecke BA, Taylor G, eds. *Occupational respiratory diseases*. Cincinnati, Ohio: Division of Respiratory Disease Studies, Appalachian Laboratory for Occupational Safety and Health, US Department of Health and Human Services, Public Health Service, National Institute for Occupational Safety and Health, 1986. (DHHS (NIOSH) Publ No 86-102.)
- 14 Gertner A, Bromberger-Barnea B, Traystman R, Menkes H. Airway reactivity in the periphery of the lung in mongrel dogs. *Am Rev Respir Dis* 1982;126:1020-4.
- 15 Enjeti S, Hazelwood B, Permutt S, Menkes S, Terry P. Pulmonary function in young smokers: male-female differences. *Am Rev Respir Dis* 1978;118:667-76.
- 16 Parikh JR. Byssinosis in developing countries [editorial]. *Br J Ind Med* 1992;49:217-9.

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early detection or attempts to improve repair mechanisms and to avoid further carcinogenic insults are the obvious approach. If there is a real possibility that it is due in part to persistence of nickel in the submucosa, then, perhaps, attempts to remove the deposits of nickel might have a part in a preventive programme. The removal of nickel by the local application of a chelating agent is one such possibility. This would not, however, be effective if the nickel is in particulate form. This was investigated by placing small quantities of fine particles of nickel subsulphide and nickel oxide in 10 ml 2% EDTA with the pH adjusted to 4.5, 7.0, 8.0, and 9.0. The suspensions were shaken periodically over four days. Nickel was readily detected in the supranatant fluid, but there was no visible depletion of the solid material.

Although removal from exposure does not lead to a diminution of risk, it is, of course, a most important preventive health measure as the increasing risk with continual exposure is eliminated.

Finally it is stressed that workers who have been employed in an area of the nickel industry where there is an excess risk of cancer must be studied separately from the rest of a cohort of nickel workers. This was the approach used by Roberts *et al.*^{1,2} Failure to do so may generate apparent excess risks of cancer in other parts of the process when such risks do not, in fact, exist.

We are grateful to the Joint Occupational Health Committee of the International Nickel Company for support in the development of this project and to Diane Johnson for measuring the solubility of nickel particulates.

- 1 Roberts RS, Julian JA, Sweezey D, Muir DCF, Shannon HS, Mastromatteo E. A study of mortality in workers engaged in the mining, smelting, and refinery of nickel. I: methodology and mortality by major cause groups. *Toxicol Ind Health* 1989;5:957-4.
- 2 Roberts RS, Julian JA, Muir DCF, Shannon HS. A study of mortality in workers engaged in the mining, smelting, and refinery of nickel. II: mortality from cancer of the respiratory tract and kidney. *Toxicol Ind Health* 1989;5:975-93.
- 3 Doll R. Cancer of the lung and nose in nickel workers. *Br J Ind Med* 1958;15:217-31.
- 4 Report of the international committee on nickel carcinogenesis in man. *Scand J Work Environ Health* 1990; 16:1-81.
- 5 Fontana RS, Taylor WF. Screening for lung cancer: the Mayo project. In: Miller AB, ed. *Screening in cancer. VICC technical report services*. Vol 40. Geneva: International Union Against Cancer, 1978:233-53.
- 6 Kaldor J, Peto J, Easton D, Doll R, Hermon C, Morgan L. Models for respiratory cancer in nickel refinery workers. *J Nat Cancer Inst* 1986;77:841-8.
- 7 Armitage P, Doll R. The age distribution of cancer and multistage models of carcinogenesis. *Br J Cancer* 1954; 8:1-12.
- 8 Peto R. Epidemiology, multistage models and short term mutagenicity tests. In: Hiatt HH, Watson JD, Winsten JA, ed. *Origins of human cancer, book C*. Cold Spring Harbor Laboratory: 1977, 1403-28.
- 9 Bell CMJ, Coleman DA. Predicted mortality patterns in cohort study populations exposed to different types of hazard: can SMR's show a dose response? *Stat Med* 1983;2:363-71.
- 10 Torjussen W, Andersen I. Nickel concentrations in nasal mucosa, plasma, and urine in active and retired nickel workers. *Ann Clin Lab Sci* 1979;9:289-98.
- 11 Adalis D, Gardner DE, Miller F. Cytotoxic effects of nickel on ciliated epithelium. *Am Rev Respir Dis* 1978; 118:347-53.

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- 1 International Steering Committee of Medical Editors, Uniform requirements for manuscripts submitted to biomedical journals. *Br Med J* 1979;1:532-5.
- 2 Soter NA, Wasserman SI, Austen KF. Cold urticaria: release into the circulation of histamine and eosinophil chemotactic factor of anaphylaxis during cold challenge. *N Engl J Med* 1976;294:687-90.
- 3 Weinstein L, Swartz MN. Pathogenic properties of invading micro-organisms. In: Sodeman WA Jr, Sodeman WA, eds. *Pathologic physiology, mechanisms of disease*. Philadelphia: W B Saunders, 1974:457-72.

been reported in dental technicians and associated with exposure to crystalline silica and metallic particulates.^{2 16 18}

In summary, for the first time, work as a dental technician has been linked with an increase in concentration of non-fibrous mineral particles in BAL fluid. These results have a practical implication: the measure of non-fibrous mineral particles in BAL fluid could be used to evaluate occupational exposure in dental technicians. A further step should be to study the association of BAL fluid dust concentration with the risk of developing a lung disease. The BAL fluid procedure in conjunction with energy dispersive x ray microanalysis could then be a useful tool for the aetiological diagnosis of interstitial lung disease. Standardisation in BAL fluid sampling and mineralogical analysis will allow guidelines to be created about the significance of particle concentrations in BAL fluid in terms of risk of lung disease.²⁵

We are very grateful to Marie-Annick Billon-Galland and Brigitte Couste (Laboratoire d'Etude des Particules Inhalées, Paris) who worked on the BAL fluid analysis and to the colleagues who's patients have been included in this study. We also thank Professor Alan Ross for his critical comments about statistical analysis.

- 1 Rom WN, Lockey JE, Lee JS, Kimball AC, Bang KM, Leaman H, et al. Pneumoconiosis and exposures of dental laboratory technicians. *Am J Public Health* 1984;74:1252-7.
- 2 Morgenroth K, Kronenberger H, Michalke G, Schnabel R. Morphology and pathogenesis of pneumoconiosis in dental technicians. *Pathol Res Pract* 1985;179:528-36.
- 3 Parkes W R. *Occupational lung disorders*. 2nd ed. London: Butterworths, 1982.
- 4 Daniele RP, Elias JA, Epstein PE, Rossman MD. Bronchoalveolar lavage: role in the pathogenesis, diagnosis and management of interstitial lung disease. *Ann Intern Med* 1985;102:93-108.
- 5 The BAL Cooperative Group Steering Committee. Bronchoalveolar lavage constituents in healthy individuals, idiopathic pulmonary fibrosis and selected comparison groups. *Am Rev Respir Dis* 1990;141:S168-202.
- 6 Sebastien P, Armstrong B, Monchaux G, Bignon J. Asbestos bodies in bronchoalveolar lavage fluid and in lung parenchyma. *Am Rev Respir Dis* 1988;137:75-8.
- 7 Gaudichet A, Sebastien P, Bientz M, Jaurand MC, Atassi K, Bonnaud G, Bignon J. Métrologie des fibres d'amiantes recueillies par lavage bronchoalvéolaire. *Revue Mal Respir* 1978;6:345-51.
- 8 Sebastien P. Possibilités actuelles de la biométrie des poussières sur échantillon de liquide de lavage bronchoalvéolaire. *Ann Biol Clin (Paris)* 1982;40:270-93.
- 9 Gaudichet A, Pairon JC, Malandain O, Couste B, Brochard P, Bignon J. Etude minéralogique des particules non fibreuses du liquide de lavage bronchoalvéolaire. *Revue Mal Respir* 1987;4:237-43.
- 10 Chariot P, Couste B, Guillon F, Gaudichet A, Bignon J, Brochard P. Nonfibrous mineral particles in bronchoalveolar lavage fluid and lung parenchyma from the general population. *Am Rev Respir Dis* 1992;146:61-5.
- 11 Maier E A, Rastegar F, Heimburger R, Ruch C, Pelletier A, Maier A, Leroy MJF. Simultaneous determination of trace elements in lavage fluids from human bronchial alveoli by energy dispersive x-ray fluorescence. 1—Technique and determination of the normal reference interval. *Clin Chem* 1986;32:551-5.
- 12 Corhay JL, Delavignette JP, Bury Th, Roelandts I, Weber G, Radermecker MF. Analyse minéralogique du liquide de lavage bronchoalvéolaire de sidérurgistes. *Archives des Maladies Professionnelles* 1991;52:339-44.
- 13 Christman JW, Emerson RJ, Hemenway DR, Graham WGB, Davis G S. Effects of work exposure retirement, and smoking on bronchoalveolar lavage measurements of lung dust in Vermont granite workers. *Am Rev Respir Dis* 1991;144:1307-13.
- 14 De Vuyst P, Dumortier P, Leophonte P, Vande Weyer R, Yernault JC. Mineralogical analysis of bronchoalveolar lavage in talc pneumoconiosis. *Eur J Respir Dis* 1987;70:150-6.
- 15 Johnson NF, Haslam PL, Dewar A, Newman-Taylor AJ, Turner-Warwick M. Identification of inorganic dust particles in bronchoalveolar lavage macrophages by energy dispersive X-ray microanalysis. *Arch Environ Health* 1986;41:133-44.
- 16 De Vuyst P, Vande Weyer R, De Coster A, Marchandise F X, Dumortier P, Ketelbaut P, et al. Dental technician's pneumoconiosis. A report of two cases. *Am Rev Respir Dis* 1986;133:316-20.
- 17 Liebling R S, Hatt T. Extraction of mineral dusts from lung tissue using sodium hypochlorite. *Environ Lett* 1971;2:153-65.
- 18 Peltier A, Moulut JC, Demange M. Le risque de pneumoconiose chez les techniciens dentistes. *INRS publication TS* 1979;3:166-8.
- 19 Carles P, Fabre J, Pujol M, Duprez A, Bollinelli R. Pneumoconioses complexes chez les prothésistes dentaires. *Archives des Maladies Professionnelles* 1978;3:189-92.
- 20 Abraham JL. Documentation of environmental particulate exposures in humans using SEM and EDXA. *Scanning Electron Microscopy* 1979;2:751-66.
- 21 Chatfield EJ, Dillon MJ. Some aspects of specimen preparation and limitations of precision in particulate analysis by SEM and TEM. *Scanning Electron Microscopy* 1978;1:487-96.
- 22 The health consequences of smoking. *Cancer and chronic lung disease in the workplace. A report of the Surgeon General (1985)*. Washington DC: US Government printing office: 1987, 189-339.
- 23 Churg A, Wiggs B. Types numbers, sizes and distribution of mineral particles in the lungs of urban male cigarette smokers. *Environ Res* 1987;42:121-9.
- 24 Stettler LE, Platek SF, Riley RD, Mastin JP, Simon SD. Lung particulate burdens of subjects from the Cincinnati, Ohio urban area. *Scanning Microsc* 1991;5:85-94.
- 25 Costabel U, Donner CF, Haslam PL, Rizzato G, Teschler H, Velluti G, Wallaert B. Clinical role of BAL in occupational lung diseases due to mineral dust exposure. *Eur Respir J* 1992;2:89-96.

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From 1 July 1985 articles submitted for publication will not be returned. Authors whose papers are rejected will be advised of

the decision and the manuscripts will be kept under security for three months to deal with any inquiries and then destroyed.

Conclusions

(1) For the accurate assessment (staging) and the differential diagnosis of the sensorineural component of HAVS, the use of multiple sensorineural tests requiring special instrumentation has been justified.

(2) Aesthesiometry, TNZ thresholds, and GRIP were found to distinguish stages 0 and 1 from stages 2 and 3, individually but preferably in combination.

(3) For the tools used by the subjects in this survey analyses of the data from AESTH and TNZ showed that examination of one digit may lead to erroneous conclusions. For the work processes involved in this survey, the importance of examining the second (forefinger) and the fifth (little) finger, if all digits are not to be tested, is stressed.

(4) In keeping with the recommendation of the Working Party of the Faculty of Occupational Medicine for medical monitoring of vibration exposed populations, the association between the results of the sensory tests described here and the final staging supports the use of multiple tests for routine monitoring and for the prevention of the development of advanced cases. In our view the initial expenditure on instrumentation has been fully justified.

We are greatly indebted to the Directors of Babcock Energy, Renfrew, Scotland and their safety, personnel and engineering departments for their support. Our thanks are also due to the staff of the medical department of Babcock Energy.

- 1 Working Party to the Faculty of Occupational Medicine of the Royal College of Physicians *Report part 1. Hand-transmitted vibration*. London: RCP, 1993, 26.
- 2 Brammer AJ, Taylor W, Lundborg G. Sensorineural stages of the hand-arm vibration syndrome. *Scand J Work Environ Health* 1987;13:279-83.

- 3 Lundstrom RJI. Responses of mechanoreceptive afferent units in the glabrous skin of the human hand to vibration. *Scand J Work Environ Health* 1986;12:413-6.
- 4 Mountcastle VB. Central nervous mechanisms in mechanoreceptive disorders. *American Physiological Society* 1984;1:789-878.
- 5 Olsen N. Diagnostic tests in Raynaud's phenomena in workers exposed to vibration: a comparative study. *Br J Ind Med* 1988;45:426-30.
- 6 Pelmear P. Laboratory tests for the evaluation of HAVS. In: *Proceedings of the 6th international conference on hand-arm vibration*. Bonn; 1992 (in press).
- 7 Taylor W, Ogston SA, Brammer AJ. A clinical assessment of seventy eight cases of hand-arm vibration syndrome. *Scand J Work Environ Health* 1986;265-268.
- 8 Harada N. Esthesiometry, nail compression and other function tests used in Japan for evaluating the hand-arm vibration syndrome. *Scand J Work Environ Health* 1987; 13: 330-3.
- 9 Wasserman DE, Taylor W. Historical perspectives in occupational medicine. Lessons from hand-arm vibration syndrome research. *Am J Ind Med* 1991;19:539-46.
- 10 Dellon AL. *Evaluation of sensibility and re-education in the hand*. Baltimore; Williams and Wilkins, 1981.
- 11 Renfrew S. Aesthesiometers. *Lancet* 1960;1:1011.
- 12 Renfrew S. Fingertip sensation. A routine neurological test. *Lancet* 1969;i:396-7.
- 13 Carlson WS, Samueloff S, Taylor W, Wasserman D. Instrumentation for measurement of sensory loss in the fingertips. *J Occup Med* 1979;21:260-4.
- 14 Ekenvall L, Nilsson BY, Gustavson P. Temperature and vibration thresholds in vibration syndrome. *Br J Ind Med* 1986;43:825-9.
- 15 Swerup C, Nilsson BY. Dependence of thermal thresholds in man on the rate of temperature change. *Acta Physiol Scand* 1987;131:623-4.
- 16 Cherniack MG, Letz R, Gerr F, Brammer A, Pace P. Detailed clinical assessment of neurological function in symptomatic shipyard workers. *Br J Ind Med* 1986;43: 825-9.
- 17 Bovenzi M. Finger systolic pressure during local cooling: reference values in Raynaud's phenomenon of occupational origin. *Int Arch Occup Environ Health* 1988;61: 179-81.
- 18 Altman DG. *Practical statistics for medical research*. London: Chapman and Hall, 1991:351-8.
- 19 Working Party to Faculty of Occupational Medicine of the Royal College of Physicians *Report part 1. Hand-transmitted vibration*. London: RCP, 1993, 26.
- 20 Dixon WJ, Brown MB, eds. *BMDP Statistical software*. Berkeley: University of California Press, 1985.
- 21 DHHS. Criteria document for a recommended standard; occupational exposure to hand-arm vibration. US Department of Health and Human Services, National Institute for Occupational Safety and Health. Cincinnati: 1989 DHHS 1989. (DHHS (NIOSH) publ No 89-106.)

NOTICE

A course on **Occupational Asthma in Practice** (organiser Dr K Venables) will be held at the National Heart and Lung Institute, Dovehouse Street, London SW3 6LY on 1-2 February 1994.

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