

subjected to histopathology examination for fibrosis distribution and severity. PET images were graded for features by consensus of three readers blinded to the identity of silica- or saline-challenged animals imaged in sets of three, with at least one control and one test animal in each set. Histopathology scores were statistically correlated with PET image scores. In-nate PET resolution, the small animal size relative to the clinical imager, animal respiration, and the presence of an azygous lung lobe in some animals limited localization of the PET imaged features to about a centimeter. ^3H proline autoradiography studies are addressing the question of the specificity of location of heightened proline uptake, i.e., to pulmonary interstitial sites of fibroblast collagen synthesis activity or to pulmonary alveolar surface locations of neutrophil-associated inflammatory response. Resolution of questions of specificity of the uptake to collagen synthesis activity will clarify the feasibility of PET imaging for detection of active stages of fibrosis and for possible application for early disease detection and prevention or for evaluation of the active status of fibrosis for guiding medical management of advanced disease. Toxicological evaluations of FP will determine if FP is safe for use or if ^{14}C -proline is needed for possible further testing and development of the method.

347 Classroom chalk: a possible new source of exposure to crystalline silica

J.B. WESTIN, E. BITCHATCHI, E.D. RICHTER
Unit for Environmental and Occupational Medicine, Hebrew University-Hadassah Medical School, Jerusalem

In its 1997 publication, volume number 68, the International Agency for Research on Cancer raised its rating for silica to Group 1: sufficient evidence for carcinogenicity in humans. Its listings of possible sources of silica exposure, however, do not include classroom chalk. We were recently surprised, therefore, to hear of a teacher in Israel in whom bronchial carcinoma was diagnosed-surprised because this sentinel case, a 54-year-old female, was found to be devoid of all the risk factors commonly associated with her disease. She never smoked and, indeed, has had a lifelong aversion to environmental tobacco smoke. Nor is she aware of any exposure to the metallic or metal-like elements (including chromium, nickel, and arsenic). Preliminary radon activity concentrations in her home were found to be unremarkable, as were other exposures to ionizing radiation. Finally, with regard to asbestos, we were unable to elicit a possible link between either the patient or her husband and this carcinogenic mineral. In brief, only exposure to classroom chalk dust seemed to remain a viable possibility. Subsequently, with the help of Material Safety Data Sheets, we were able, to establish that numerous types of chalk currently in use contain crystalline silica. Furthermore, and closer to home, recent analyses by the Israel Ministry of Labor indicate that airborne concentrations of silica dust in a chalk factory exceeded the current NIOSH REL (0.05 mg/m^3) by as much as a factor of 10. The hypotheses generated by these findings, along with the assumed size (worldwide) of the potentially exposed population, suggest that even at this early stage a number of steps may reasonably be taken to begin to deal with the problem. First, current use of silica in chalk should be reduced or eliminated; even if exposures prove to be "low," the number of those

potentially at risk is large. As in other, similar situations, we believe that the precautionary principle should be implemented. Second, screening and surveillance programs concerning silica should include questions relative to chalk - especially classroom chalk - exposure on their questionnaires. Third, should illness following exposure to chalk dust be recognized as work related, it is probably never too early for the public-health community to begin to consider the medico-legal aspects of the matter. Finally, to determine the risks from past exposures among teachers and others, appropriate epidemiologic studies should be carried out.

348 About one case of acute silicosis: a current risk in the rubber industry

P.G. BARBIERI, R. CALISTI*

SPSAL ASL Brescia, Italy

* SPSAL ASL 8 Civitanova Marche, Italy

Introduction: Silicosis is considered a definitely declining occupational disease, as a result of a better control of the occupational risk. Current statistics from INAIL show that in the '90ths 4.161 cases were recognized compared to 45.194 cases from 1965 to 1974; those data refer mostly to chronic forms. No statistics are available about trends of the so-called acute or quickly-increasing silicosis; despite they seem to regard only outdated conditions of occupational risk, they are so far authoritative and recent works on occupational diseases.

Case report: A 41 years aged worker was admitted in hospital during 1996 november 1996 for a severe fibrogenic pneumopathy, suspecting a sarcoidosis or an autoimmune lung fibrosis. One out of the pneumatologists in charge posed, in addition, the diagnostic hypothesis of an occupational form and demanded a close examination by an industrial medicine specialist. The seriousness of the illness imposed a lung transplant; the whole removed lungs were granted for testings. The chemical analysis of lung samples showed a significant presence of nickel, molybdenum and tungsten, while vanadium and cobalt were under the analytical limit of 30 micrograms/kg. Under histological examination a hard-metal pneumopathy was in any case excluded, at the same time with the evidence of a severe interstitial fibrosis, with both diffuse both hyaline nodular aspects, granulomatosis, capillaritis and sclero-calcific nodes. On polarized light, inside the parenchymal sclero-hyaline nodes were bi-refracting particles referable in greater part to silicates, in lesser share to crystalline silica. Out of the patient's jobs was, noteworthy appeared the one of attached to the open mixers inside a small firm producing siliconic rubber, where he worked for five years from 1988 to 1993. The Occupational Prevention and Safety Unit of the Local Health Administration for Brescia ascertained that, still during the first months of 1997, inside the firm siliconic blends were prepared using mineral fillers with quartz (Sicron) and cristobalite (Celite) respectively at concentrations of 90 and 60%. Those fillers, in the form of a fine powder with a mean consumption of about 5-6.000 kg/month, were manually taken from bags and put into the open mixer, having an extracting hood wrongly hanging above the respiratory zone of the attached worker, failing any respiratory personal protective device; the powder that, being not included

in the mixture, fell upon the tray underlying the mixer rolls were manually picked up, using dustpan and broom, and re-inserted in the loading trough. The workers attached to the mixers had no idea and information about the hazard, and the same was for the person in charge for workers' safety and health inside the firm; moreover, nothing was mentioned respect to this in the risk evaluation and management document drawn up by the manufacturer applying the art. 4 of D.lgs. 626/94.

Conclusions: We cannot exclude, at the origin of the described severe pulmonary fibrosis case, a concurrent and synergistic disreactive disease, but we retain that a causative role has to be attributed to the relevant exposure to crystalline silica along five years. In any case, a relationship between silica exposure and auto-immune diseases was already conjectured some years ago. A recent case-control epidemiologic study give strong evidence in favour of a not-casual association between sarcoidosis and exposure to quartz and cristobalite. Similar circumstances to those described have been referred to another case of acute silicosis affecting a young worker in the artistic micro-fusion section. The described case confirms the persistence of relevant and underrated risks from quartz and cristobalite; this fact imposes suited measures of prevention and control, beginning from a correct evaluation of the risk and from a related clear information.

349 Analysis of occupational lung disease identified at autopsy in the South African mining industry

J. MURRAY, P. BACK

National Centre for Occupational Health, Cape Town, South Africa

School of Public Health, University of the Witwatersrand, Cape Town, South Africa

Introduction: South African law provides for the autopsy examination of the lungs of deceased miners for compensation purposes, regardless of the clinical cause of death. The autopsy rate for white miners and ex-miners and for currently employed black miners is around 85%. Since 1975 autopsies have been performed on 83,564 men, around 75% of whom were gold miners. The computerised database was studied to: 1) compare compensation after death with compensation during life; 2) analyse the trend in pulmonary tuberculosis (PTB); and 3) analyse the trend in silicosis in men with gold-mining service.

Results: 1) 2530 miners and ex-miners who came to autopsy at the NCOH during 1999 were analysed. Autopsy compensation (19%) of occupational lung disease was twice that of in life compensation (9.5%). Silicosis accounted for 35%, obstructive airways disease (COAD) for 33% and PTB for 6% of compensation during life, in contrast to postmortem compensation: PTB 63%, silicosis 19% and COAD 9%. 2) Data on 55,451 black men were analysed for the presence of active TB (1975-2000). The prevalence of TB increased from 37/1000 cases (1975) to 63/1000 (1990) and to 217/1000 (2000). Increasing duration of service and hence silica dust exposure was important in the increase in TB until 1990, and the HIV epidemic has had a major impact on the increase in TB during the 1990's. 3) Since 1975 the rate of silicosis at autopsy in gold miners has not decreased significant-

ly: 177 per 1000 (1975); 209 (1980); 167 (1990) and 191 in yr 2000.

Conclusion: The autopsy service plays an important role in identifying occupational lung disease. The findings of these studies indicate the heavy burden of occupational lung disease in miners and ex-miners.

350 Lung cancer in Vermont granite workers-an update

W.G.B. GRAHAM, P.M. VACECK, J. COSTELLO

The Pulmonary and Biometry Divisions, University of Vermont State Health Department, Vermont, USA

Subjects and Methods: A cohort of 5414 Vermont granite workers, all of whom had worked at some time during the period 1950-1982, was followed in a mortality study until 1996. 2539 were deceased, and deaths certificates on 2436 were classified by a qualified nosologist. Employment records at the Vermont Division of Industrial Hygiene (VDIH) contained occupational histories, so that tenure and latency could be established. The deceased were divided into two groups, those hired before 1940, and those hired in 1940 or later. The 1940 date defined the time that dust controls were fully implemented in the manufacturing plants (stone sheds). Prior to 1940, dust levels were extremely high, averaging 60 million particles /cubic foot in pneumatic cutters, and 20 million particles/cubic foot in general stone shed air. Deaths from silicosis and tuberculosis were extremely high. The standard of exposure set by the VDIH was 10 mppcf, which is approximately equivalent to a gravimetric standard of 0.1 mg/cubic meter, the current permissible exposure limit in Vermont. After 1940, industrial hygiene measures reduced levels sharply, eventually reaching a level 5-10 times lower than prior to 1940.

Results: The effects of dust reduction in our mortality cohort were dramatic: the SMR for silicosis was 2771 ($p < 0.01$) for pre-1940 hires, and zero in the post-1940 hires. The tuberculosis SMRs went from 1820.4 ($p < 0.01$) to 52.1 ($p = \text{NS}$). 211 lung cancer deaths occurred in the entire cohort, 91 out of 1472 workers (6.2%) hired before 1940 (SMR of 131.4; $p < 0.05$), and 120 out of 1044 workers (11.4%) hired after 1940 (SMR of 112.6; $p = \text{NS}$). Stone shed workers were then analysed as two separate groups by hire date by tenure and latency (quarry workers were excluded because their SMRs for lung cancer were not elevated). For workers hired before 1940, SMR for lung cancer was elevated only in workers who had tenure over thirty years and latency over 40 years (SMR 163.1; $p < 0.05$). For workers hired after 1940, significant elevations in lung cancer SMRs were found in both the 10-29 year tenure and 25-39 latency category (SMR 153.5; $p < 0.05$) and in the 30+ year tenure and 40+ year latency (SMR 216.7; $p < 0.05$). Despite the fact that the post-1940 hires were exposed to far lower quartz dust levels, the mortality experience from lung cancer was not lowered compared to the pre-1940 hires.

Conclusions: These results suggest that elevations of lung cancer SMRs which were found prior to 1940 and attributed to high dust exposures were not substantially changed after quartz dust levels were sharply reduced. They also suggest that quartz dust exposures may play a negligible role or none in the induction of pulmonary malignancy.