

## **GOHNET issue no. 12 - 2007**



### **Elimination of Silicosis**

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## The ILO/WHO Global Programme for the Elimination of Silicosis (GPES)



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1. K. Chiyotani, Y.Hosoda, Y.Aizawa, editors. "Advances in the Prevention of Occupational Respiratory Diseases". Proceedings of the 9<sup>th</sup> International Conference on Occupational Respiratory Diseases, Kyoto, Japan, 13-16 October 1997. Excerpta Medica International Congress Series 1153, pp.1256, ELSEVIER 1998
2. "Health Effects of Occupational Exposure to Respirable Crystalline Silica". NIOSH Hazard Review. Department of Health and Human Services, CDC, NIOSH, 2002.
3. 2002 World Health Report, WHO, Geneva
4. XVIIth World Congress on Safety and Health at Work. 18-22 September 2005, Orlando, USA. Introductory Report: Decent Work- SafeWork (<http://www.ilo.org/public/english/protection/safework/wdcongrs17/intrep.pdf>)
5. Fedotov I., "Global Elimination of Silicosis: the ILO/WHO International Programme" Asian-Pacific Newsletter on Occupational Health and Safety, Vol.4, No.2, 1997
6. "Thirteenth Session of the Joint ILO/WHO Committee on Occupational Health" Report of the Committee, JCOH/XIII/D.4, ILO, Geneva, 2003.

## Elimination of Silicosis: The importance of preventing occupational exposure to dust



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1. WHO (1995a) "Global Strategy on Occupational Health for All", World Health Organization, Geneva, Switzerland (Also available online at: [http://www.who.int/occupational\\_health/publications/globstrategy/en/index5.html](http://www.who.int/occupational_health/publications/globstrategy/en/index5.html))
2. WHO (1999) Prevention And Control Exchange: PACE, Hazard Prevention and Control in the Work Environment: Airborne Dust, WHO/SDE/OEH/99.14, World Health Organization, Geneva, Switzerland
3. Andersson, I. -M., G. Rosén, L.-E. Byström and M. Skoglund (2005) "Hazard Prevention and Control in the Work Environment: Airborne Dust – CD Package", National Institute for Working Life, Sweden (This CD package may be obtained through the site: <http://www.arbetslivsinstitutet.se/dust/>)
4. Swuste, P., M. Corn and B. Goelzer (1994) "Hazard Prevention and Control in the Workplace - report of a WHO meeting", *Occup Hyg*, 1: 325-328
5. WHO (1995b) "Prevention and Control Exchange (PACE) - a document for decision makers", WHO/OC./95.3, World Health Organization, Geneva, Switzerland
6. Swuste, P. and A. Hale. (1992) "Databases on Measures to Prevent Occupational Exposure", Safety Science Group, Delft University of Technology, The Hague: Labour Inspectorate, The Netherlands
7. Ramazzini, B. (1713) "The morbis artificum diatriba"; available in English as "Diseases of Workers", Thunder Bay, Ontario, NorthWest Training and Development, 1993 (317 p.), translated from the original Latin text by Wilmer Cave Wright
8. Goelzer, B. (1996) "The 1996 William P. Yant Award Lecture: The Harmonized Development of Occupational Hygiene - a Need in Developing Countries", *Am. Ind. Hyg. Assoc. J.*, 57: 984, American Industrial Hygiene Association, USA
9. HSE (1999a) "The technical basis for COSHH Essentials: Easy steps to control chemicals", Health and Safety Executive, UK

10. HSE (1999b) "COSHH Essentials: Easy steps to control chemicals", HS (G)193, Health and Safety Executive, UK (also available on-line: <http://www.coshh-essentials.org.uk/>)
11. SOBANE (Belgium) - available online at: <http://www.md.ucl.ac.be/hytr/new/en/>
12. Tischer, M. and S. Scholaen (2003) "Chemical Management and Control Strategies: Experiences from the GTZ Pilot Project on Chemical Safety in Indonesian Small and Medium-sized Enterprises", *Ann. Occup. Hyg.*, 47: 571-575, Oxford University Press. Available online at: <http://annhyg.oxfordjournals.org/cgi/content/full/47/7/571>
13. ILO (2001) "ILO Guidelines on occupational safety and health management systems - ILO-OSH 2001", ILO, Geneva, Switzerland (available online at: <http://www.ilo.org/public/english/protection/safework/cops/english/download/e000013.pdf>)

Footnote: ILO (1998a) Goelzer, B., "Occupational Hygiene: goals, definitions, general information and practice", Part I, Chapter 30. Occupational Hygiene, in: "ILO Encyclopaedia of Occupational Health and Safety", International Labour Office (ILO), Geneva, Switzerland (available free of charge online at: <http://www.ilo.org/encyclopedia/>)

### Silica-Related Disease: It's not just silicosis



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1. CDC/NIOSH (Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health). NIOSH Hazard Review: Health effects of occupational exposure to respirable crystalline silica. DHHS (NIOSH) Publication No. 2002-129. 2002 <http://www.cdc.gov/niosh/02-129A.html>
2. WHO International Programme on Chemical Safety. Crystalline Silica, Quartz. Concise International Chemical Assessment Document No. 24. 2000. <http://www.who.int/ipcs/publications/cicad/en/cicad24.pdf>
3. Goldsmith DF, Winn DM, Shy CM, eds. [1986]. Silica, silicosis, and cancer: Controversy in occupational medicine. New York: Praeger Publishers.
4. Westerholm P. Silicosis: Observations on a case register. *Scand J Work Environ Health* 1980 6 (Suppl 2):5-86.
5. Finkelstein M, Kusiak R, Suranyi G. Mortality among miners receiving workmen's compensation for silicosis in Ontario: 1940-1975. *J Occup Med* 1982 24(9):663-667.
6. Goldsmith DF, Guidotti TL, Johnston DR. Does occupational exposure to silica cause lung cancer? *Am J Ind Med* 1982 3:423-440.
7. IARC. Silica, some silicates, coal dust and para-aramid fibrils. IARC monographs on the evaluation of carcinogenic risks to humans Vol. 68. Lyon, France: World Health Organization, International Agency for Research on Cancer. 1997.
8. ATS (American Thoracic Society). Adverse effects of crystalline silica exposure. *Am J Respir Crit Care Med* 1997 155:761-768.
9. National Toxicology Program (NTP). Silica, Crystalline (Respirable Size). 11th Report on Carcinogens 2005. <http://ntp.niehs.nih.gov/ntp/roc/eleventh/profiles/s161sili.pdf>
10. Hnizdo E, Vallyathan V. Chronic obstructive pulmonary disease due to occupational exposure to silica dust: a review of epidemiological and pathological evidence. *Occup Environ Med* 2003 60(4):237-243.
11. Murray J, Rees D. Tuberculosis and silicosis in South African gold mining. *OSH & Development* 2003 5(December):2-10.
12. Elmes P, Cockcroft A, Nemery B. Inorganic dusts. In: Hunter's diseases of occupations, 9th Edition. Baxter PJ, Adams PH, Tar-Ching A, Cockcroft A, Harrington M, Eds. London, UK: Arnold. 2000; Chapter 35. P. 674.
13. teWaternaude JM, Ehrlich RI, Churchyard GJ, Pemba L, Dekker K, Vermeis M, White NW, Thompson ML, Myers JE. Tuberculosis and silica exposure in South African gold miners. *Occup Environ Med* 2006 63(3):187-192.

14. Owens MW, Kinasewitz GT, Gonzalez E. Case report: Sandblaster's lung with mycobacterial infection. *Am J Med Sci* 1988 295(6):554-557.
15. Ziskind M, Jones RN, Weill H. Silicosis. *Am Rev Resp Dis* 1976 113:643-665.
16. Parker JE, Wagner GR. Silicosis. In: Stellman JM, Ed. *Encyclopaedia of Occupational Health and Safety*. 4th Ed. Geneva, Switzerland: International Labour Office 1998:pp. 10.43-10.46.  
<http://www.ilo.org/encyclopedia/?d&nd=857400199&prevDoc=857400016>
17. Steenland K, Brown D. Mortality study of gold miners exposed to silica and nonasbestiform amphibole minerals: an update with 14 more years of follow-up. *Am J Ind Med* 1995 27:217-229.
18. Cowie RL. Silica-dust-exposed mine workers with scleroderma (systemic sclerosis). *Chest* 1987 92(2):260-262.
19. Sluis-Cremer GK, Hessel PA, Hnizdo E, Churchill AR. Relationship between silicosis and rheumatoid arthritis. *Thorax* 1986 41:596-601.
20. Klockars M, Koskela R-S, Järvinen E, Kolari PJ, Rossi A. Silica exposure and rheumatoid arthritis: A follow up study of granite workers 1940—81. *Br Med J* 1987;294:997-1000.
21. Cooper GS, Parks CG. Occupational and environmental exposures as risk factors for systemic lupus erythematosus. *Curr Rheumatol Reports* 2004; 6(5 (October)):367-374.
22. Calvert GM, Steenland K, Palu S. End-stage renal disease among silica-exposed gold miners: a new method for assessing incidence among epidemiologic cohorts. *J Am Med Assoc* 1997 277(15):1219-1223.
23. Steenland K, Nowlin S, Ryan B, Adams S. Use of multiple-cause mortality data in epidemiologic analyses: US rate and proportion files developed by the National Institute for Occupational Safety and Health and the National Cancer Institute. *Am J Epidemiol* 1992 136(7):855-862.
24. Nuyts GD, Van Vlem E, De Vos A, Daelemans RA, Rorive G, Elseviers MM, Schurgers M, Segaert M, D'Haese PC, De Broe ME. Wegener granulomatosis is associated to exposure to silicon compounds: a case-control study. *Nephrol Dial Transplant* 1995 10:1162-1165.
25. Hotz P, Gonzalez-Lorenzo J, Siles E, Trujillano G, Lauwerys R, Bernard A. Subclinical signs of kidney dysfunction following short exposure to silica in the absence of silicosis. *Nephron* 1995 70:438-442.
26. Boujema W, Lauwerys R, Bernard A. Early indicators of renal dysfunction in silicotic workers. *Scand J Work Environ Health* 1994 20(3):180-183.
27. Ng TP, Lee HS, Phoon WH. Further evidence of human silica nephrotoxicity in occupationally exposed workers. *Br J Ind Med* 1993 50:907-912.
28. Steenland K, Sanderson W, Calvert GM. Kidney disease and arthritis in a cohort study of workers exposed to silica. *Epidemiology* 2001 12(4):405-412.
29. McDonald JC, McDonald AD, Hughes JM, Rando RJ, Weill H. Mortality from lung and kidney disease in a cohort of North American industrial sand workers: an update. *Ann Occup Hyg* 2005 49(5):367-373.
30. Steenland K, Attfield M, Manneje A. Pooled analyses of renal disease mortality and crystalline silica exposure in three cohorts. *Ann Occup Hyg* 2002 46(Suppl 1):4-9.
31. Calvert GM, Rice FL, Boiano JM, Sheehy JW, Sanderson WT. Occupational silica exposure and risk of various diseases: an analysis using death certificates from 27 states of the United States. *Occup Environ Med* 2003 60(2):122-129.
32. Steenland K. One agent, many diseases: exposure-response data and comparative risks of different outcomes following silica exposure. *Am J Ind Med* 2005 48(1):16-23.
33. WHO (World Health Organization). Silicosis. WHO Information Fact Sheet No. 238. 2000.  
<http://www.who.int/mediacentre/factsheets/fs238/en/>

## Chronic obstructive bronchitis and emphysema <sup>(1)</sup> in hard coal miners



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1. International Agency for Research on Cancer (IARC) working group on the evaluation of carcinogenic risks to humans: Silica, some silicates, coal dust and para-aramid fibrils. IARC Monogr Eval Carcinog Risks Hum 1997;68:1-475.
2. Marine WM, Gurr D, Jacobsen M. Clinically important respiratory effects of dust exposure and smoking in British coal miners. Am Rev Respir Dis 1988;137:106-112.
3. Leigh J. 15 year longitudinal studies of FEV<sub>1</sub> loss and mucus hypersecretion development in coal workers in New South Wales, Australia. VII. International Pneumoconiosis Conference 1988 Pittsburgh. Pittsburgh 1990;112-121.
4. Smidt U. Distribution of inhaled air in coal workers with and without silicosis. Rev Inst Hyg Mines (Hasselt).1974;29(2):72-84.
5. Reichel G. Die Bedeutung der beruflichen Staubbelastung unter Tage für die Entwicklung der obstruktiven Atemwegserkrankungen. Atemw Lungenkrkh 1989;9:471-475.
6. Bates DV, Pham QT, Chau N, Pivoteau C, Dechoux J, Sadoul P. A longitudinal study of pulmonary function in coal miners in Lorraine, France. Amer J Industr Med 1985;8:21-32.
7. Minette A. Is chronic bronchitis also an industrial disease? Europ J Resp Dis 1986;146:87-98.
8. Nemery B, Veriter C, Brasseur L, Frans A. Impairment of ventilatory function and pulmonary gas exchange in non-smoking coalminers. The Lancet 1987;2(8573):1427-1430.
9. Deutsche Forschungsgemeinschaft (DFG). Quarz-Feinstaub und quarzhaltiger Feinstaub. In: Henschler D. Gesundheitsschädliche Arbeitsstoffe. Toxikologisch-Arbeitsmedizinische Begründung von MAK-Werten. Chemie, Weinheim 1971;121.
10. Deutsche Forschungsgemeinschaft (DFG). Arbeitsmedizinische Querschnittsuntersuchungen zur Bedeutung chronischer inhalativer Belastungen für das bronchopulmonale System. Forschungsbericht chronische Bronchitis und Staubbelastung am Arbeitsplatz. Harald Bolt, Boppard 1975.
11. Deutsche Forschungsgemeinschaft (DFG). Steinkohlengrubenstaub. In: Greim H. Gesundheitsschädliche Arbeitsstoffe. Toxikologisch-arbeitsmedizinische Begründungen von MAK-Werten. Senatskommission zur Prüfung gesundheitsschädlicher Arbeitsstoffe. VCH, Weinheim 1999;1-51.
12. Soutar C, Campbell S, Gurr D, Lloyd M, Love R, Cowie H et al. Important deficits of lung function in three modern colliery populations. Relations with dust exposure. Am Rev Respir Dis 1993;147(4):797-803.
13. Oxman AD, Muir DCF, Shannon HS, Stock SR, Hnizdo E, Lange HJ. Occupational dust exposure and chronic obstructive pulmonary disease. A systematic overview of the evidence. Amer Rev Resp Dis 1993;148:38-48.
14. Fernie JM, Ruckley VA. Coal worker's pneumoconiosis: correlation between opacity profusion and number and type of dust lesions with special reference to opacity type. Br J Ind Med 1987;44(4):273-277.
15. Hnizdo E, Murray J, Sluis-Cremer GK, Glyn Thomas R. Correlation between radiological and pathological diagnoses of silicosis - an autopsy population based study. Am J Ind Med 1993.23:427-445.
16. Miller BG, Jacobsen M. Dust exposure pneumoconiosis and mortality of coalminers. Br J Ind Med 1985;42(11):723-733.
17. Atuhaire LK, Campbell MJ, Cochrane AL, Jones M, Moore F. Mortality of men in the Rhondda Fach 1950-80. Br J Ind Med 1985;42(11):741-745.
18. Cockcroft A, Berry G, Cotes JE, Lyons JPN. Shape of small opacities and lung function in coalworkers. Thorax 1982;37:765-769.
19. Lamb D. A survey of emphysema in coal-workers and the general population (Abstract). Proc Roy Soc Med 1976;69:14.
20. Ruckley VA, Fernie JM, Campbell SJ, Cowie HA. Causes of disability in coalminers: a clinico-pathological study of emphysema, airway obstruction and massive fibrosis. Edinburgh: Institute of Occupational Medicine, 1989. (Report No. TM/89105).
21. Leigh J, Outhred KG, McKenzie HI, Wiles AN. Multiple regression analysis of quantified aetiological, clinical and post-mortem pathological variables related to respiratory disease in coal workers. Ann Occup Hyg 1982;26(1-4):383-400.
22. Leigh J, Driscoll TR, Cole BD, Beck RW, Hull BP, Jung J. Quantitative relation between emphysema and lung mineral content in coalworkers. Occup Environ Med 1994;51:400-407.
23. Ruckley VA, Gauld SJ, Chapman JS, Davis JM, Douglas AN, Fernie JM et al. Comparison of radiographic appearances with associated pathology and lung dust content in a group of coal workers. Br J Ind Med 1984;41:459-467.
24. Ruckley VA, Gauld SJ, Chapman JS, Davis JM, Douglas AN, Fernie JM et al. Emphysema and dust exposure in a group of coal workers. Am Rev Respir Dis 1984;129(4):528-532.
25. Vallyathan V, Brower PS, Green FHY, Attfield MD. Radiographic and pathologic correlation of coal worker's pneumoconiosis. Am J Respir Crit Care Med 1996;154:741-748.

26. Vallyathan V, Green FHY, Brower PS, Attfield MD. The role of coal mine dust exposure in the development of pulmonary emphysema. *Inhaled Particles*. VIII Ann Occup Hyg 1997;41:352-357.
27. Morrow PE, Muhle H, Mermelstein R. Chronic inhalation study findings as a basis for proposing a new occupational dust exposure limit. *J Am Coll Toxicol* 1991;10:279-290.

## Elimination of Silicosis in the Americas



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1. CDC/NIOSH (Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health). NIOSH Hazard Review: Health effects of occupational exposure to respirable crystalline silica. DHHS (NIOSH) Publication No. 2002-129. 2002 <http://www.cdc.gov/niosh/02-129A.html>
2. Centers for Disease Control and Prevention (CDC). Silicosis mortality, prevention, and control—United States 1968-2002. *MMWR* 2005 Apr 29;56(16):401-5. <http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5416a2.htm>
3. WHO (World Health Organization). Silicosis. WHO Information Fact Sheet No. 238. 2000. <http://www.who.int/mediacentre/factsheets/fs238/en/>

## Silicosis and its control in small scale silica mills in India



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1. <http://www.osha.gov>
2. IARC. IARC monographs on the evaluation of carcinogenic risks to humans: Silica, some silicates, coal dust and para-aramid fibrils. Vol 68. Lyon, France: World Health Organization, International Agency for Research on Cancer, 1997.
3. BOM. Mineral commodity summaries, 1994. Washington, DC: U.S. Department of the Interior, U.S. Bureau of Mines, 1994, P. 137, 144-147.
4. Natarajan AS; Gajalakshmi L; Karunakaran S Accelerated silicosis in a silica flour mill worker Lung India. 1992; 10(1): 33-37
5. Gupta K.B, Manav Manchanda and Parveen Kaur Case Report - Bilateral Spontaneous Pneumothorax in Silicosis Indian J Chest Dis Allied Sci 2006; 48: 201-203.
6. NIOSH. Manual of Analytical Methods (NMAM). Method 7602. Silica Crystalline by IR. 1994
7. NIST. National Institute of Standards and Technology. Certificate of Analysis, SRM 1878a, Respirable alpha-quartz, 1999.
8. THE FACTORIES ACT [Act No. 63 of 1948] As amended by the Factories (Amendment) Act, 1987] <http://dglasli.nic.in/html/factoryact>.
9. Banks, D.E., K.L. Moring and B.A. Boehlecke: Summary Reports... Silicosis in the 1980's. *Am. Ind. Hyg. Assoc. J.* 1981; 42:77-79.

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1. Ribeiro FSN. Exposição ocupacional à sílica no Brasil: tendência temporal entre 1985 e 2001. DPH dissertation from the School of Public Health, University of São Paulo
2. BRASIL. Ministério do Trabalho. Secretaria de Segurança do Trabalho. Portaria N°. 3214, 1978. Norma Regulamentadora N°. 15: Atividades e Operações Insalubres. Available at <http://www.mte.gov.br/Temas/SegSau/Legislação/Normas/Default.asp>
3. BRASIL. Ministério do Trabalho. Secretaria de Segurança do Trabalho. Portaria N°. 24 de 30/12/1994 Norma Regulamentadora No 7 a de controle médico de saúde ocupacional. Portaria 24, Diário Oficial da União, Brasília, 1994
4. Carneiro APS, Campos LO, Gomes MFCF, Assunção AA. Perfil de 300 trabalhadores expostos à sílica atendidos ambulatorialmente em Belo Horizonte. *J Pneumol* 2002;28:329-334
5. Mendes R. *Epidemiologia da silicose na região sudeste do Brasil*. DPH dissertation from the School of Public Health, University of São Paulo
6. Minervino D. M., Garrafa N. M., De Stefano I. J. A silicose pulmonar nas indústrias de São Paulo, in *Anais do Congresso Americano de Medicina do Trabalho*, São Paulo, 1964;268-80
7. Franco A. R. Silicose pulmonar em trabalhadores de pedreiras. *Rev Bras Saude Ocup* 1978;6:21-59
8. Oliveira J.I. Prevalence of silicosis among ceramic industry workers in the city of Pedreira, Brazil. in, *Abstracts of Communications, VII International Pneumoconioses Conference*, 1988. p 114
9. Souza Filho A. J., Alice S. H. Pneumoconiose em borracheiros. *J Pneumol*, 1992;18(Supl 2),101-2
10. Holanda M. A., Holanda M. A., Martins M. P. S. et al. Silicosis in Brazilian pit diggers: relationship between dust exposure and radiological findings. *Am J Ind Med* 1995;27:367-78
11. Bagatin E., Jardim J. R. B., Nery L. E. et al. Ocorrência de silicose pulmonar na região de Campinas-SP. *J Pneumol* 1995;21:17-26
12. Comissão Técnica Estadual de Pneumopatias Ocupacionais do Estado do Rio de Janeiro. A silicose na indústria naval do Rio de Janeiro: análise parcial. *J. Pneumol*, 1995;21:13-6.
13. Araújo A. *Determinants of silicosis in quarry workers - final report*. Irwing Selikoff Fellowship, PAHO/Mount Sinai/Queens College, 2001

