

5. References

- Abell, M.T. & Carlsberg, J.R. (1984) A simple reliable method for the determination of airborne hexavalent chromium. *Am. ind. Hyg. Assoc. J.*, 35, 229-233
- Akbarkhanzadeh, F. (1980) Long-term effects of welding fumes upon respiratory symptoms and pulmonary function. *Arch. environ. Health*, 22, 337-341
- Åkesson, B. & Skerfving, S. (1985) Exposure in welding of high nickel alloy. *Int. Arch. occup. environ. Health*, 56, 111-117
- American Conference of Governmental Industrial Hygienists (1988) *TLVs Threshold Limit Values and Biological Exposure Indices for 1988-1989*, Cincinnati, OH, p. 38
- American Welding Society (1973) *The Welding Environment*, Miami, FL
- American Welding Society (1979) *Effects of Welding on Health*, Miami, FL
- Angerer, J. & Lehnert, G. (1990) Occupational chronic exposure to metals. II. Nickel exposure of stainless steel workers — biological monitoring. *Int. Arch. occup. environ. Health*, 62, 7-10
- Angerer, J., Amin, W., Heinrich-Ramm, R., Szadkowski, D. & Lehnert, G. (1987) Occupational chronic exposure to metals. I. Chromium exposure of stainless steel welders — biological monitoring. *Int. Arch. occup. environ. Health*, 59, 503-512
- Angervall, L., Hansson, G. & Röckert, H. (1960) Pulmonary siderosis in electrical welder. A note on pathological appearances. *Acta pathol. microbiol. scand.*, 49, 373-380
- Anthony, J.S., Zamel, N. & Aberman, A. (1978) Abnormalities in pulmonary function after brief exposure to toxic metal fumes. *Can. med. Assoc. J.*, 119, 586-588
- Anttila, S. (1986) Dissolution of stainless steel welding fumes in the rat lung: an X-ray micro-analytical study. *Br. J. ind. Med.*, 43, 592-596
- Antti-Poika, M., Hassi, J. & Pyy, L. (1977) Respiratory diseases in arc welders. *Int. Arch. occup. environ. Health*, 40, 225-230
- Asal, N.R., Lee, E.T., Geyer, J.R., Kadamani, S., Risser, D.R. & Cherng, N. (1988) Risk factors in renal cell carcinoma. II. Medical history, occupation, multivariate analysis, and conclusions. *Cancer Detect. Prev.*, 13, 263-279
- Attfield, M.D. & Ross, D.S. (1978) Radiological abnormalities in electric-arc welders. *Br. J. ind. Med.*, 35, 117-122
- Baker, R.S.U., Arlauskas, A., Tandon, R.K., Crisp, P.T. & Ellis, J. (1986) Toxic and genotoxic action of electric-arc welding fumes on cultured mammalian cells. *J. appl. Toxicol.*, 6, 357-362
- Barfoot, K.M., Mitchell, I.V., Verheyen, F. & Babeliowsky, T. (1981) Combined PIXE and X-ray SEM studies of time-resolved deposits of welding shop aerosols. *Nucl. Instr. Methods*, 181, 449-457
- Barhad, B., Teculescu, D. & Craciun, O. (1975) Respiratory symptoms, chronic bronchitis, and ventilatory function in shipyard welders. *Int. Arch. occup. environ. Health*, 36, 137-150
- Beaumont, J.J. & Weiss, N.S. (1980) Mortality of welders, shipfitters, and other metal trades workers in boilermakers local no. 104, AFL-CIO. *Am. J. Epidemiol.*, 112, 775-786

- Beaumont, J.J. & Weiss, N.S. (1981) Lung cancer among welders. *J. occup. Med.*, **23**, 839-844
- Becker, N., Claude, J. & Frentzel-Beyme, R. (1985) Cancer risk of arc welders exposed to fumes containing chromium and nickel. *Scand. J. Work Environ. Health*, **11**, 75-82
- Benhamou, S., Benhamou, E. & Flamant, R. (1988) Occupational risk factors of lung cancer in a French case-control study. *Br. J. ind. Med.*, **45**, 231-233
- Berg, N.O., Berlin, M., Bohgard, M., Rudell, B., Schütz, A. & Warvinge, K. (1987) Broncho-carcinogenic properties of welding and thermal spraying fumes containing chromium in the rat. *Am. J. ind. Med.*, **11**, 39-54
- Bergmann, L. (1982) On a possible relation between the occupational exposure of welders and the development of bronchogenic carcinoma (Ger.). *Z. Erkrank. Atm. Org.*, **158**, 322-325
- Bernacki, E.J., Parsons, G.E., Roy, B.R., Mikac-Devic, M., Kennedy, C.D. & Sunderman, F.W., Jr (1978) Urine nickel concentrations in nickel-exposed workers. *Ann. clin. Lab. Sci.*, **8**, 184-189
- Beton, D.C., Andrews, G.S., Davies, H.J., Howells, L. & Smith, G.F. (1966) Acute cadmium fume poisoning. Five cases with one death from renal necrosis. *Br. J. ind. Med.*, **23**, 292-301
- Biggart, N.W. & Rinehart, R.R. (1987) Comparison between aqueous-phase and gas-phase exposure protocols for determining the mutagenic potential of nitrogen dioxide and the gas fraction of welding fumes. *Mutat. Res.*, **188**, 175-184
- Biggart, N.W., Rinehart, R.R. & Verfaillie, J. (1987) Evidence for the presence of mutagenic compounds other than chromium in particles from mild steel welding. *Mutat. Res.*, **188**, 55-65
- Bille, M., Rosendahl, C.-H., Steen, A., Svensson, L. & Wallen, K.-A. (1976) Determination of decomposition products formed during welding on painted steel. *Svetsaren*, **2**, 6-13
- Bjørnerem, H., Thomassen, L.M. & Wergeland, E. (1983) Welding asthma (Norw.). *Tidsskr. Nor. Læforen.*, **103**, 1286-1288
- Blot, W.J., Harrington, J.M., Toledo, A., Hoover, R., Heath, C.W., Jr & Fraumeni, J.F., Jr (1978) Lung cancer after employment in shipyards during World War II. *New Engl. J. Med.*, **299**, 620-624
- Blot, W.J., Morris, L.E., Stroube, R., Tagnon, I. & Fraumeni, J.F., Jr (1980) Lung and laryngeal cancers in relation to shipyard employment in coastal Virginia. *J. natl Cancer Inst.*, **65**, 571-575
- Breslow, L., Hoaglin, L., Rasmussen, G. & Abrams, H.K. (1954) Occupations and cigarette smoking as factors in lung cancer. *Am. J. public Health*, **44**, 171-181
- Brillié, J. (1990) *Soudure Electrique à l'Arc* (Electric arc welding), Paris, Ecole Supérieure de Soudure Autogène
- British Standards Institution (1986) *Fume from Welding and Allied Processes: Guide to Methods for Sampling and Analysis of Particulate Matter and Gases* (BS6691 Parts 1, 2), London
- Brun, J., Cassan, G., Kofman, J., Gilly, J. & Magnin, F. (1972) Conglomerate siderosis in arc welders (Fr.). *J. fr. Méd.*, **26**, 133-142

- Buiatti, E., Kriebel, D., Geddes, M., Santucci, M. & Pucci, N. (1985) A case control study of lung cancer in Florence, Italy. I. Occupational risk factors. *J. Epidemiol. Community Health*, 39, 244-250
- Bunin, G.R., Nass, C.C., Kramer, S. & Meadows, A.T. (1989) Parental occupation and Wilms' tumor: results of a case-control study. *Cancer Res.*, 49, 725-729
- Caccuri, S. & Fournier, E. (1969) *On Welding* (Publication Series on Occupational Hygiene and Occupational Medicine No. 9), Luxembourg, Commission of the European Communities
- Carpenter, A.V., Flanders, W.D., Frome, E.L., Tankersley, W.G. & Fry, S.A. (1988) Chemical exposures and central nervous system cancers: a case-control study among workers at two nuclear facilities. *Am. J. ind. Med.*, 13, 351-362
- Casciani, G., Ruspolini, F., Verdel, U. & Cecchetti, G. (1986) Welding fumes concentration in heavy carpentry working environment and trial to correlate same with gas and powdered fluorides. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Gumes and Gases*, Amsterdam, Excerpta Medica, pp. 153-157
- Cavalleri, A. & Minoia, C. (1985) Distribution in serum and erythrocytes and urinary elimination of chromium in workers occupationally exposed to Cr(VI) and Cr(III). (Ital.) *Med. Lav.*, 7, 35-38
- Charr, R. (1953) Respiratory disorders among welders. *J. Am. med. Assoc.*, 152, 1520-1522
- Charr, R. (1956) Pulmonary changes in welders: a report of three cases. *Ann. intern. Med.*, 44, 806-812
- Claude, J.C., Frentzel-Beyme, R.R. & Kunze, E. (1988) Occupation and risk of cancer of the lower urinary tract among men. A case-control study. *Int. J. Cancer*, 41, 371-379
- Coenen, W., Grothe, I., Kühnen, G., Pfeiffer, W. & Schenk, H. (1985) Nickel and chromate in welding fume. (Ger.) *Staub*, 45, 546-550
- Coenen, W., Grothe, I. & Kühnen, G. (1986) Exposure to welding fumes in the workplace with regard to nickel and chromates. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 149-152
- Cotes, J.E., Feinmann, E.L., Male, V.J., Rennie, F.S. & Wickham, C.A.C. (1989) Respiratory symptoms and impairment in shipyard welders and caulker/burners. *Br. J. ind. Med.*, 46, 292-301
- Dare, P.R.M., Hewitt, P.J., Hicks, R., Van Bemst, A., Zober, A. & Fleischer, M. (1984) Barium in welding fume. *Ann. occup. Hyg.*, 28, 445-448
- Decouflé, P., Stanislawczyk, K., Houten, L., Bross, I.D.J. & Viadana, E. (1977) *A Retrospective Survey of Cancer in Relation to Occupation* (DHEW (NIOSH) Publ. No. 77-178), Cincinnati, OH, National Institute for Occupational Safety and Health
- Doig, A.T. & McLaughlin, A.I.G. (1936) X-Ray appearances of the lungs of electric arc welders. *Lancet*, i, 771-775
- Doig, A.T. & McLaughlin, A.I.G. (1948) Clearing of X-ray shadows in welders' siderosis. *Lancet*, i, 789-791

- Dubrow, R. & Wegman, D.H. (1984) Cancer and occupation in Massachusetts: a death certificate study. *Am. J. ind. Med.*, 6, 207-230
- Dunn, J.E., Jr & Weir, J.M. (1965) Cancer experience of several occupational groups followed prospectively. *Am. J. public Health*, 55, 1367-1375
- Dunn, J.E., Jr & Weir, J.M. (1968) A prospective study of mortality of several occupational groups. Special emphasis on lung cancer. *Arch. environ. Health*, 17, 71-76
- Dunn, J.E., Jr, Linden, G. & Breslow, L. (1960) Lung cancer mortality experience of men in certain occupations in California. *Am. J. public Health*, 50, 1475-1487
- Eichhorn, F. & Oldenburg, T. (1986) Welding fumes emitted during welding of high-alloyed materials — evaluation of amount, chemical composition and morphology, including the influence of welding parameters. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 51-59
- Emmerling, G., Zschiesche, W., Schaller, K.-H., Weltle, D., Valentin, H. & Zober, A. (1987) Quantification of external and internal exposure to total chromium and chromium VI in welding with high alloy consumables. (Ger.) In: Norpoth, K., ed., *Proceedings of the 27th Annual Assembly of the German Society of Occupational Medicine, Essen, May 6-9 1987*, Stuttgart, Gentner Verlag, pp. 497-501
- Emmett, E.A., Buncher, C.R., Suskind, R.B. & Rowe, K.W., Jr (1981) Skin and eye diseases among arc welders and those exposed to welding operations. *J. occup. Med.*, 23, 85-90
- Englund, A., Ekman, G. & Zabrielski, L. (1982) Occupational categories among brain tumor cases recorded in the cancer registry in Sweden. *Ann. N.Y. Acad. Sci.*, 381, 188-196
- Engström, K., Engström, B. & Henriks-Eckerman, M.-L. (1988) Evaluation of exposures during the welding or flame-cutting of painted steel. *Scand. J. Work Environ. Health*, 14 (Suppl. 1), 33-34
- Enzer, N. & Sander, O.A. (1938) Chronic lung changes in electric arc welders. *J. ind. Hyg. Toxicol.*, 20, 333-350
- Etienne, C.F., Hooftman, R.N., de Raat, W.K., Reuzel, P.G.J., van der Sluis, H.H. & Wilmer, J.W.G.M. (1986) *The Assessment of the Carcinogenicity of Chromium- and Nickel-containing Welding Fumes. Phase I: In vitro and In vivo Genotoxicity and Cytotoxicity Studies. Final Report* (ECSC-TNO Contract 7248/22/020), Luxembourg, Commission of the European Communities
- Evans, M.J., Ingle, J., Molyneux, M.K. & Sharp, G.T.H. (1979) An occupational hygiene study of a controlled welding task using a general purpose rutile electrode. *Ann. occup. Hyg.*, 22, 1-17
- Fabre, M., Marais, M., Ladouch, A., Paillas, J., Blanchon, P. & Quillard, J. (1976) Pneumocoinosis in arc welders. (Fr.) *Arch. Anat. Cytol. pathol.*, 24, 481-485
- Farrants, G., Reith, A., Schöler, B. & Feren, K. (1988) A simple, direct method for the collection of particles from air samples for transmission electron microscopy and digital image analysis. *J. Microsc.*, 149, 88-93
- Farrell, F.J. (1987) Angioedema and urticaria as acute and late phase reactions to zinc fume exposure, with associated metal fume fever-like symptoms. *Am. J. ind. Med.*, 12, 331-337

- Fasiska, E.J., Wagenblast, H.W. & Nasta, M. (1983) *Characterization of Arc Welding Fume*, Miami, FL, American Welding Society
- Fawer, R.F., Gardner, A.W. & Oakes, D. (1982) Absences attributed to respiratory diseases in welders. *Br. J. ind. Med.*, 39, 149-152
- Fletcher, A.C. & Ades, A. (1984) Lung cancer mortality in a cohort of English foundry workers. *Scand. J. Work Environ. Health*, 10, 7-16
- Fogh, A., Frost, J. & Georg, J. (1969) Respiratory symptoms and pulmonary function in welders. *Ann. occup. Hyg.*, 12, 213-218
- Fregert, S. & Övrum, P. (1963) Chromate in welding fumes with special reference to contact dermatitis. *Acta dermatovenereol.*, 43, 119-124
- Friede, E. & Rachow, D.O. (1961) Symptomatic pulmonary disease in arc welders. *Ann. intern. Med.*, 54, 121-127
- Froats, J.F.K. & Mason, P.J. (1986) Worker exposure to welding fumes and gases during hydraulic plant turbine repair. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Gumes and Gases*, Amsterdam, Excerpta Medica, pp. 137-140
- Funahashi, A., Schlueter, D.P., Pintar, K., Bemis, E.L. & Siegesmund, K.A. (1988) Welder's pneumoconiosis: tissue elemental microanalysis by energy dispersive X-ray analysis. *Br. J. ind. Med.*, 45, 14-18
- Gallagher, R.P. & Threlfall, W.J. (1983) Cancer mortality in metal workers. *Can. med. Assoc. J.*, 129, 1191-1194
- Garnuszewski, Z. & Dobrzynski, W. (1967) Regression of pulmonary radiological changes in dockyard welders after cessation or decrease of exposure to welding fumes. *Pol. med. J.*, 6, 610-613
- Gérin, M., Siemiatycki, J., Bégin, D., Kemper, H., Lakhani, R., Nadon, L. & Richardson, L. (1986) Epidemiological monitoring system for identifying carcinogens in the Montréal work environment: a progress report. (Fr.) *Trav. Santé*, 2, S42-S46
- Gobbato, F., Melato, M. & Bucconi, S. (1980) Welder's lung and possible neoplastic complications. (Ital.) *Med. Lav.*, 2, 132-140
- Gottlieb, M.S. (1980) Lung cancer and the petroleum industry in Louisiana. *J. occup. Med.*, 22, 384-388
- Grandjean, P. & Kon, S.H. (1981) Lead exposure of welders and bystanders in a ship repair yard. *Am. J. ind. Med.*, 2, 65-70
- Grandjean, P., Selikoff, I.J., Shen, S.K. & Sunderman, F.W., Jr (1980) Nickel concentrations in plasma and urine of shipyard workers. *Am. J. ind. Med.*, 1, 181-189
- Grekula, A., Peura, R. & Sivonen, S.J. (1986) Quantitative energy dispersive X-ray microanalysis of welding fumes. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Gumes and Gases*, Amsterdam, Excerpta Medica, pp. 85-88
- Grozdenko, L.A. & Kuzina, A.S. (1982) Hygienic measurement of the welding arc radiation under present industrial conditions. (Russ.) *Gig. Tr. prof. Zabol.*, 5, 31-34

- Guidotti, T.L., DeNee, P.B., Abraham, J.L. & Smith, J.R. (1978) Arc welder's pneumoconiosis: application of advanced scanning electron microscopy. *Arch. environ. Health*, 33, 117-124
- Guralnick, L. (1963) *Mortality by Industry and Cause of Death Among Men 20 to 64 Years of Age: United States, 1950* (Vital Statistics Special Reports 53), Washington DC, US Department of Health, Education, and Welfare, p. 246
- Gustafsson, T.E., Tossavainen, A. & Aitio, A. (1986) Scanning electron microscope studies on flame cutting and welding fumes in a steel foundry. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 93-97
- Gustavsson, C. & Welinder, H. (1986) Stainless steel manual metal-arc welding and chromium in blood. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 185-188
- Gylseth, B., Gundersen, N. & Langård, S. (1977) Evaluation of chromium exposure based on a simplified method for urinary chromium determination. *Scand. J. Work Environ. Health*, 3, 28-31
- Hagberg, M., Lindqvist, B. & Wall, S. (1986) Exposure to welding fumes and chronic renal diseases, a negative case-referent study. *Int. Arch. occup. environ. Health*, 58, 191-195
- Hallne, U. & Hallberg, B.-O. (1982) *Problems of the Work Environment due to Welding*, Part 21, *Nickel Carbonyl, Carbon Monoxide and Nitrogen Oxide Emissions from Arc Welding Cast Iron Using Nickel Containing Electrodes* (Report 1982:11), Solna, Arbetarskyddsstyrelsen
- Haneke, E. (1973) Ejaculation findings in electric welders (Ger.) *Dermatol. Monatsschr.*, 159, 1036-1040
- Hansen, K. & Stern, R.M. (1984) Toxicity and transformation potency of nickel compounds in BHK cells *in vitro*. In: Sunderman, F.W., Jr, ed., *Nickel in the Human Environment* (IARC Scientific Publications No. 53), Lyon, IARC, pp. 193-200
- Hansen, K. & Stern, R.M. (1985) Welding fumes and chromium compounds in cell transformation assays. *J. appl. Toxicol.*, 5, 306-314
- Harding, H.E., McLaughlin, A.I.G. & Doig, A.T. (1958) Clinical, radiographic and pathological studies of the lungs of electric-arc and oxyacetylene welders. *Lancet*, ii, 394-398
- Hayden, S.P., Pincock, A.C., Hayden, J., Tyler, L.E., Cross, K.W. & Bishop, J.M. (1984) Respiratory symptoms and pulmonary function of welders in the engineering industry. *Thorax*, 39, 442-447
- Hedenstedt, A., Jenssen, D., Lidesten, B.-M., Ramel, C., Rannug, U. & Stern, R.M. (1977) Mutagenicity of fume particles from stainless steel welding. *Scand. J. Work Environ. Health*, 3, 203-211
- Hemminki, K. & Lindbohm, M.-L. (1986) Reproductive effects of welding fumes: experimental and epidemiological studies with special reference to chromium and nickel compounds. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 291-302

- Hernberg, S., Collan, Y., Degerth, R., Englund, A., Engzell, U., Kuosma, E., Mutanen, P., Nordlinder, H., Sand Hansen, H., Schultz-Larsen, K., Sjøgaard, H. & Westerholm, P. (1983a) Nasal cancer and occupational exposures. Preliminary report of a joint Nordic case-referent study. *Scand. J. Work Environ. Health*, 9, 208-213
- Hernberg, S., Westerholm, P., Schultz-Larsen, K., Degerth, R., Kuosma, E., Englund, A., Engzell, U., Sand Hansen, H. & Mutanen, P. (1983b) Nasal and sinusal cancer. Connection with occupational exposures in Denmark, Finland and Sweden. *Scand. J. Work Environ. Health*, 9, 315-326
- Hewitt, P.J. & Madden, M.G. (1986) Welding process parameters and hexavalent chromium in MIG fume. *Ann. occup. Hyg.*, 30, 427-434
- Hicks, R., Hewitt, P.J. & Lam, H.F. (1979) An investigation of the experimental induction of hypersensitivity in the guinea pig by material containing chromium, nickel and cobalt from arc welding fumes. *Int. Arch. Allergy appl. Immunol.*, 59, 265-272
- Hicks, R., Al-Shamma, K.J., Lam, H.F. & Hewitt, P.J. (1983) An investigation of fibrogenic and other toxic effects of arc-welding fume particles deposited in the rat lung. *J. appl. Toxicol.*, 3, 297-306
- Hicks, R., Lam, H.F., Al-Shamma, K.J. & Hewitt, P.J. (1984) Pneumoconiotic effects of welding-fume particles from mild and stainless steel deposited in the lung of the rat. *Arch. Toxicol.*, 55, 1-10
- Hicks, R., Oshodi, R.O. & Pedrick, M.J. (1987) Cytotoxic, irritant and fibrogenic effects of metal-fume particulate materials investigated by intramuscular injection in the rat and guinea pig. *Arch. Toxicol., Suppl.* 11, 220-222
- Hildebrand, H.F., Collyn-D'Hooghe, M. & Stern, R.M. (1986) Cytotoxic effects of welding fumes on human embryonic epithelial pulmonary cells in culture. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 319-324
- Houten, L., Bross, I.D.J., Viadana, E. & Sonnesso, G. (1977) Occupational cancer in men exposed to metals. *Adv. exp. Med. Biol.*, 91, 93-102
- Howe, G.R., Burch, J.D., Miller, A.B., Cook, G.M., Estève, J., Morrison, B., Gordon, P., Chambers, L.W., Fodor, G. & Winsor, G.M. (1980) Tobacco use, occupation, coffee, various nutrients, and bladder cancer. *J. natl Cancer Inst.*, 64, 701-713
- Howe, G.R., Fraser, D., Lindsay, J., Presnal, B. & Yu, S.Z. (1983) Cancer mortality (1965-77) in relation to diesel fume and coal exposure in a cohort of retired railway workers. *J. natl Cancer Inst.*, 70, 1015-1019
- Husgafvel-Pursiainen, K., Kalliomäki, P.-L. & Sorsa, M. (1982) A chromosome study among stainless steel welders. *J. occup. Med.*, 24, 762-766
- IARC (1989) *Mortality and Cancer Incidence Follow-up on an Historical Cohort of European Welders* (Intern. tech. Rep. 89/003), Lyon
- Irmscher, G., Beck, B., Ahlendorf, W., Anspach, M., Konetzke, G., Ludwig, V. & Sturm, W. (1975) Experience gained in assessing doubtful cirrhosis of the lung caused by welding fumes. (Ger.) *Z. ges. Hyg.*, 21, 562-566

- Järvisalo, J., Olkinuora, M., Tossavainen, A., Virtamo, M., Ristola, P. & Aitio, A. (1983) Urinary and blood manganese as indicators of manganese exposure in manual metal arc welding of mild steel. In: Brown, S.S. & Savory, J., eds, *Chemical Toxicology and Clinical Chemistry of Metals*, New York, Academic Press, pp. 123-126
- Jefferson, T.B. (1988) 1987: a comeback for welding sales. *Welding Design Fabrication*, July, 51-54
- Jindrichova, J. (1978) Harmful effects caused by chromium in electric welders. (Ger.) *Z. ges. Hyg.*, 24, 86-88
- Kalliomäki, P.-L., Sutinen, S., Kelhä, V., Lakomaa, E., Sortti, V. & Sutinen, S. (1979) Amount and distribution of fume contaminants in the lungs of an arc welder *post mortem*. *Br. J. ind. Med.*, 36, 224-230
- Kalliomäki, P.-L., Rahkonen, E., Vaaranen, V., Kalliomäki, K. & Aittoniemi, K. (1981) Lung-retained contaminants, urinary chromium and nickel among stainless steel welders. *Int. Arch. occup. environ. Health*, 49, 67-75
- Kalliomäki, P.-L., Kiilunen, M., Vaaranen, V., Lakomaa, E.-L., Kalliomäki, K. & Kivelä, R. (1982a) Retention of stainless steel manual metal arc welding fumes in rats. *J. Toxicol. environ. Health*, 10, 223-232
- Kalliomäki, P.-L., Kalliomäki, K., Korhonen, O., Nordman, H., Rahkonen, E. & Vaaranen, V. (1982b) Respiratory status of stainless steel and mild steel welders. *Scand. J. Work Environ. Health, Suppl. 1*, 117-121
- Kalliomäki, P.-L., Junttila, M.-E., Kalliomäki, K., Lakomaa, E.-L. & Kivelä, R. (1983a) Comparison of the behavior of stainless and mild steel manual metal arc welding fumes in rat lung. *Scand. J. Work Environ. Health*, 9, 176-180
- Kalliomäki, P.-L., Junttila, M.-E., Kalliomäki, K., Lakomaa, E.-L. & Kivelä, R. (1983b) Comparison of the retention and clearance of different welding fumes in rat lungs. *Am. ind. Hyg. Assoc. J.*, 44, 733-738
- Kalliomäki, P.-L., Lakomaa, E., Kalliomäki, K., Kiilunen, M., Kivelä, R. & Vaaranen, V. (1983c) Stainless steel manual metal arc welding fumes in rats. *Br. J. ind. Med.*, 40, 229-234
- Kalliomäki, P.-L., Tuomisaari, M., Lakomaa, E.-L., Kalliomäki, K. & Kivelä, R. (1983d) Retention and clearance of stainless steel shieldgas welding fumes in rat lungs. *Am. ind. Hyg. Assoc. J.*, 44, 649-654
- Kalliomäki, P.-L., Olkinuora, M., Hyvärinen, H.-K. & Kalliomäki, K. (1984) Kinetics of nickel and chromium in rats exposed to different stainless-steel welding fumes. In: Sunderman, F.W., Jr, ed., *Nickel in the Human Environment* (IARC Scientific Publications No. 53), Lyon, IARC, pp. 385-393
- Kalliomäki, P.-L., Hyvärinen, H.-K., Aitio, A., Lakomaa, E.-L. & Kalliomäki, K. (1986) Kinetics of the metal components of intratracheally instilled stainless steel welding fume suspensions in rats. *Br. J. ind. Med.*, 43, 112-119
- Kantor, A.F., McCrea Curnen, M.G., Meigs, J.W. & Flannery J.T. (1979) Occupations of fathers of patients with Wilms's tumour. *J. Epidemiol. Community Health*, 33, 253-256

- Keimig, D.G., Pomrehn, P.R. & Burmeister, L.F. (1983) Respiratory symptoms and pulmonary function in welders of mild steel: a cross-sectional study. *Am. J. ind. Med.*, 4, 489-499
- Keskinen, H., Kalliomäki, P.-L. & Alanko, K. (1980) Occupational asthma due to stainless steel welding fumes. *Clin. Allergy*, 10, 151-159
- Kilburn, K.H., Warshaw, R. & Thornton, J.C. (1985) Asbestosis, pulmonary symptoms and functional impairment in shipyard workers. *Chest*, 88, 254-259
- Kjuus, J., Skjaerven R., Langård, S., Lien, J.T. & Aamodt, T. (1986) A case-referent study of lung cancer, occupational exposures and smoking. I. Comparison of title-based and exposure-based occupational information. *Scand. J. Work Environ. Health*, 12, 193-202
- Knight, G.S., Williams, H.E.M. & Hinton, D. (1985) Elevated plasma manganese levels in welders cutting manganese steel. *N.Z. med. J.*, 98, 870
- Knudsen, I. (1980) The mammalian spot test and its use for the testing of potential carcinogenicity of welding fume particles and hexavalent chromium. *Acta pharmacol. toxicol.*, 47, 66-70
- Kobayashi, M. & Tsutsumi, S. (1986) Investigation on crystalline materials in welding fumes of covered electrodes. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 77-80
- Koponen, M., Gustaffson, T., Kalliomäki, P.-L., Kalliomäki, K. & Moilanen, M. (1981) Grinding dusts of alloyed steel and hard metal. *Ann. occup. Hyg.*, 24, 191-204
- Koshi, K. (1979) Effects of fume particles from stainless steel welding on sister chromatid exchanges and chromosomal aberrations in cultured Chinese hamster cells. *Ind. Health*, 17, 39-49
- Koshi, K., Yagami, T. & Nakanishi, Y. (1984) Cytogenetic analysis of peripheral blood lymphocytes from stainless steel welders. *Ind. Health*, 22, 305-318
- Kujawska, A. & Marek, K. (1979) Radiological picture of pneumoconiosis in welders. (Pol.) *Med. Prac.*, 30, 79-84
- Lam, H.F., Hewitt, P.J. & Hicks, R. (1979) A study of pulmonary deposition, and the elimination of some constituent metals from welding fume in laboratory animals. *Ann. occup. Hyg.*, 21, 363-373
- Lancaster, J.F. (1980) *Metallurgy of Welding*, 3rd ed., London, George Allen & Unwin
- Lerchen, M.L., Wiggins, C.L. & Samet, J.M. (1987) Lung cancer and occupation in New Mexico. *J. natl Cancer Inst.*, 79, 639-645
- Lindberg, R.A. & Braton, N.R. (1985) *Welding and Other Joining Processes*, Boston, MA, Allyn and Bacon Inc.
- Lippmann, M. (1986) Magnetopneumography as a tool for measuring lung burden of industrial aerosols. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 199-213
- Littorin, M., Högstedt, B., Strömbäck, B., Karlsson, A., Welinder, H., Mitelman, F. & Skerfving, S. (1983) No cytogenetic effects in lymphocytes of stainless steel welders. *Scand. J. Work Environ. Health*, 9, 259-264

- Littorin, M., Welinder, H. & Hultberg, B. (1984) Kidney function in stainless steel welders. *Int. Arch. occup. environ. Health*, 53, 279-282
- Logan, W.P.D., ed. (1982) *Cancer Mortality by Occupation and Social Class 1851-1971* (IARC Scientific Publications No. 36), Lyon, IARC, pp. 239, 246
- Malmqvist, K.G., Johansson, G.I., Bohgard, M. & Akselsson, K.R. (1981) Elemental concentrations in airborne particles from welding and metal spraying operations. *Nucl. Instr. Methods*, 181, 465-471
- Malmqvist, K.G., Johansson, G., Bohgard, M. & Akselsson, K.R. (1986) Process-dependent characteristics of welding fume particles. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Jarvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 31-46
- Maxild, J., Andersen, M., Kiel, P. & Stern, R.M. (1978) Mutagenicity of fume particles from metal arc welding on stainless steel in the *Salmonella*/microsome test. *Mutat. Res.*, 56, 235-243
- Mayer, A. & Salsi, S. (1980) *Etude en Laboratoire de la Pollution Chimique et du Rayonnement aux Postes de Soudage à l'Arc. Résultats des Essais Préliminaire Effectués sur 18 Couples 'Produit d'Apport — Métal Soudé' Différents* [Laboratory Study of Chemical Pollution and of Radiation at Arc Welding Stations. Results of Preliminary Tests Performed on 18 Different 'Support Material—Welded Metal' Couples] (Notes scientifiques et techniques de l'INRS No. 25), Paris, Institut National de Recherche et de Sécurité
- McLaughlin, J.K., Malaker, H.S.R., Blot, W.J., Malaker, B.K., Stone, B.J., Weiner, J.A., Ericsson, J.L.E. & Fraumeni, J.F., Jr (1987) Occupational risks for intracranial gliomas in Sweden. *J. natl Cancer Inst.*, 78, 253-257
- McMillan, G.H.G. (1981) The health of welders in naval dockyards: welding, tobacco smoking and absence attributed to respiratory diseases. *J. Soc. occup. Med.*, 31, 112-118
- McMillan, G.H.G. (1983) The health of welders in naval dockyards. The risk of asbestos-related diseases occurring in welders. *J. occup. Med.*, 25, 727-730
- McMillan, G.H.G. & Pethybridge, R.J. (1983) The health of welders in naval dockyards: proportional mortality study of welders and two control groups. *J. Soc. occup. Med.*, 33, 75-84
- McMillan, G.H.G. & Pethybridge, R.J. (1984) A clinical, radiological and pulmonary function case-control study of 135 dockyard welders aged 45 years and over. *J. Soc. occup. Med.*, 34, 3-23
- Menck, H.R. & Henderson, B.E. (1976) Occupational differences in rates of lung cancer. *J. occup. Med.*, 18, 797-801
- Meyer, E.C., Kratzinger, S.F. & Miller, W.H. (1967) Pulmonary fibrosis in an arc welder. *Arch. environ. Health*, 15, 462-469
- Milham, S., Jr (1976) *Occupational Mortality in Washington State, 1950-1971* (DHEW (NIOSH) Publ. No. 76-175), Cincinnati, OH, National Institute for Occupational Safety and Health
- Milham, S., Jr (1983) *Occupational Mortality in Washington State, 1950-1979* (DHEW (NIOSH) Publication No. 83-116), Cincinnati, National Institute for Occupational Safety and Health

- Milne, K.L., Sandler, D.P., Everson, R.B. & Brown, S.M. (1983) Lung cancer and occupation in Alameda county: a death certificate case-control study. *Am. J. ind. Med.*, 4, 565-575
- Minni, E. (1986) Assessment of the use of electron spectroscopy and sputtering for studies of solid fume particles. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 89-92
- Minni, E., Gustafsson, T.E., Koponen, M. & Kalliomäki, P.-L. (1984) A study of the chemical structure of particles in the welding fumes of mild and stainless steel. *J. Aerosol Sci.*, 15, 57-68
- Moreton, J. (1986) The case for standardization of tests for welding fume emission rates and chemical composition determination. *Ann. occup. Hyg.*, 30, 435-444
- Moreton, J., Day, S.E. & Jenkins, N. (1986) Fume emission rate measurements and fume analysis on four stainless steel welding consumables. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 61-64
- Morgan, W.K.C. (1989) On welding, wheezing and whimsy. *Am. ind. Hyg. Assoc. J.*, 50, 59-69
- Morgan, W.K.C. & Kerr, H.D. (1963) Pathologic and physiologic studies of welders' siderosis. *Ann. intern. Med.*, 58, 293-304
- Mortensen, J.T. (1988) Risk for reduced sperm quality among metal workers, with special reference to welders. *Scand. J. Work Environ. Health*, 14, 27-30
- Morton, W.E. & Treyve, E.L. (1982) Histologic differences in occupational risks of lung cancer incidence. *Am. J. ind. Med.*, 3, 441-457
- Moss, C.E. & Murray, W.E. (1979) Optical radiation levels produced in gas welding, torch brazing and oxygen cutting. *Welding J.*, 9, 37-46
- Mur, J.M., Teculescu, D., Pham, Q.T., Gaertner, M., Massin, N., Meyer-Bisch, C., Moulin, J.J., Diebold, F., Pierre, F., Meurou-Poncelet, B. & Muller, J. (1985) Lung function and clinical findings in a cross-sectional study of arc welders. An epidemiological study. *Int. Arch. occup. environ. Health*, 57, 1-17
- Mur, J.M., Pham, Q.T., Teculescu, D., Massin, N., Meyer-Bisch, C., Moulin, J.J., Wild, P., Leonard, M., Henquel, J.C., Baudin, V., Betz, M., Fontana, J.M. & Toamain, J.P. (1989) Arc welders' respiratory health evolution over five years. *Int. Arch. occup. environ. Health*, 61, 321-327
- Mutti, A., Cavatorta, A., Pedroni, C., Borghi, A., Giaroli, C. & Franchini, I. (1979) The role of chromium accumulation in the relationship between airborne and urinary chromium in welders. *Int. Arch. occup. environ. Health*, 43, 123-133
- Mutti, A., Pedroni, C., Arfini, G., Franchini, I., Minoia, C., Micoli, G. & Baldi, C. (1984) Biological monitoring of occupational exposure to different chromium compounds at various valency states. *Int. J. environ. anal. Chem.*, 17, 35-41
- Najarian, T. & Colton, T. (1978) Mortality from leukaemia and cancer in shipyard nuclear workers. *Lancet*, i, 1018-1020
- Näslund, P.-E. & Högstedt, P. (1982) Welding and bronchitis. *Eur. J. respir. Dis.*, 118 (Suppl.), 69-72

- National Institute for Occupational Safety and Health (1985) *Manual of Analytical Methods*, 2nd ed., *Hexavalent Chromium* (Publ. 80-125) Vol. 6, Washington DC, US Department of Health, Education, and Welfare
- National Institute for Occupational Safety and Health (1988) *Criteria for a Recommended Standard, Welding, Brazing and Thermal Cutting* (DHHS (NIOSH) Publ. No. 88-110a; PB88-231774), Cincinnati, OH
- Newhouse, M.L., Oakes, D. & Woolley A.J. (1985) Mortality of welders and other craftsmen at a shipyard in NE England. *Br. J. ind. Med.*, 42, 406-410
- Niebuhr, E., Stern, R.M., Thomsen, E. & Wulf, H.-C. (1980) Relative solubility of nickel welding fume fractions and their genotoxicity in sister chromatid exchange *in vitro*. In: Brown, S.S. & Sunderman, F.W., Jr, eds, *Nickel Toxicology*, London, Academic Press, pp. 129-132
- Norell, S., Ahlbom, A., Olin, R., Erwald, R., Jacobson, G., Lindberg-Navier, I. & Wiechel, K.-L. (1986) Occupational factors and pancreatic cancer. *Br. J. ind. Med.*, 43, 775-778
- Office of Population Censuses and Surveys (1986) *Occupational Mortality. The Registrar General's Decennial Supplement for Great Britain, 1979-80, 1982-83. Part 1, Commentary* (Series DS No. 6), London, Her Majesty's Stationery Office, p. 72
- Oláh, L. & Tölgyessy, J. (1985) Determination of heavy metals in welder's working environment using nuclear analytical methods. *J. Radioanal. nucl. Chem.*, 93, 43-54
- Oldenburg, T. (1988) *Vergleichende Bewertung von Schweissrauchen bei Verwendung Chrom-, Nickel- oder Bariumhaltiger Schweisszusatzwerkstoffe* [Comparing Assessment of Welding Fumes from Chromium-, Nickel- and Barium-containing Consumables] (Welding tech. Res. Rep. No. 21), Düsseldorf, DVS-Verlag
- Olin, R.G., Ahlbom, A., Lindberg-Navier, I., Norell, S.E. & Spännare, B. (1987) Occupational factors associated with astrocytomas: a case-control study. *Am. J. ind. Med.*, 11, 615-625
- Olsen, J., Sabroe, S. & Lajer, M. (1984) Welding and cancer of the larynx: a case-control study. *Eur. J. Cancer clin. Oncol.*, 20, 639-643
- Ott, M.G., Holder, B.B. & Langner, R.R. (1976) Determinants of mortality in an industrial population. *J. occup. Med.*, 18, 171-177
- Oxhoj, H., Bake, B., Wedel, H. & Wilhelmsen, L. (1979) Effects of electric arc welding on ventilatory lung function. *Arch. environ. Health*, 34, 211-217
- Pasanen, J.T., Gustafsson, T.E., Kalliomäki, P.-L., Tossavainen, A. & Järvisalo, J.O. (1986) Cytotoxic effects of four types of welding fumes on macrophages *in vitro*: a comparative study. *J. Toxicol. environ. Health*, 18, 143-152
- Patel, K.C., Sheth, S.M. & Kamat, S.R. (1977) Arc welder's lung. A case report. *J. postgrad. Med.*, 23, 35-38
- Pedersen, B., Thomsen, E. & Stern, R.M. (1987) Some problems in sampling, analysis and evaluation of welding fumes containing Cr(VI). *Ann. occup. Hyg.*, 31, 325-338
- Peters, J.M., Murphy, R.L.H., Ferris, B.G., Burgess, W.A., Ranadive, M.V. & Pendergrass, H.P. (1973) Pulmonary function in shipyard welders. *Arch. environ. Health*, 26, 28-31

- Petersen, G.R. & Milham, S., Jr (1980) *Occupational Mortality in the State of California 1959-61* (DHEW (NIOSH) Publ. No. 80-104), Cincinnati, OH, US Department of Health, Education and Welfare
- Polednak, A.P. (1981) Mortality among welders, including a group exposed to nickel oxides. *Arch. environ. Health*, 36, 235-242
- Preston-Martin, S. & Peters, J.M. (1988) Prior employment as a welder associated with the development of chronic myeloid leukaemia. *Br. J. Cancer*, 58, 105-108
- Puntoni, R., Vercelli, M., Merlo, F., Valerio, F. & Santi, L. (1979) Mortality among shipyard workers in Genoa, Italy. *Ann. N.Y. Acad. Sci.*, 330, 353-377
- de Raat, W.K. & Bakker, G.L. (1988) Induction of sister chromatid exchanges in Chinese hamster ovary cells by fume particles from various welding processes. *Ann. occup. Hyg.*, 32, 191-202
- Rachootin, P. & Olsen, J. (1983) The risk of infertility and delayed conception associated with exposures in the Danish workplace. *J. occup. Med.*, 25, 394-402
- Rahkonen, E., Junttila, M.-L., Kalliomäki, P.L., Olkinouora, M., Koponen, M. & Kalliomäki, K. (1983) Evaluation of biological monitoring among stainless steel welders. *Int. Arch. occup. environ. Health*, 52, 243-255
- Raithel, H.J., Schaller, K.H., Reith, A., Svenes, K.B. & Valentin, H. (1988) Investigations on the quantitative determination of nickel and chromium in human lung tissue. Industrial medical, toxicological, and occupational medical expertise aspects. *Int. Arch. occup. environ. Health*, 60, 55-66
- Reuzel, P.G.J., Beems, R.B., de Raat, W.K. & Lohman, P.H.M. (1986) Carcinogenicity and in vitro genotoxicity of the particulate fraction of two stainless steel welding fumes. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Jarvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 329-332
- Rieke, F.E. (1969) Lead intoxication in shipbuilding and shipscrapping 1941 to 1968. *Arch. environ. Health*, 19, 521-539
- Rinsky, R.A., Zumwalde, R.D., Waxweiler, R.J., Murray, W.E., Jr, Bierbaum, P.J., Landrigan, P.J., Terpilak, M. & Cox, C. (1981) Cancer mortality at a naval nuclear shipyard. *Lancet*, i, 231-235
- Rinsky, R.A., Melius, J.M., Hornung, R.W., Zumwalde, R.D., Waxweiler, R.J., Landrigan, P.J., Bierbaum, P.J. & Murray, W.E., Jr (1988) Case-control study of lung cancer in civilian employees at the Portsmouth naval shipyard, Kittery, Maine. *Am. J. Epidemiol.*, 127, 55-64
- Risch, H.A., Burch, J.D., Miller, A.B., Hill, G.B., Steele, R. & Howe, G.R. (1988) Occupational factors and the incidence of cancer of the bladder in Canada. *Br. J. ind. Med.*, 45, 361-367
- Ronco, G., Ciccone, G., Mirabelli, D., Troia, B. & Vineis, P. (1988) Occupation and lung cancer in two industrialized areas of Northern Italy. *Int. J. Cancer.*, 41, 354-358
- Roquet-Doffiny, Y., Roquet, P. & Lachapelle, J.M. (1977) Burns, artificial actinitis and multiple epitheliomas in a cutting-welder. (Fr.) *Dermatologica*, 155, 176-179
- Ross, D.S. (1974) Welders' metal fume fever. *J. Soc. occup. Med.*, 24, 125-129

- Sawatari, K. & Serita, F. (1986) Determination of chromium speciation in fumes prepared by a plasma metal sprayer as a model of actual welding fumes. *Ind. Health*, 24, 51-61
- Schaller, K.-H., Zober, A., Weltle, D. & Valentin, H. (1986) Kinetics of chromium in biological materials during one week of stainless steel welding. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 189-192
- Schneider, W.D. (1983) Lung diseases in welders — a cross-sectional study. (Ger.). *Z. Erkrank. Atm.-Org.*, 161, 279-282
- Schoenberg, J.B., Stenham, A., Mason, T.J., Patterson, J., Bill, J. & Altman, R. (1987) Occupation and lung cancer risk among New Jersey white males. *J. natl Cancer Inst.*, 79, 13-21
- Selikoff, I.J., Nicholson, W.J. & Lilis, R. (1980) Radiological evidence of asbestos disease among ship repair workers. *Am. J. ind. Med.*, 1, 9-22
- Sheers, G. & Coles, R.M. (1980) Mesothelioma risks in a naval dockyard. *Arch. environ. Health*, 35, 276-282
- Silverman, D.T., Hoover, R.N., Albert, S. & Graff, K.M. (1983) Occupation and cancer of the lower urinary tract in Detroit. *J. natl Cancer Inst.*, 70, 237-245
- Silverstein, M., Maizlish, N., Park, R. & Mirer, F. (1985) Mortality among workers exposed to coal tar pitch volatiles and welding emissions: an exercise in epidemiologic triage. *Am. J. public Health*, 75, 1283-1287
- Sipek, L. & Smårs, E. (1986) Ozone and nitrogen oxides in gas shielded arc welding. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 107-110
- Sjögren, B. (1980) A retrospective cohort study of mortality among stainless steel welders. *Scand. J. Work Environ. Health*, 6, 197-200
- Sjögren, B. & Carstensen, J. (1986) Cancer morbidity among Swedish welders and gas-cutters. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 461-463
- Sjögren, B., Hedström, L. & Ulfvarson, U. (1983a) Urine chromium as an estimator of air exposure to stainless steel welding fumes. *Int. Arch. occup. environ. Health*, 51, 347-354
- Sjögren, B., Lundberg, I. & Lidums, V. (1983b) Aluminium in the blood and urine of industrially exposed workers. *Br. J. ind. Med.*, 40, 301-304
- Sjögren, B., Hedström, L. & Lindstedt, G. (1984) Urinary fluoride concentration as an estimator of welding fume exposure from basic electrodes. *Br. J. ind. Med.*, 41, 192-196
- Sjögren, B., Lidums, V., Håkansson, M. & Hedström, L. (1985) Exposure and urinary excretion of aluminum during welding. *Scand. J. Work Environ. Health*, 11, 39-43
- Sjögren, B., Gustavsson, A. & Hedström, L. (1987) Mortality in two cohorts of welders exposed to high- and low-levels of hexavalent chromium. *Scand. J. Work Environ. Health*, 13, 247-251
- Sjögren, B., Elinder, C.-G., Lidums, V. & Chang, G. (1988) Uptake and urinary excretion of aluminum among welders. *Int. Arch. occup. environ. Health*, 60, 77-79

- Skriniar, J. (1986) Technical history and future development of the welding industry. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 23-28
- Slepicka, J., Kadlec, K., Tesar, Z., Skoda, V. & Mirejovsky, P. (1970) Contribution to the problem of pneumoconiosis in electric-welders. (Ger.) *Int. Arch. Arbeitsmed.*, 27, 257-280
- Stanescu, D.C., Pilat, L., Gavrilescu, N., Teculescu, D.B. & Cristescu, I. (1967) Aspects of pulmonary mechanics in arc welders' siderosis. *Br. J. ind. Med.*, 24, 143-147
- Steenland, K., Beaumont, J. & Hornung, R. (1986) The use of regression analysis in a cohort mortality study of welders. *J. chronic Dis.*, 39, 287-294
- Stern, F.B., Waxweiler, R.A., Beaumont, J.J., Lee, S.T., Rinsky, R.A., Zumwalde, R.D., Halperin, W.E., Bierbaum, P.J., Landrigan, P.J. & Murray, W.E., Jr (1986) A case-control study of leukemia at a naval nuclear shipyard. *Am. J. Epidemiol.*, 123, 980-992
- Stern, R.M. (1977) *A Chemical, Physical and Biological Assay of Welding Fume. Part 1. Fume Characteristics*, Copenhagen, The Danish Welding Institute
- Stern, R.M. (1979) Health protection in the industry. Research at the Danish Welding Institute (Fr.) *Assoc. suisse Tech. Soudage (Basel)*, 69, 66-76
- Stern, R.M. (1980a) *Process Dependent Risk of Delayed Health Effects for Welders. Risk Assessment for the Welding Industry: Part II* (Report 80.50), Copenhagen, The Danish Welding Institute
- Stern, R.M. (1980b) A chemical, physical and biological assay of welding fume. In: Brown, R.C., Gormley, J.P., Chamberlin M. & Davis, R., eds, *The In Vitro Effects of Mineral Dusts*, London, Academic Press, pp. 203-209
- Stern, R.M. (1982) Chromium compounds: production and occupational exposure. In: Langård, S., ed., *Biological and Environmental Aspects of Chromium*, Amsterdam, Elsevier, pp. 5-47
- Stern, R.M. (1983) Occupational exposure in the welding industry: health risk assessment. In: *Health Effects of Combined Exposures to Chemicals in Work and Community Environments. Proceeding of a Course by the European Cooperation on Environmental Health Aspects of the Control of Chemicals*, Lodz, Poland, 18-22 October 1982, Copenhagen, World Health Organization, pp. 226-261
- Stern, R.M. (1987) Cancer incidence among welders: possible effects of exposure to extremely low frequency electromagnetic radiation (ELF) and to welding fumes. *Environ. Health Perspect.*, 76, 221-229
- Stern, R.M. & Pigott, G.H. (1983) In vitro RPM fibrogenic potential assay of welding fumes. *Environ. Health Perspect.*, 51, 231-236
- Stern, R.M., Pigott, G.H. & Abraham, J.L. (1983) Fibrogenic potential of welding fumes. *J. appl. Toxicol.*, 3, 18-30
- Stern, R.M., Thomsen, E. & Furst, A. (1984) Cr(VI) and other metallic mutagens in fly ash and welding fumes. *Toxicol. environ. Chem.*, 8, 95-108
- Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds (1986) *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica

- Stern, R.M., Lipka, J., Madsen, M.B., Mørup, S., Thomsen, E. & Koch, C.J.W. (1987) Instability of lung retained welding fumes: a slow active Ni and Cr compartment. In: Foa, V., Emmett, E.A., Maroni, M. & Colombi, A., eds, *Occupational and Environmental Chemical Hazards: Cellular Biochemical Indices for Monitoring Toxicity*, Chichester, Ellis Horwood, pp. 444-460
- Stern, R.M., Drenck, K., Lyngenbo, O., Dirksen, H. & Groth, S. (1988) Thoracic magnetic dust content, occupational exposure, and respiratory status of shipyard welders. *Arch. environ. Health*, 43, 361-370
- Stettler, L.E., Groth, D.H. & Mackay, G.R. (1977) Identification of stainless steel welding fume particulates in human lung and environmental samples using electron probe microanalysis. *Am. ind. Hyg. Assoc. J.*, 38, 76-82
- Stuchly, M.A. & Lecuyer, D.W. (1989) Exposure to electromagnetic fields in arc welding. *Health Phys.*, 56, 297-302
- Thomsen, E. & Stern, R.M. (1979) A simple analytic technique for the determination of hexavalent chromium in welding fumes and other complex matrices. *Scand. J. Work Environ. Health*, 5, 386-403
- Tinkler, M.J. (1983) *Evaluation and Control of Fumes Produced During Welding*, Vol. I, *Problem Survey* (Report 000 G 156), Montréal, Canadian Electrical Association
- Tola, S., Kilpiö, J., Virtamo, M. & Haapa, K. (1977) Urinary chromium as an indicator of the exposure of welders to chromium. *Scand. J. Work Environ. Health*, 3, 192-202
- Tola, S., Kalliomäki, P.-L., Pukkala, E., Asp, S. & Korkala, M.-L. (1988) Incidence of cancer among welders, platers, machinists, and pipe fitters in shipyards and machine shops. *Br. J. ind. Med.*, 45, 209-218
- Uemitsu, N., Shimizu, Y., Hosokawa, T., Nakayoshi, H., Kobayashi, M., Minato, S., Ogawa, T. & Tsutsumi, S. (1984) Inhalation toxicity study of welding fumes: effect of single or repeated exposure in the lungs of rats. *Toxicology*, 30, 75-92
- Ulfvarson, U. (1979) *Arbetsmiljöproblem vid Svetsning* [Work environment problems in welding] (Vetenskaplig skriftserie, 1979:31), Solna, Arbetskyddsverket
- Ulfvarson, U. (1981) Survey of air contaminants from welding. *Scand. J. Work Environ. Health*, 7 (Suppl. 2), 1-28
- Ulfvarson, U. (1986) Air contaminants involved in welding in Swedish industry — sources of variation in concentrations. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 133-136
- Ulfvarson, U., Hallne, U., Bellander, T. & Hayenhjelm, H. (1978a) *Arbetsmiljöproblem vid Svetsning* [Work environment problems in welding] (Vetenskaplig skriftserie, 1978:6), Solna, Arbetskyddsverket
- Ulfvarson, U., Hallne, U. & Bellander, T. (1978b) *Arbetsmiljöproblem vid Svetsning* [Work environment problems in welding] (Vetenskaplig skriftserie, 1978:8), Solna, Arbetskyddsverket
- Ulfvarson, U., Hallne, U., Bergström, B. & Hallberg, B.O. (1978c) *Arbetsmiljöproblem vid Svetsning* [Work environment problems in welding] (Vetenskaplig skriftserie, 1978:19), Solna, Arbetskyddsverket

- Verschoor, M.A., Bragt, P.C., Herber, R.F.M., Zielhuis, R.L. & Zwennis, W.C.M. (1988) Renal function of chrome-plating workers and welders. *Int. Arch. occup. environ. Health*, 60, 67-70
- van der Wal, J.F. (1985) Exposure of welders to fumes, Cr, Ni, Cu and gases in Dutch industries. *Ann. occup. Hyg.*, 29, 377-389
- van der Wal, J.F. (1986) Further studies on the exposure of welders to fumes, chromium, nickel and gases in Dutch industries: plasma welding and cutting of stainless steel. *Ann. occup. Hyg.*, 30, 153-161
- Welinder, H., Littorin, M., Gullberg, B. & Skerfving, S. (1983) Elimination of chromium in urine after stainless steel welding. *Scand. J. Work Environ. Health*, 9, 397-403
- Werner, U. (1977) Diseases of the upper respiratory tract in welders. (Ger.) *Z. ges. Hyg.*, 23, 731-734
- White, L.R., Hunt, J., Tetley, T.D. & Richards, R.J. (1981) Biochemical and cellular effects of welding fume particles in the rat lung. *Ann. occup. Hyg.*, 24, 93-101
- White, L.R., Hunt, J., Richards, R.J. & Eik-Nes, K.B. (1982) Biochemical studies of rat lung following exposure to potassium dichromate or chromium-rich welding fume particles. *Toxicol. Lett.*, 11, 159-163
- White, L.R., Marthinsen, A.B.L., Jakobsen, K. & Eik-Nes, K.B. (1983) Response of bovine alveolar macrophages *in vitro* to welding fume particles. *Environ. Health Perspect.*, 51, 211-215
- Widgery, D. (1986) Welding — the key to better productivity. *Weld. Met. Fabr.*, March, 58, 70
- Widgery, D.J. (1988) Flux-cored wire: an update. *Weld. Met. Fabr.*, April, 118-124
- Wilkins, J.R., III & Sinks, T.H., Jr (1984) Paternal occupation and Wilms' tumour in offspring. *J. Epidemiol. Community Health*, 38, 7-11
- Wilkinson, J. (1988) Fabrication worldwide. *Met. Constr.*, March, 134-139
- Wiseman, L.G. & Chapman, E.T. (1986) Test program to determine whether nickel carbonyl forms during the welding of nickel-containing alloys: a progress report. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 111-113
- Zielhuis, R.L. & Wanders, S.P. (1986) Health effects and medical wastage due to combined exposure in welding. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Järvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 497-533
- Zober, A. (1981a) Symptoms and findings in the bronchopulmonary system of electric arc welders. I. Communication: epidemiology. (Ger.) *Zbl. Bakt. Hyg. I. Abt. Orig.*, 173, 92-119
- Zober, A. (1981b) Symptoms and findings in the bronchopulmonary system of electric arc welders. II. Communication: pulmonary fibroses. (Ger.) *Zbl. Bakt. Hyg. I. Abt. Orig.*, 173, 120-148

- Zschiesche, W., Wilhelm, E., Zober, A., Schaller, K.H., Weltle, D. & Valentin, H. (1986) Manganese in stainless steel welding fumes, external exposure and biological monitoring. In: Stern, R.M., Berlin, A., Fletcher, A.C. & Jarvisalo, J., eds, *Health Hazards and Biological Effects of Welding Fumes and Gases*, Amsterdam, Excerpta Medica, pp. 193-196
- Zschiesche, W., Emmerling, G., Schaller, K.H. & Weltle, D. (1987) Investigation on renal impairments of high alloy steel welders. In: Foa, V., Emmett, E.A., Maroni, M. & Colombi, A., eds, *Occupational and Environmental Chemical Hazards: Cellular and Biochemical Indices for Monitoring Toxicity*, Chichester, Ellis Horwood, pp. 339-343
- Zschiesche, W., Emmerling, G., Schaller, K.-H. & Weltle, D. (1989) *Arbeitsmedizinische Untersuchungen zur Toxizität Löslicher Barium-verbindungen aus Schweissrauchen* [Occupational Medical Investigations on the Toxicity of Soluble Barium Compounds in Welding Fumes] (German Welding Society (DVS) Report), Düsseldorf, DVS Publishers