

R E P O R T S

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THE 23rd INTERNATIONAL CONGRESS ON OCCUPATIONAL HEALTH

(Montreal, Canada, 22–28 September, 1990)

The 23rd International Congress on Occupational Health was held in Montreal from 22 through 28 September, 1990. It was attended by over 2,000 participants from all over the world, and about 700 papers were presented (see Tables 1–5). The President of the Organizing Committee – Professor *Jean-Yves Savoie* and its Vice-President – Professor *Louise Marier Thibault* were responsible for the organization of this prestigious venture. The Congress was sponsored by the International Commission on Occupational Health (ICOH). The Congress was opened with addresses given by: Professor *Sven Hernberg*, the President of ICOH, Professor *Jean-Yves Savoie* and Professor *Michel Lesage*, Co-Chairman of the Congress Honorary Committee, the Mayor of Montreal and the Prime Minister of Quebec.

The Congress objectives were to present the latest advancements in the occupational health in view of an increasing demand for workers' health care. In many contributions, the significance of the human being in the working environment and health promotion were stressed.

The Congress was attended by specialists representing various areas of occupational health: physicians, toxicologists, industrial hygienists, psychologists, physiologists, nurses from different centers and research institutions all over the world. Altogether there were 2277 participants from 76 countries. Canada, France, Finland, USA and Japan were represented by the largest delegations. East European countries were represented by only four participants from Poland (including Professor *Janusz Bielski*, Academy of Agriculture, Poznań and the author of this report), Czechoslovakia and the former GDR.

The scientific programme included 46 sessions during which 278 reports, 282 posters and 128 videocassettes were presented. Apart from the plenary sessions there were 33 various subject-matter groups and 14 mini-symposia. In addition, 15 pre-congress courses and one seminar on "Experience Exchange Aimed at Solving Working Environment Problems", were organised.

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TABLE 1. The 23rd International Congress on Occupational Health Montreal, Canada, 22–28 September, 1990

Europe	Number of partici- pants	Papers	Video presenta- tions	Posters	Leading papers
Austria	11	4		1	
Belgium	45	9	6	4	
Czechoslovakia	1				
Denmark	18	4		2	
Finland	184	26		22	1
France	282	34	9	35	1
Greece	3				
Spain	20				
The Netherlands	29	4		4	
Ireland	7	1			
Yugoslavia	22	3		11	
Luxemburg	1				
Monaco	1				
FRG	79	11		7	
GDR	1				
Norway	31	6		8	
Poland	1				
Portugal	16	1			
Switzerland	10	1		1	
Sweden	170	27	6	29	
Great Britain	54	15	4	3	1
Italy	78	12		16	
Total	1064	158	25	143	3

The greatest number of oral presentations (about 30) represented the following occupational health areas: industrial hygiene, cancer epidemiology, occupational lung diseases; the toxicology of metals; and occupational health in the chemical industry. The remaining subjects were: toxicology (16 papers); neurotoxicology (23); occupational health in the building and agriculture industries; occupational health epidemiology; biological monitoring; mineral and natural fibres; the health effects of physical factors, skin diseases, musculoskeletal disorders; work and the heart; work physiology and psychology; ergonomics in industry; education and training in occupational health; and occupational health services in developing countries. Most of the presentations were based on the experimental studies.

Eight keynote addresses presented the latest scientific advancements in the most vital areas of occupational health. As they dealt with very important issues, a brief review of them is given below.



TABLE 2. The 23rd International Congress on Occupational Health Montreal, Canada, 22–28 September, 1990

Asia	Number of partici- pants	Papers	Video presenta- tions	Posters	Leading papers
Saudi Arabia	2				
China	15	3		5	
Philippines	2				
Hong Kong	4	1		2	
India	9	1		2	
Indonesia	5				
Iraq	1	1			
Iran	8				
Israel	6	1		2	
Japan	139	22		55	1
Quatar	1				
Korea	6	1		1	
Malesja	1				
Pakistan	1				
Singapore	10	5			
Sir Lanka	1				
Thailand	2				
Total	213	35		67	1

TABLE 3. The 23rd International Congress on Occupational Health Montreal, Canada, 22–28 September, 1990

Americas	Number of partici- pants	Papers	Video presenta- tions	Posters	Leading papers
North					
The Dominican Republic	1				
Jamaica	1				
Canada	625	42	94	33	2
Costa Rica	1				
Mexico	5				
Nicaragua	1	1			
USA	182	31	1	26	2
Sub-total	843	74	95	59	4
South					
Argentina	7				
Bolivia	2				
Brazil	13			1	
Chile	1				
Peru	1				
Uruguay	1				
Venezuela	3				
Sub-total	28			1	
Total	871	74	95	60	4

TABLE 4. The 23rd International Congress on Occupational Health Montreal, Canada, 22–28 September, 1990

Africa	Number of partici- pations	Papers	Video presenta- tions	Posters	Leading papers
Algeria	5			4	
Benin	1				
Botswana	1				
Egypt	1				
Ghana	1				
Ivory Coast	1				
Kenya	2			1	
Malawi	1				
Mali	2				
Marocco	2				
Mauritania	1				
Nigeria	10	1		1	
Reunion	2				
South Africa	22	2		3	
Tanzania	2				
Tunesia	2				
Uganda	4			2	
Zaire	2				
Zambia	3				
Zimbabwe	1				
Total	66	3		11	

Professor *Jorma Saari* from the Institute of Occupational Health in Helsinki, Finland in his paper on "Successful interventions in safety at work", presented the current state of knowledge on safety at work and steps taken to make work safe. In many industrialized countries the number of accidents at work shows no sign of abating. Hence, a new approach to the problem of occupational safety is necessary. Tradition has stressed, among other issues, the significance of information on hazards and the perception of risk. At present, these emphases do not seem satisfactory and some new techniques of safety promotion have been developed. The programme, presented in Professor *Saari's* paper is based on feedback and it is focussed on studying a consequences resulting from the safe or unsafe work system. The programme has proved to be useful as it leads to a reduction in the number of accidents. The author stresses that the final goal of this programme is to give top priority to the work safety over all other issues in the area of work methodology.

Professor *Saari* and other authors as well tried to present, in their papers and posters, a new approach to the question of accidents at work and to describe attempts made to develop more effective preventive methods.



TABLE 5. The 23rd International Congress on Occupational Health Montreal, Canada, 22–28 September, 1990

	Number of partici- pants	Papers	Video presenta- tions	Posters	Leading papers
Europe	1064	158	25	143	3
Asia	213	35		67	1
North America	843	74	97	59	4
South America	28				
Africa	66	3		11	
Australia	55	7	6	1	1
New Zealand	8	1			
Total	2277	278	128	282	9

In many papers, attention was turned to the following issues which have been, so far, underestimated. (a) The development of understanding of preventive measures among workers, which has proved to be more effective than efforts to change individual attitudes and behaviour (*A. Seppala*). (b) The proper adjustment of the place, where a working process happens and the proper positioning of a worker in this process, in relation to safety requirements. This should also be included in the analysis of accidents at work (*S. Kidziak*). (c) A more controlled analysis of the so-called "chain of circumstances", leading to an accident, in order to disclose its real background. This should be followed by expanding the mandatory documentation of an accident (*A. Soderqvist*). (d) The development of a stronger motivation among employees for measures through the disclosure of accident-related expenditures (*E. Brody*).

Because accidents at work are so prevalent among social and economical losses caused by work related diseases, the session devoted to these problems was found most interesting and important.

Professor *Rene Mendes* from the Faculty of Medicine, State University of Sao Paulo in Brazil, in his paper "Advancements in primary health care in the Third World", dealt with health problems related to working conditions and environment in developing countries. His presentation was based on theoretical and practical studies. The peculiarities of those countries and their scattered production structure require a very specific approach to the problem of workers' health care: hence primary health care as an alternative for implementation of the strategy "Health For All by the Year 2000", within which health care for the working population is included.

Professor *Martin J. Gardner* from the University of Southampton, UK, Member of the Medical Research Council at the Faculty of Environmental Epidemiology, in his presentation "The contribution of occupational exposure



to cancer: recent developments", discussed the relationship between cancers of various parts of the body and occupational exposure. The changing technologies in industry are creating new hazards. New cases of cancer, even at low levels of exposure, are being reported. Therefore, It is vital, therefore, to set up priorities for cancer research and to recognize future needs in this regard as the sum of knowledge on this subject is still limited. Specialists in various scientific areas should integrate their efforts to organize an information network which would facilitate the identification of hazards and the control of newly-introduced hazardous technologies.

Dr *Alison D. McDonald*, a retired Professor from London University, director of the research project: "Woman at Work" at the Institute of Occupational Health and Safety in Quebec in the years 1981 – 87, gave a paper "Work and pregnancy – the Montreal survey in Context". It was a review of an epidemiological survey on pregnancy in working women.

The paper presented the results of the survey on 55,000 women, after their delivery or spontaneous abortion, carried out by the University of Montreal. The study covered such indices respecting occupational and non-occupational factors as: (1) fetal death; (2) congenital defects; (3) prematurity; and (4) infertility. It was found that white-collar jobs have no adverse effect on pregnancy; whereas jobs involving lifting heavy objects or standing for long hours, exposure to organic solvents and cytostatic drugs run the risk of effecting the fetus and should be avoided during pregnancy.

The survey also revealed a significant relationship between the risk of miscarriages and exposure to noise of high intensity or to short-wave radiation.

Professor *Kenzaburo Tsuchiya* – President of the University of Occupational Health in Japan – presented a paper on "Risk assessment as it applies to occupational health issues". He discussed risks in the working environment, and the risk assessment of chemicals (excluding carcinogens), based on data obtained in animal experiments, epidemiological studies, biological monitoring and working environment monitoring. The author also dealt with such issues as biological half-time, dose-response and dose-effect relationships. The author suggested a conceptual model depicting the relationship between the working environment and its health risk.

Dr *Paul S. Schulte* – the National Institute for Occupational Safety and Health (NIOSH), USA – presented a very interesting paper on "Contribution of biological markers to occupational health". Biological markers are now the key issue in the prevention and control of occupational diseases (though, admittedly, they have been used in occupational health for a long time). At present, researchers are looking for more sensitive methods of identifying exposure to chemicals. The new generation of biological markers measures doses in such small units as pico- and fento-moles. Simultaneously, there is a need to consider other factors influencing biological indices such as genetic or acquired factors – which are responsible for different pathological changes and different matters in similar exposures. Therefore, the evaluation of the nature and degree of variation between particular individuals is of high



importance. In the future, initiation of integrated studies aimed at testing the markers in animal and human experiments seems to be indispensable.

Scientists have long focussed their attention on quartz: firstly, due to the high number of workers exposed to it (in the USA — 3.2 mln workers) and: secondly, because its toxic mechanisms are not sufficiently elucidated.

Patrick Sebastien a specialist in occupational hygiene, diseases and toxicology, head of the Occupational Health Group at CERCHAR (France) in his paper "What's magic in quartz", presented the newest theories on mechanisms of quartz toxicity, based on the physicochemical properties of the surface of quartz particles. The most interesting seems to be a theory on the formation of quartz-based radicals which, in the biological environment, due to acido-basic or Redox activities, may produce oxygenated or hydroxyl radicals, considered to be the most reactive in chemistry. Investigations into the structure of the quartz particle surfaces, and the multidisciplinary collaboration of scientists, should provide evidence either confirming or contradicting this theory.

Dr Alistair Woodward senior lecturer in the Department of Community Medicine, University of Adelaide, Australia — has dealt long with the problem of passive smoking. He presented the results of his research in the paper "Passive smoking in the workplace — a fictitious or real health risk?". The illustrated evidence, based on data from the literature, demonstrated the cause-and-effect relationship between passive smoking and incidence. Some data appear to be somewhat surprising e.g. Russell (1987) estimated that mortality from passive smoking in Great Britain is about 1000 deaths per year. The answer to the question put in the title of the paper is that passive smoking in workplace is a real health risk, although it is hard to assess its magnitude.

In the OCCUPATIONAL HYGIENE group (13 reports, 18 posters), much attention was given to methods of measurement and evaluation of exposure to dusts and fibres at workposts. The titles of some of the papers are as follows: „Exposure to airborne concentrations of mineral wool dust during manufacturing and installation of insulation products" (*U. Draeger et al.*, FRG); "Medical and hygienic surveillance of workers exposed to noise and dusts in iron works" (*M. Vezina et al.*, University of Quebec); "Characteristics of asbestos dusts in foundries" (*D. Michaud et al.*, University of Quebec); "Pulmonary functions and exposure to metal dusts" (*A. E. Kholi et al.*, University of Paris); "Airborne diatomaceous earth risk assessment in brewery workers" (*S. Gomez, J. A. Dosman*, University of Saskatchewan in Canada); "Glax and sisal dust: Comparison between various sampling methods" (*E. De Rosa et al.*, University of Ferrara, Italy); "Mineral Fibres in Office Work" (*P. Heikkila et al.*, Institute of Occupational Health in Helsinki); "Review and evaluation of current sampling and analytical techniques for airborne man-made mineral fibres" (*P. N. Breyse et al.* John Hospkins University, USA); "Retrospective exposure assessment of asbestos for car and bus mechanics" (*N. Plato, S. Kranz* Karolinska Hospital, Stockholm, Sweden).

Welding fumes were another interesting issue discussed in this group, "Hexavalent chromium formation in welding fumes" (*P. J. Hewitt and M. G.*

Madden, University of Bradford, U.K.); "A Surface and bulk study of particles in the welding fumes of mild and stainless steels" (*E. Minni et al.*, Regional Institutes of Occupational Health, Finland); "Personal and background exposure to stainless steel welding fumes" (*J. T. Karlsen et al.*, Central Hospital, Norway); "Concentrations of metal fumes outside and inside the welding helmet" (*D. Liu et al.*, Occupational Health Clinic, San Francisco, USA).

Sampling methods, analytical methods for determination and identification of compounds, exposure-assessment mechanisms of reactions on the surface of fume particles, and chemical composition of those particles, were the main topics presented in this group.

The presence of hexavalent chromium is an important hygienic issue. It is assumed that exposure to chromium is not properly assessed by means of conventional analytical methods and, therefore, their verification is recommended.

The results of a joint international study carried out in various research centres in Italy, Great Britain, Sweden, Denmark, Norway and Finland were presented in the paper of *M. Biocca et al.*: "Joint assessment of styrene exposure in six European countries among workers in the reinforced plastics industry". As a result of exposure assessment, the so-called "exposure matrix" was developed. It identifies industrial branch, occupational activity and period of exposure. The matrix will be used in epidemiological studies.

Toxicological issues were discussed during two sessions. The first one was devoted to the TOXICOLOGY OF METALS (12 papers, 27 findings and 15 posters) and dealt chiefly with assessment of the toxicity of such metals as mercury, cadmium, lead, nickel and manganese, whereas during the other one, devoted to GENERAL TOXICOLOGY (8 reports and 10 posters), the toxicity of ethylene oxide and organic solvents (both in humans and animals) were discussed. The scientists from Japan presented the greatest number of presentations at both sessions (21 out of 45).

Biological indicators which allow the detection of early pathological symptoms, especially helpful in preventive activities, are now widely applied in toxicological research. This issue was discussed during the session: BIOLOGICAL MONITORING (14 reports, 10 posters).

The presentations dealt with monitoring of exposure to metals, solvents, carcinogens and some other substances. A well known marker of exposure to lead, delta-aminolevulinic acid in the blood, was tested among others by a Japanese, *T. Takebayashi*. Lead was also the subject of a study carried out at the National Centre of Occupational Medicine in Johannesburg. The results were presented in the poster: "The class of industry affects the relationship between zinc protoporphyrin and blood lead in workers exposed to inorganic lead". In the case of exposure to copper, chromium and arsenic (CCA), in plants using CCA for timber preservation, determination of chromium in the urine proved to be the best indicator of the exposure as shown by *T. Szafraniec et al.* from Australia.

T. Norseth et al. from the Institute of Occupational Health in Oslo, assessed antimony absorption and excretion from the body in workers



employed in the lead battery industry. The measurements of antimony content in the air blood and urine proved that the body accumulates this metal.

Nickel and its insoluble compounds, which are suspected to induce cancers in the lungs and nose, were studied by *H. Raithel* and *K. H. Schaller* from FRG. The results were presented in a poster "Biomonitoring of nickel in human pulmonary tissue". The authors found that determination of nickel concentrations in the pulmonary tissue seemed to be a good indicator of exposure to nickel. In the future, it may facilitate the study on the cause-and-effect relationship between Ni exposure and lung cancer.

Quite a few papers from various centers discussed biological indicators and their role in the evaluation of exposure to solvents. *T. Satoh* et al. from Japan: "Involvement of pulmonary ventilation in the determination of exposure to acetone: Relationship to urinary excretion of acetone"; *H. W. Goergens* et al. (FRG): "Evaluation of biological indicators in humans for monitoring exposure to styrene"; *M. P. Korn* et al., (FRG): „Metabolism of ethylbenzene in man"; *A. Lof* et al., (Sweden) "Can hippuric acid be used for the biological monitoring of toluene exposure?".

Some other papers dealt with n-hexane, a solvent frequently used in industry. Its metabolites in the urine were investigated in Japanese research centres (*I. Salto, T. Kawal* et al.). In Italy (*G. B. Bartolucci* et al.) and in FRG (*R. Dornow* et al.) the influence of ethanol on n-hexane toxicokinetics was investigated. The scientists from Sweden presented an interesting paper: "Assessment of genotoxic exposure among Swedish coke oven workers by different methods of biological monitoring". The authors, in spite of using various research methods (cytogenetic analysis, bacterial tests, determination of thioethers in the urine) found no differences between the exposed and unexposed groups. Smokers were the only exception.

Another session ON EPIDEMIOLOGY IN OCCUPATIONAL HEALTH (9 reports and 8 posters) also proved to be very interesting. A principal issue, discussed in many presentations was the exposure-response relationship.

The strategy of measurements at work places and exposure assessment (presented by *F. D. K. Liddell*, University of Montreal; "Le mieux est l'ennemi du bien") are still controversial.

The paper of *D. Wegman* et al. (representing several Universities in the USA); "A novel approach to the assessment and evaluation of irritant symptoms for use in epidemiologic studies" presented new methods which provide, better than simple cross-sectional studies, characteristics of exposure-response relationships. The authors, monitoring exposure to sodium borates, evaluated acute symptoms of irritation in the respiratory system and mucous membrane.

In many papers, attention was paid to the role of subjective feelings of worker in evaluating working conditions, e.g. *F. Kauffman* et al. (France) "Job exposure — matrix versus self-reported occupational exposure" and *M. Joffe* (St. Mary's Hospital Medical School in London) "Validity of exposure data derived from interviews with workers".

Children's employment, very rarely discussed in medical literature was raised during the Congress. It is an important problem since in the USA, four million children under the age of 18 are legally employed. In this group, work-related injuries and diseases and even some cases of deaths frequently occur. *S. Pollack et al.* in the report "Epidemiologic studies on the health hazards of child labor" presented the frequency of accidents at work and work-related diseases during last five years.

F. Hofmann et al. in the paper „Hepatitis A: An occupational hazard in food-handling professions?“, states that not only medical personnel, but also catering workers, are exposed to hepatitis.

During the session: EPIDEMIOLOGY AND CANCER, 35 contributions were presented. Some of these presentations dealt with the noxious effects of metals on the human organism.

Two reports referred to cadmium: "Occupational cadmium exposure as a risk factor for renal cell carcinoma", *L. D. Marrett et al.* (Canada), pointed to cadmium nephrotoxicity and its probable carcinogenicity. Preliminary analysis suggests a possible association between renal adenocarcinoma and occupational exposure to cadmium.

L. Jarup et al. (Sweden) presented the results of their study on "Lung cancer mortality in cadmium exposed battery workers" which confirmed the relationship between lung cancer and exposure to cadmium.

The studies on the relationship between work in the nickel industry and respiratory tract cancer were aimed at verifying the hypothesis that exposure to nickel compounds increases incidence risk. The risk was assessed in workers exposed to nickel in the nickel mines of New Caledonia (one of the biggest nickel producers of the world). Although the results have not confirmed an increased risk of cancer of the respiratory tract, there is a risk of pleural carcinoma associated with exposure to nickel. The aforesaid study was carried out by *P. Goldberg et al.* (France) and discussed in the paper "Incidence des cancers respiratoires en Nouvelle-Calédonie en liaison avec l'industrie du nickel".

P. Kristensen and A. Andersen (Norway) presented "A cohort study on cancer-incidence among children with a father in the printing industry", indicating that the risk of cancer in children of male printing industry workers exposed to lead and solvents is low. However, the materials were too limited to exclude fortuitous observations.

Other three contributions: (1) *S. E. Chia et al.* (Singapore) "Silicotic male Chinese granite quarry workers and lung cancer"; (2) *F. Merlo et al.*, (Italy) "Lung cancer risk among refractory brick workers"; and (3) *P. Carta et al.* (Italy) "A mortality study among Sardinian silicotic patients" proved a significant relationship between silicosis and lung cancer. Smoking additionally enhances the risk of lung cancer.

Some papers discussed occupational exposure to asbestos. *G. Mowé et al.* (Norway) presented the results of their study on "Malignant mesothelioma in Norway registered by the Cancer Registry and notified to the Labour Inspection between 1960–1987", showing that the number of mesothelioma



cases in those who have been occupationally exposed to asbestos has tripled. It is expected that, due to the long latency period, the occurrence of malignant mesothelioma will display a growing tendency after the year 2000. *J. M. M. Meijers et al.* in "Asbestos exposure and pleural mesotheliomas in the Netherlands — Trends and geographical patterns 1970–1987" reported the highest mortality caused by pleural mesothelioma in the world. The occurrence of pleural mesothelioma is most frequent (with a growing tendency) in males over 55; this is attributed probably to asbestos exposure in the shipbuilding industry. It is noteworthy that in the Netherlands there are neither asbestos plants nor asbestos processing industry.

E. Raffn et al. in "Incidence of histological types of lung cancer among employees in the asbestos cement industry in Denmark" presented the first cohort study on the morbidity of lung cancer. A half-century observation of lung cancer in the whole population was the base for identifying the histological form of this cancer. A characteristic relation between the histological form of lung cancer and employment period was established. Occupational exposure to cement dust was discussed by *K. Jakobsson et al.* (Sweden) in "Gastrointestinal cancer and lung cancer among cement workers: A Case-Referent Study". They suggested a possible relationship between the length of employment in the cement industry and the rectal carcinoma incidence.

The incidence of oesophageal and stomach cancers is associated with a shorter employment period. The morbidity of respiratory system cancers does not show a growing tendency. The risk of rectal carcinoma among the workers exposed to cement dusts for a longer period of time, reported by the authors, requires further epidemiological studies, however the carcinogenesis of cement dust has not been experimentally proved. Cohort studies are continuing.

B. H. Noorlind and O. Axelsson (Sweden) in "Wood workers potentially exposed to man-made mineral fibres and death from some malignant diseases" reported an increased risk of lung cancer among wood workers employed in the production of man-made mineral fibres. Fatal cases of rectal carcinoma, lung cancer and stomach cancers were also reported. However, the studies performed did not show a convincing relationship between exposure to man-made, natural fibres and the risk of morbidity and mortality from rectal carcinoma and lung or stomach cancers.

Occupational exposure in the petroleum industry was described by *P. A. Bertazzi et al.* (Italy) in "Increased lung cancer risk among workers engaged in pumping and moving petroleum products". The incidence of prostate cancer, renal and blood cancers in persons employed in the petroleum industry was reported. The studies conducted also confirm earlier assumptions of the increased incidence of lung cancer among the employees of the petrochemical industry: *R. A. Schnatter et al.* (Canada) "An updated retrospective mortality study among operating segments within a petroleum company". A significantly increased incidence of melanocarcinoma among males, directly exposed to hydrocarbons, as well as a statistically significant increase of the incidence of benign neoplasms among employees of petroleum refining plants were repor-

ted. Also, a statistically insignificant increase of incidence of multiple myeloma was observed among workers distributing and transporting petroleum products in the long run. A lower rate of mortality from leukemia than from other lymphatic system neoplasms was also noted.

E. F. Heineman et al. (USA) in "Occupational exposure to chlorinated aliphatic hydrocarbons and risk of astrocytic brain cancer: A case-control study", reported an increased incidence of the brain tumor among persons exposed to tetrachloromethylene, methyl chloride and tetrachloroethylene. The results of that study should be viewed with caution, and the problem requires further studies.

In "Toluene Exposure and Tumors", *B. G. Svensson et al. (Sweden)* indicated no correlation between exposure to toluene and mortality or morbidity.

Ch. Hogstedt et al. (Sweden) in "Benzene, combustion products and urothelial cancer — A case-referent study in Stockholm 1985—1987" stressed that the question of relationship between the incidence of urothelial cancer and exposure to benzene requires further studies.

K. Miyashita et al. (Japan) in "An epidemiological and clinical study of lung cancer among workers exposed to bis (chloromethyl) ether" recommended, due to the long period of lung cancer latency, periodical routine examination of those workers.

Problems of the carcinogenic effects of dioxins were presented in two works: (1) *A. C. Pesatori et al. (Italy)* "Mortality among persons 1—20 years after accidental exposure to dioxin (TCDD)". Because of the small number of deaths, short latency and insufficient information included in death certificates, it is hard to interpret the observations. Studies on the cancer incidence are continuing. (2) *P. Jäppinen, E. Pukkala (Finland)*, "Cancer incidence of pulp and paper workers exposed to dioxins and other chlorinated compounds formed during chlorine pulp bleaching". A low, insignificant increase of cancer-incidence in the population exposed to dioxin and other chlorinated compounds was observed. However it was impossible to present an explicit conclusion that the increased incidence of lung cancer is positively related to the workplace and, therefore, further studies involving a greater cohort are necessary.

The risk of lung cancer in paper mills was also discussed by *G. Wingren* and *B. Persson (Sweden)* in "A case-referent study on Swedish pulp mill workers". Periodical clinical examinations of workers demonstrated an increased risk of cancer of the digestive tract, pancreas, respiratory system, as well as lymphomas, leukemia diabetes, ischaemic heart disease and obstructive lung disorders. In order to obtain more reliable results further cohort studies will be continued.

The risk of cancer associated with occupational exposure in the nitrate fertilizer industry was discussed in two works: (1) *S. I. Fandrem et al. (Norway)* "Cancer incidence among nitrate fertilizer workers" and (2) *T. Bellander et al. (Sweden)* "Exposure to nitrate dust and cancer morbidity in a cohort of nitrate fertilizer workers". The results of the study showed no significant increase in



cancer of the lung, colon, rectum or stomach. The increase observed in the incidence of prostate cancer remains unexplained.

The incidence of bladder cancer was presented, by *M. J. Stasik et al.* (FRG) in "4-chloro-0-toluidine and the etiological agent in the induction of bladder cancer and hemorrhagic cystitis among industrially exposed workers". A substantially increased incidence of bladder cancer was observed among persons exposed to 4-chloro-0-toluidine". Given the results, the German Hygiene Standards Commission (MAK) has classified 4-chloro-0-toluidine as carcinogenic for people. This is the first monocyclic aromatic amine among industrial arsines, declared to be an etiological factor evoking bladder cancer. *M. Hours et al.* in their paper: "Cancers de la vessie et risques professionnels: Résultats d'une étude cas-témoins — Lyon- France 1984—1988", indicated that nitrozo-amines, which cause lung and skin neoplasms may also be responsible for the incidence of bladder cancer.

F. Lander et al. (Denmark), in their work on the carcinogenic properties of pesticides (chloroorganic compounds, DDT and phenoxyacids), "A cohort study on cancer incidence among gardeners" stated that the examinations of farmers and gardeners demonstrated an increased risk of soft tissue sarcomas and malignant neoplasms of the lymphatic and hematopoietic tissues.

K. A. L'Abbé et al. (France) in "Mortality results from the European multi-centric study of workers employed in the vinyl chloride industry" reported (1) an evident relationship between exposure to vinyl chloride and an increased incidence of liver cancer — and (2) absence of relationship between occupational exposure to vinyl chloride and an increased mortality from lymphosarcoma, lung or brain cancers'.

Studies on the incidence of melanocarcinoma of the skin were presented by *L. De Guire et al.* (Canada), in "Malignant melanoma of the skin among workers of a large electrical and electronic products industry 1976—1983 — A mortality study". The cohort study confirmed an increased incidence of malignant melanoma of the skin, the death rate was, however, very low. Case-referent studies have been undertaken to find a possible correlation between the incidence and occupational exposure.

E. A. Eisen et al. (USA) in "Mortality patterns in a cohort of autoworkers exposed to machining fluids", refer to NIOSH data which confirm that nowadays approx. 1 million workers in the USA are exposed to machining fluid aerosols. Cohort studies were undertaken to evaluate whether an increased mortality from cancer was associated with long exposure to machining fluids. The increase of SMR values to 2.0 was observed in some types of cancers of the respiratory and digestive systems.

H. K. Stagis et al. (Denmark), "A Cohort study on cancer incidence in welders and other metal workers" investigated the relationship between exposure to various types of welding fumes and the incidence of cancer. Both welding and metalworking increase the risk of cancer, in particular lung cancer.

S. Langård et al. (Norway), in "Incidence of cancer among radon exposed niobium mine workers" confirmed that combined exposure to radon and tobacco smoking increases the risk of lung cancer.



L. Hagmar and *C. Reuterwall* (Sweden), in "An Inter-Nordic prospective study on peripheral lymphocyte chromosome damage and cancer risk" confirmed, on the basis of cohort studies, that, in persons with high chromosome aberration frequency, the rate of cancer incidence was twice as high as in other persons.

Organic solvents were the main topic of the MEDICHEM session (13 papers, 16 posters). They were discussed in the following works: *R. Gilioli et al.* (Italy) "Epidemiological study of neurobehavioral effects of long-term low-level exposure to organic solvents", and *J. D. Chen et al.* (University of Taiwan) "Biochemical alterations of the liver and exposure to mixtures of solvents among paint workers".

Cooperation between Italian universities and the University of Brussels, sponsored by the Committee of the European Community yielded a communication presented by *A. Mutti et al.* "Cross-sectional investigation of early renal disturbances in workers occupationally exposed to tetrachloroethylene (PRRC)" in which renal activity indicators were studied by immunochemical methods. A new approach to the problem of exposure to TRI was discussed in work by *A. Sato et al.* (Japan), "Occupational trichloro-methylene causes pneumatosis cystoides intestinalis?". The authors' answer is positive.

E. Kusters and *R. Lauwerys* (Belgium) presented the method how to monitor biologically the exposure to monochlorobenzene, through the measurement of metabolites in urine. *M. Ikeda et al.* (Japan) studied exposure to benzene and other aromatic hydrocarbons among persons employed in the petrochemical industry and cistern refuelling. Cases of occupational acute poisoning were reported in two communications: *M. Manno et al.* (Italy), "Double fatal occupational exposure to methylene chloride" and *B. Cestin et al.* (France), "À propos de 4 cas d'intoxication au chlorure de méthyle (CH_3Cl).

There is still considerable concern about exposure to carbon sulphide and hydrogen sulphide in viscose fibre production. This issue was presented by *M. Vanhoorne* (Belgium), in "Health effects of carbon disulfide in a Belgian Viscose Rayon Factory — Preliminary Results", and by *T. Higashi et al.* (Japan) in a poster: "A cross-sectional study of respiratory heart rate variations and symptoms in rayon textile workers". In a poster "Health profiles of workers exposed to acrylonitrile", *T. Muto et al.* (Japan) presented the results of medical examinations of workers employed in acrylic fibre factories. Toxic effects, in workers involved in the manufacture of epoxyde or arcyamide plastics, were described in a poster by *J. Danse* of ENVIRONMED Health Services, Inc., USA.

Exposure to vinyl chloride during its manufacture, and/or polymerisation, was the subject of a paper by *F. Clavel et al.* (France) where they presented the results of an 8-year cohort study on incidence and mortality. A communication from Taiwan, on the other hand, reported early symptoms of liver injury among workers employed at PVXC polymerization plants. Ordinary functional liver tests proved to be satisfactory. The tests revealed insufficient protection of workers from exposure to vinyl chloride.

The problem of carcinogens was highlighted by the following authors



during the MEDICHEM session, *T. Tanigawa et al.* (Japan), "A decrease in CD4 positive T-lymphocytes among workers exposed to chromate and aromatic amines", *R. W. Ahlberg et al.* (Finland, Sweden), "Genotoxicity and exposure assessment in the manufacture of 1,3-butadiene". It should be noted that 1,3-butadiene is one of the compounds which occupy a leading position in world production, and its metabolites are highly genotoxic and carcinogenic. *A. Harada et al.* (Japan) presented a poster "Studies on structure-activity relationships of aniline derivatives". *G. Liss* of the Ontario Ministry of Labour, in his "Proportional mortality in a polyester manufacturing facility in Ontario" demonstrated that mortality from lung cancer as a result of exposure to chemical substances used in the production of polyester was higher than expected. *Ch. Hine* and *U. DeSilva* (USA), "Lung cancer following exposure to metal working fluids (MWF)" reported an evident relationship between exposure and cases of death from lung cancer.

To sum up the MEDICHEM session, it should be noted that in many communications, further epidemiological surveys in large populations were recommended. The adverse health effects of non-occupational factors, such as tobacco smoking or alcohol drinking were also strongly stressed.

During the session on OCCUPATIONAL LUNG DISEASES (18 papers. 20 posters), comprehensive studies on respiratory diseases were discussed. The majority of communications presented results of epidemiological surveys among workers of mining, metal (aluminium and copper foundries), chemical, plastics, polygraphic and grinding industries. Some studies also referred to groups of welders, electro-platers, electrolyzers and dentists. Out of a number of the investigated factors, much attention was paid to dusts of metals, plastics and cereals, as well as to solvents, mineral dusts and welding fumes.

The effects of exposure to heavy metal dusts were discussed by: *A. Boran et al.* (U.K.) in "Respiratory morbidity study in electroplaters exposed to chromium and nickel"; *T. Sinks et al.* (USA) in "A cross-sectional survey of respiratory conditions at a sintered rare-earth magnet manufacturer"; *B. Persson et al.* (Sweden) in "Pneumoconiosis among dental technicians"; *Y. Kusaka et al.* (Japan) in "Chest radiographic appearances, ventilatory function and respiratory symptoms among hard metal grinders: A five-year follow-up study". Additionally, the poster by *B. Nemery et al.* (Belgium) presented the studies of pneumotoxic effect of cobalt on animals.

The problem of occupational asthma and restrictive pulmonary changes in persons exposed to cereal or flour dusts were studied by *O. M. Bachmann* and *J. E. Myers* (South Africa) and *H. H. McDuffie et al.* (Canada).

Incidence of respiratory diseases in the plastics industry were discussed in a number of communications from France, Canada, Sweden, Japan and Singapore. Papers and posters prepared as a result of cooperation between the London School of Hygiene and Tropical Medicine and the National Institute for Occupational Health, Sweden, as well as by *D. Markovic et al.*, (Institute of Occupational Health, Belgrade), referred to medical examinations associated with the evaluation of radiological changes in the thorax.

Control of occupational lung diseases, congenital and acquired bronchial

hypersensitivity, pneumonia diagnosis, the risk of occupational asthma and other questions were also discussed. Many papers stressed the effects of tobacco smoking on the development of pulmonary diseases.

Two Congress sessions were focused on **OCCUPATIONAL HEALTH PROBLEMS AMONG HEALTH SERVICE EMPLOYEES** (12 papers, 10 posters). Several papers dealt with exposure to known chemical agents among health service workers. Examples: *K. Oliver et al.* (Canada), "Exposure to anesthetic vapour/gases and other airborne contaminants at veterinary clinics/hospitals in Ontario", *M. Petitot et al.* (France), "Étude des concentrations de l'atmosphère en produits contenus dans un nouveau procédé de désinfection terminale exempt d'aldéhydes".

The problem of infections in health service workers caused by contacts with biological material is still of importance. This was discussed by *M. McGill and A. Yassi* (Canada), "Incidence, determinants and follow-up of accidental exposures to blood and body fluids in health care workers". The author presented his observations, based on extensive material from a 1,100-bed hospital. He concluded that during a year, over 400 cases of infections (e.g. by injury or splash) were noted. Testing of biological fluids indicated that about 10% was infected with B-type hepatitis. This problem was also presented by *B. A. Swan et al.* (USA) in their poster. The studies have resulted in the collection of information expanding our knowledge about the risk of infection among health care workers. The question of hepatitis risk is associated with the vaccination of health service workers, discussed in 3 communications from France and the United Kingdom.

Studies on professional, social and health condition of health service employees were reported in several papers. For example, data collected by *P. G. W. Smulders*, Institute of Preventive Health Care, Leiden, the Netherlands, and presented in his paper "A comparison of the work and health situation of twelve professional groups in health care institutions in the Netherlands" covered a large population (9,000) of workers. The author concluded that the professional position of physicians head nurses and therapists is favourable, while the work of auxiliary nursing workers nursing aides and kitchen personnel is defined as hard. Appropriate measures should be taken to improve the working conditions of these groups.

Similar subjects were discussed in three other communications of the group of scientists from Montreal University, *A. Arsenault, M. R. Ameringen et al.* "The predictive value of work organization related stressors on markers of hospital wards dysfunction: Are the workers running away for their health?"; "Work organization related stressors as predictors of the quality of life outside work: empirical evidence of a spillover effect on hospital workers' psychosocial well-being"; "Stress in emergency wards and intensive care units: effects of feedback and training on workers' perceptions of problems and level of disenchantment". The studies were stimulated by a remarkable labour turnover among health service workers (25% of hospital workers change employment each year). It seems that the following three reasons are responsible for this situation:



- underestimation of responsibilities (also in financial terms);
- conflicts between the individual groups (nurses/doctors); and
- overburdening with duties.

Low back pain in health care workers was the subject of a number of communications, e.g. from Dep. Val Marne Occupational Medicine Centres, Besançon, and from Baghdad University.

The session on OCCUPATIONAL HEALTH SERVICES (9 papers, 5 posters) presented activities in the area of industrial workers' health care, chiefly in the European countries.

The systems of occupational health services (OHS) operating in Scandinavian countries, France and Canada were also reviewed. Some of the reports presented health care of different groups of workers (e.g. middle-aged workers, policemen in Finland, etc.) or the control over particular risk agents (e.g. lead).

The "Survey of Occupational Health Services in Europe" (*J. Rantanen, S. Tarkowski* WHO, Copenhagen) conducted in 32 countries of the European Region, revealed, following an analysis of questionnaire survey, that 40% of workers make use of specialised occupational health services while 20–30% of workers have access only to the primary health care (PHC). As regards the needs of the workers' health care, the most essential issue is the inadequate number of specialists oriented towards current problems of the working environment.

R. Anderson (Ireland), in his report on "Innovative workplace action for health: an overview of developments in the European Community", discussed results of the study on functions of OHS in seven EEC countries, undertaken by an international group of experts, set up in order to initiate health promotion at work. They emphasized the importance of legislation in the area of labour protection, up-dated information, workers' involvement in promotion of life styles conducive to health and the role of employers and trade unions in this respect. The problems of health care in small factories, were also tackled. The issue appeared to be so vital that it became the subject of an additional session.

Neurotoxicity of chemical and physical agents was discussed during the session on NEUROTOXICOLOGY AND PSYCHOPHYSIOLOGY (27 reports including some presented at a minisymposium and 12 posters). The minisymposium concerned major aspects of neurotoxicity and outlined new approaches in the field. *B. Knave* from the National Institute of Occupational Health, Solna, Sweden, in his paper "Solvent neurotoxicity – still of occupational concern", produced a historical overview of the studies conducted in Scandinavian countries since 1970. Numerous studies confirmed chronic disorders after exposure to solvents, but a few reports did not indicate such changes; nevertheless, the controversial results were based on studies of a standard scientific value. It is concluded that quantitative and qualitative analyses should explain those inconsistencies.

In the critical review of current literature concerning solvent-induced chronic CNS-Effects, *G. Triebig* (FRG), pointed to the fact that levels of exposure to single substances and their mixtures, clinical and subclinical health effects, epidemiology, risk assessment as well as explanations of various

discrepancies are, nowadays, most frequently discussed in the literature. *R. G. Feldman*, Boston University, USA, in his "Documentation of neurological and behavioural impairment: Toxic effects or primary neurological disorder", stressed that the recognition of early neurological impairments and their differentiation from the neurotoxic syndrome, as well as the proper evidence of observations are essential.

N. Cherry's paper (Canada) "Does neurobehavioral testing lead to valid conclusions of CNS impairment from organic solvents exposure?" indicated that the current tests are not effective enough to detect specific damages.

Studies aimed at determining the neurotoxicity of chemical substances and physical factors in humans and animals were also discussed in reports and posters.

The results were often obtained due to the international cooperation of various research centers. Most of ten participants discussed epidemiological surveys conducted among workers exposed to organic solvents in paint and varnish manufacturing, plastics and microelectronic industries as well as the toxicity of heavy metals and pesticides. Frequently, neurobehavioral tests were used in the evaluation of neuropsychological functions in the workers under study.

Some reports described the results of neurophysiological examinations, a sensitive diagnostic method for detecting even a tiny impairment in the CNS. The most interesting were the reports submitted by Japanese, Scandinavian and Chinese researchers.

S. Araki et al. in their "Determination of the distribution of nerve conduction velocities in occupational health, assessment of all faster and slower large myelinated nerve fibres" discussed the results of the study conducted in six different groups of subjects: chain-saw operators, people after acute thallium poisoning, lead smelters, workers exposed occupationally to styrene, in alcohol addicts and in diabetics.

Computer assisted analysis was used to measure the conduction velocity of the sensory median nerve. The studies revealed a higher correlation between the adverse effects of chemical (as well as physical) agents and fast-conduction nerve fibres compared to slow.

The report by *K. Murata et al.* (Japan) on the "Application of evoked potentials and R-R interval variability of ECG in occupational medicine", presented examinations of short-latency somatosensory, auditory and visual evoked potentials, R-R interval variability of ECG as well as motor and sensory median nerve conduction velocities in four groups of workers. The subjects were chain-saw operators, computer display operators, and workers exposed to styrene and lead. The studies proved the evoked potentials and R-R interval variability of ECG to be sensitive methods for evaluating the toxic effects of occupational and environmental chemicals on the central and peripheral nervous systems. *K. Yokoyama et al.* (Japan) in their work "Psychological performance and peripheral nerve conduction velocities in workers exposed to low level of styrene", provided evidence to the effect that the psychological efficiency and conduction velocities of large myelinated fibres



become affected after exposure to styrene at the level of 77 ppm and lower. A number of other works dealt also with the problem of styrene toxicity.

E. Matikainen et al. (Finland), in their research on "Low level occupational styrene exposure and quantitative EEG" discovered a slight tendency towards a slower basic, bioelectrical function of the brain, especially in posterior parts along with a longer exposure time. More detailed analyses to explain this finding were recommended.

F. He et al. (China), presented their report on "Delayed encephalopathy following acute carbon monoxide poisoning — brain evoked potential and CT SCAN studies". The examinations performed revealed that brain-evoked potential measurements seem to be a more sensitive method than CT scanning for the early detection and localization of brain dysfunction, and assessing the effects of poisoning.

The study on "Hyposmia and anosmia among electronics fabrication workers" by *J. E. Cone* et al. (USA and Canada) discussed patients suffering from different olfactory impairments related to past exposures when assembling microelectronics devices. A higher percentage of olfactory impairments was found in this group of workers when compared to controls. A similar work was given by *D. Mergler* et al. (USA), focused on "Visual disturbances among former microelectronics workers". Visual acuity examinations were performed in workers reporting previous exposure to chlorinated hydrocarbons, glycol ethers, isopropanol, acetone, toluene, xylene and ethyl alcohol. The study results revealed that far and near visual acuity, contrast sensitivity and colour vision were significantly poorer among former micro-electronic workers as compared to the reference group.

L. Blain et al. (Canada) applied a modified retinogram and oscillating potentials in a study on chronic exposure to trichloroethylene. A visual acuity examination was also the subject of experimental studies conducted at the Institute of Occupational Health, Solna, Sweden, and the Cancer Research Institute in Stockholm. During the study on the "Alterations in retinal morphology and visual function in rats after long-term mixed exposure to 2,5-hexanediol and fluorescent light" *M. Hagman* et al. observed functional alterations in the retina of albino rats accompanied by the loss of visual receptors. The examination of threshold vibration sense was utilised by *J. Myers* and *I. Macun* (Republic of South Africa), to determine peripheral neuropathy in workers employed in the acrylamide manufacture as well as by *McConnell* et al. USA, who examined farmers exposed to metamidophos and other organophosphates.

The results of epidemiological studies on solvent and heavy metal toxicity were discussed in Scandinavian, Italian, Dutch and American papers, namely: "Psychometric function of solvent-exposed paint industry workers; A 9-year follow-up" (*P. Ørbaek* et al. University of Lund, Sweden); "International study of the neuro-behavioural effects of chronic low level exposure to mixed organic solvents" (*M. L. Bleecker* et al., Baltimore, USA and Milan, Italy); "Subjective symptoms and neurobehavioural functioning in young and older Dutch



painters" (*J. Hooisma*, the Netherlands); "Neuropsychiatric illness among painters – interaction between solvents and alcohol" (*I. Lundberg* et al. Karolinska Hospital, Stockholm, and Institute of Occupational Health, Solna, Sweden); "A cross-sectional reappraisal of the neurobehavioural and neuro-endocrine changes in styrene-exposed workers" (*I. Franchini* et al., University of Parma, Italy and Institute of Occupational Health, Solna, Sweden); "Health effects of chemical exposure in fibre reinforced plastics industry" (*L. Forsman-Gronholm* et al., Institute of Occupational Health, Helsinki); "Neurovegetative symptoms and signs in a population of welders from Northern Sweden" (*B. Kolmodin-Hedman* et al., University Hospital and National Institute of Occupational Medicine, Umea, Sweden).

The problem of solvent toxicity was also touched upon by *C. Ferroni* et al., University of Parma, Italy, in their report on "Neurobehavioural performance and endocrine parameters in workers occupationally exposed to tetrachloroethylene (PERC)" and also by *A. Laine* et al., Finland in "Immediate and delayed nervous effects by experimental m-xylene inhalation in man". *A. Seeber* et al., University of Dortmund, FRG investigated "Neurobehavioural effects of experimental exposure to acetone and ethylacetate". The authors, during the Montreal Congress, reported different nervous system impairments in workers exposed to neurotoxic agents. Most of researchers advocate further studies on neuro-toxicity using standardized parameters.

The session on HEALTH EFFECTS OF PHYSICAL ENVIRONMENTAL FACTORS (9 reports, 9 posters) concerned such aspects as exposure to noise, vibration, e-m fields, microclimate, laser radiation or hyperbarism. Most of the authors focused on exposure to noise. For instance, *J. Starck* et al. (Finland) made the interesting observation that the risk of hearing impairment increased with exposure to impulse noise, whereas no effect of this kind was noted in combined exposure to noise and local vibration.

The problem of occupational hearing loss in North American workers 60% of whom were exposed to noise levels exceeding 95dB, was discussed by *R. Héту* and *L. Getty*, (University of Montreal, Canada). As a result of measuring psychosocial disadvantages, by means of a specially designed questionnaire, they found a dramatically low perception of hearing hazards in workers exposed to high-level noise. They also noticed that workers had not applied for compensation for work-related hearing loss, which appeared to be a severe hindrance in preventive activities.

H. J. Smolik et al. (Institute of Occupational Health, Dijon, France) and *M. S. Green* et al. (Israel) tackled the problem of the effect of noise exposure on heart rate. The well-documented relationship between exposure to vibration and finger vascular disorders was thoroughly investigated by *M. Bovenzi* et al. (Institute of Occupational Health, Trieste, Italy), who emphasized the usefulness of the cooling test in the diagnoses of the aforesaid changes. A correlation between symptoms of finger vascular disorders and depression in chain-saw operators was noted by researchers from University of Fukudzi, Japan. *H. Mito* et al. (University of Osaka) discovered that the peripheral circulatory



disturbances in the sawyers might result not only from exposure to vibration but also to noise.

Studies on exposure to electromagnetic fields were reported in the following communications: *S. London* et al. (University of California), "Assessment of magnetic and electric field exposures by job category"; *R. Hocking* et al. (Australia), "Cytogenetic study of radio-linemen"; *T. Terrana* et al. (University of Milan), "Pituitary-thyroid activity and radio frequencies: A case-control study in female workers exposed to high electromagnetic fields".

To sum up the discussion on these topics, it can be stated that the studies presented in papers and posters were rather of a contributory character and referred much to data published earlier. They lacked new concepts on mechanisms of change influenced by physical factors, and need wider studies.

The group on EDUCATION AND TRAINING IN OCCUPATIONAL HEALTH (14 papers, 6 posters) discussed principles of training and curricula of university research institutes and medical schools in the USA, Scandinavian countries, Canada and Australia.

B. B. Kuchinski in "The role of institutes of occupational health in training and education" (NIOSH, USA) presented developments in the training of industrial hygienists in a number of world-famous institutes. In view of enormous training demands, the leading role of occupational health institutes was stressed. They should provide training facilities for native personnel and foreigners, especially from developing countries.

W. O. Phoon (University of Sydney, Australia) in his paper "Present status of occupational health education" analysed the existing system of educational programmes and concluded that few satisfy modern training principles. They do not teach methods of evaluating and observing phenomena and how to transfer theory into practice. Two works of Scandinavian authors, *Ch. Ekeberg* in "The course introductory education for OHS became a reinforcement for the need of a collective and joint view on goal, assets and methods for the OHS", and *M. Soininen* et al., in "Health negotiations as a way of improving conditions in the work place" presented systems of training where students, together with teachers, developed ideas of how to improve the labour and health conditions of industrial workers, how to advance health services and how to develop their cooperation with industry.

Scientists from the Mehilainen Medical Centre, Helsinki, and the University of Tampere, Finland (*J. Lukkari* and *P. Frilander*) presented a paper "A worksite health promotion programme as a method for occupational health professionals". Training workers in how to promote life-styles conducive to health in and outside work places was essential in the programme.

In several communications of the Medical College of Wisconsin, USA. *S. Shindell* and *E. Cassell* presented a system of extramural education in occupational medicine particularly applicable to developing countries. The system has a number of advantages; students are issued diplomas, education is inexpensive and can be provided at workplaces. The training involves computer and telecommunication systems. It has been in operation for several years and has already produced good results.

Ribak et al. presented an unconventional teaching method of medical students: for example a chemical accident or explosion was simulated. The kind and characteristics of the simulated accident were defined, students were split into groups which represented institutions and persons involved in the eradication and control of consequences resulting from the disaster. The students were asked to prepare a plan of action which was immediately discussed and evaluated by the teacher. The method proved to be an extremely effective teaching tool in the area of occupational and environmental health.

Programmes for nursing education were presented in papers by *C. Lowis*: "Innovations in occupational health nursing education" and *L. Katajarinne*: "Complementary training of occupational health nurses – evaluation of the course programme and the effectiveness of the course".

The poster on "Information resources to aid health professionals" aroused a lot of interest. It included instruction materials on hazardous substances at worksites, addressed to health service workers. They were short descriptions of exposure effects and case studies together with the so-called "toxicological profiles". The enthusiastic reception of those materials demonstrated the extent of the demand for information in the field of occupational medicine.

J. Kastorina and *L. Rosenstock* in their poster turned attention to the general shortage of physicians specialising in the occupational and environmental health so necessary in the education of medical personnel, in research and in various expertises. It is estimated that in the United States the shortage of such specialists amounts to 3200–5500 persons.

The session on MINERAL FIBRES AND MINERAL DUST (9 papers and 11 posters), focused mainly on issues related to asbestos, which continue to be the major health problem in the world.

Another session was on NATURAL FIBRES AND ORGANIC DUSTS. Three papers and three posters were presented: the main issues of the session included health problems resulting from exposure to cotton fibres and coffee dust. Among authors of papers and posters were representatives of Uganda, Hong-Kong, USA and France.

During the session on GENOTOXICOLOGY, (3 papers and 5 posters) the genotoxic effects of benzene, diethylamine, sodium fluoride, methyl meta-crylate, arsenic compounds and the toxic compounds emitted during welding, were discussed.

In the session devoted to WORK PHYSIOLOGY (17 contributions, including 8 posters) Japanese centres were widely represented. The presentations focused on three main issues:

1. physical work load (lifting and moving heavy objects) – presentations from USA, Finland, the Netherlands and Belgium;
2. the influence of microclimate (thermal stress) on the organism – results of studies carried out by centres in Belgium, France, Finland and Japan; and
3. sight testing among visual display terminals (VDT) operators – papers from Japanese and Italian centers.

In addition, several methodological papers dealt with electromyographic (EMG) recordings (Norway), vibration perception (Japan) and blood pressure measurements (Japan).



Similar issues were discussed during the session on **ERGONOMICS IN INDUSTRY** (13 presentations including 4 posters). Among others the following ones should be mentioned: evaluation of working conditions in various industrial branches and on particular workposts, e.g. in food and cellulose — paper industry (contributions from Canada); textile industry (Yugoslavia); stress and strain in kitchen workers (Finland); muscle load in VDT workers (Norway).

Another session on **SHIFTWORK**, closely linked with the issues discussed during two sessions mentioned above (12 presentations, including 6 posters) was focused on the evaluation of physiological changes due to night shift work. The majority of presentations were from Japan. Presentations from other countries referred to views on the circadian rhythm (Canada, Finland); stress and organism response (Finland); women's shiftwork and its effects on their family life (U.K.).

Finally, an excellent organization of the Congress deserves special mention. The scientific programme covered a wide range of issues. The participants displayed a large representation of various centres and institutions from developed and developing countries.

All contributions and particularly posters were very interesting and they represented a high scientific standard. One observation, somewhat surprising should be stressed here, namely the very limited number of participants from Eastern European countries, while it is well known that research centers of that region have contributed considerably to a world-wide advancement in occupational medicine.

It should be the concern of future congress organisers to invite representatives of those countries. However, this is conditioned to a great extent, by the economic situation in Eastern Europe. It is obvious that a doctor from a country where a monthly salary ranges from 28 to 158 USD cannot afford to pay an 800 dollar registration fee — a condition of presenting a paper — not mentioning the enormous cost of air-fares and accommodation expenses.

Let us hope that a Foundation set up by the Polish Association of Occupational Medicine, named "Health for Working People" will contribute to enlarging the financial means to permit Polish specialists to promote the values of their occupational medicine and to participate in future international meetings.

I would like to wish my successors to reach this goal.

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