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Preface

In collaboration with many people, the Research Strategies for Occupational Health in the 21st Century have been developed to provide a framework to guide occupational health research in our country. I would like to emphasize the following two features of the new strategies.

Firstly, these strategies have been formulated as a direct response to the call for unified research strategies focusing on priorities. The earliest research report in Japan dealing with occupational health dates back to 1889 when a paper on pneumoconiosis was published (Miura, 1980). Since then, numerous research papers have been published in this field. They have contributed to the step-by-step progress in the structure and practice for occupational health. Compared with other scientific fields, occupational health research is conducted in unique circumstances reflecting the conflict in interests between social partners. As a result, a close examination is always needed about the scientific nature of research results. The prominent history of occupational health research tells us the importance of strong enthusiasm for overcoming difficulties arising from this background. On the other hand, however, we sometimes felt the need for dear national strategies in occupational health research. While we admit that individual experts and institutions have had their own strategic goals, there often has been a lack of national level strategies. We thus need a unified framework for developing research in this field. Needless to say, the future progress in occupational health research will depend on the adoption of nationally designed strategies.

Secondly, the presented strategies are intended to be a framework for action, and not merely for debate. In developing the strategies, therefore, we used a consensus building process for analyzing real situations in Japan. We have tried to base our discussion on nation-wide inputs. During the first two years, members of the Conference and its subcommittees identified approximately 1000 important issues relating to occupational health practice and management. Selected priorities were distributed *as* the yearly reports to a wide range of interested parties. In the third year, about 250 experts and professionals provided comments and suggestions to these priorities. All these inputs were reflected in the development of the strategies. Three key research areas and 18 priority issues have been identified, together with eight measures for promoting research.

I hope these strategies focusing on selected priority issues will be useful for researchers, research institutions and government agencies as well as for organizations providing research funds, in making decisions on their research policies and programs. In implementing research on the basis of the new strategies, we need to examine their validity with a view to determining more appropriate strategies in the next stage. We are all aware that any of the selected priority issues will not be solved easily. Radically speaking, I expect that these strategies will play a role of a "broadax" leading to a breakthrough in occupational health research. The implementation of the strategies requires extensive cooperation of many people and institutions concerned, and it is hoped that this breakthrough could be achieved by joining efforts of all.

Japan in the 21st century should be a society in which people at work can have a bright future enjoying health and well-being. My sincere hope is that the new strategies will be implemented fruitfully by younger generations that bear responsibility for the new century.

TACHI Masatomo

1. Introduction

Japan has been engaged in research on occupational health for many years and has obtained significant results, including improvements to the work environment and the prevention of occupational diseases. Still, many new problems have arisen as a result of technological innovations, changes in the industrial structure, diversification of employment styles, changing demographics, and the increase in women workers in all occupational fields. Small and self-employed undertakings are gaining much interest because of the lack of information on the types of occupational health hazards present and on appropriate health management that will control these hazards.

In order to create and maintain a corporate/work culture that promotes health and productivity, it is now necessary to establish a sustainable health management system and to institute new approaches in occupational health practice.

The diverse occupational health concerns have triggered research activities that were likewise varied. Research efforts were directed towards not only “traditional” occupational health problems but also daunting problems that have eluded resolution such as combined effects of multiple hazard exposures, contribution of psychosocial factors in disease development and reproductive effects of certain hazardous agents. These efforts, though numerous, were fragmented and did not address systematically the current issues. The need to bring to a focus onto the occupational health research efforts to effectively prevent injury and diseases has been recognized in view of the limited resources available. That research strategies on occupational health should be formulated based not only on the existing research framework has become a vital concern.

In 1998, considering the current situation, the Conference on Occupational Health Research Strategies in the 21st Century was launched with the support of the Ministry of Labour. Experts in various areas of occupational health gathered together to identify research issues in workplaces. From the list that resulted from the discussion, the potential research topics were selected, classified and prioritized based on the short- and long-term impacts, taking into consideration conformity with occupational health needs, degree of importance and urgency, and usefulness of research results. The inputs and comments of other stakeholders were also solicited. Finally, the important areas of research on occupational health, priority issues, and measures for effective research implementation were compiled in the document “Occupational Health Research Strategies in the 21st Century.” With the unveiling of this important document, it is envisioned that occupational health research will be more responsive to the challenges of the 21st Century and that a wider base of participation from the public and private sectors will be fostered.

2. Occupational Health Research Strategies in the 21st Century

Japan in the 21st century should promote and maintain an environment where every person at work can be safe and healthy and feel a sense of fulfillment and satisfaction. Collaboration of both government and non-government sectors is an essential prerequisite to realize this vision with occupational health research serving as the foundation of this partnership. The “Occupational Health Research Strategies for the 21st Century” aims to effectively and systematically address, through research, priority occupational health problems in the next ten years.

(1) Key research areas and priority issues

The research strategies identified 18 priority issues grouped under three key research areas. An overview of their significance, thrust and objectives are described in the sections below.

***Key research area I* Research on issues related to working life and health that arise from changes in the occupational structure**

The growth and change of workplaces in Japan have resulted in the dominance of tertiary industries, diversification of employment styles, innovation in information technology, aging of the labour force, and the expansion of employment opportunities for women workers. Research targeting six priority issues aims to

elucidate the effects of the fast-evolving occupational structure on the well-being of workers. The priority issues under this section are the following:

- 1. Diversification of work styles and health**
- 2. Information technology (IT) and occupational health**
- 3. Mental health and occupational stress**
- 4. Prevention of work-related diseases**
- 5. Health of elderly workers**
- 6. Health of women workers**

***Key research area II* Research on the human health effects of hazardous workplace factors**

Various chemical, physical, ergonomic and biological factors are known to adversely affect the health of workers. The emergence of new substances, exposure to multiple hazards, and introduction of new manufacturing processes have increased the opportunities for contact between potentially injurious agents and the worker. It, therefore, becomes important to understand how these agents produce their harmful effects on the human system. Uncovering the mechanisms of injury, effects of multiple exposures, or determinants of individual susceptibility to specific hazards will lead not only to better understanding of the disease or injury but will aid in the development of appropriate preventive measures. The second key research area will focus on the following:

- 1. Hazard assessment for chemicals**
- 2. Effects on genes and occupational cancer**
- 3. Effects of multiple hazard exposure**
- 4. Individual differences in effects on health**
- 5. Ergonomic factors and workload**

***Key research area III* Research on risk assessment and the management system for occupational health and safety**

As changes in industrial technologies and labour styles accelerate, it is necessary that work practices and occupational health activities are conducted voluntarily, in addition to those which comply with established labour laws and regulations. It has become even more important to conduct research on interventions that will ensure workers' health through assessment of combined risks in workplaces and management systems for occupational health and safety. This key research area will involve research on systems of occupational health management that will enhance harmonization with schemes established by international bodies and foster cooperation with other countries. The thrust of this research field will provide the means to establish appropriate management systems that will protect the health and safety of the workforce. Under this key research area are the priority issues listed below:

- 1. Risk assessment and development of health effect indices**
- 2. Effective methods of risk communication**
- 3. Development of measurement system and control technology for work environment**
- 4. Business administration and occupational health and safety management system**
- 5. Measures to promote occupational health in small and self-employed undertakings**
- 6. Improvement of the quality of working life through health promotion**
- 7. Harmonization with international standards on occupational health and promoting international cooperation**

The following figure shows the correlation and roles of the three key research areas. These areas are not independent of each other and to a large extent are complementary. Government agencies, academic institutions, and the private sector involved in occupational health research are envisioned to direct their research programs on the three key research areas and eighteen priority research issues mentioned in this report and to promote efficient and high-level research. This partnership will encourage the setting up of an effective system of collection and dissemination of up-to-date information relevant to occupational health research.

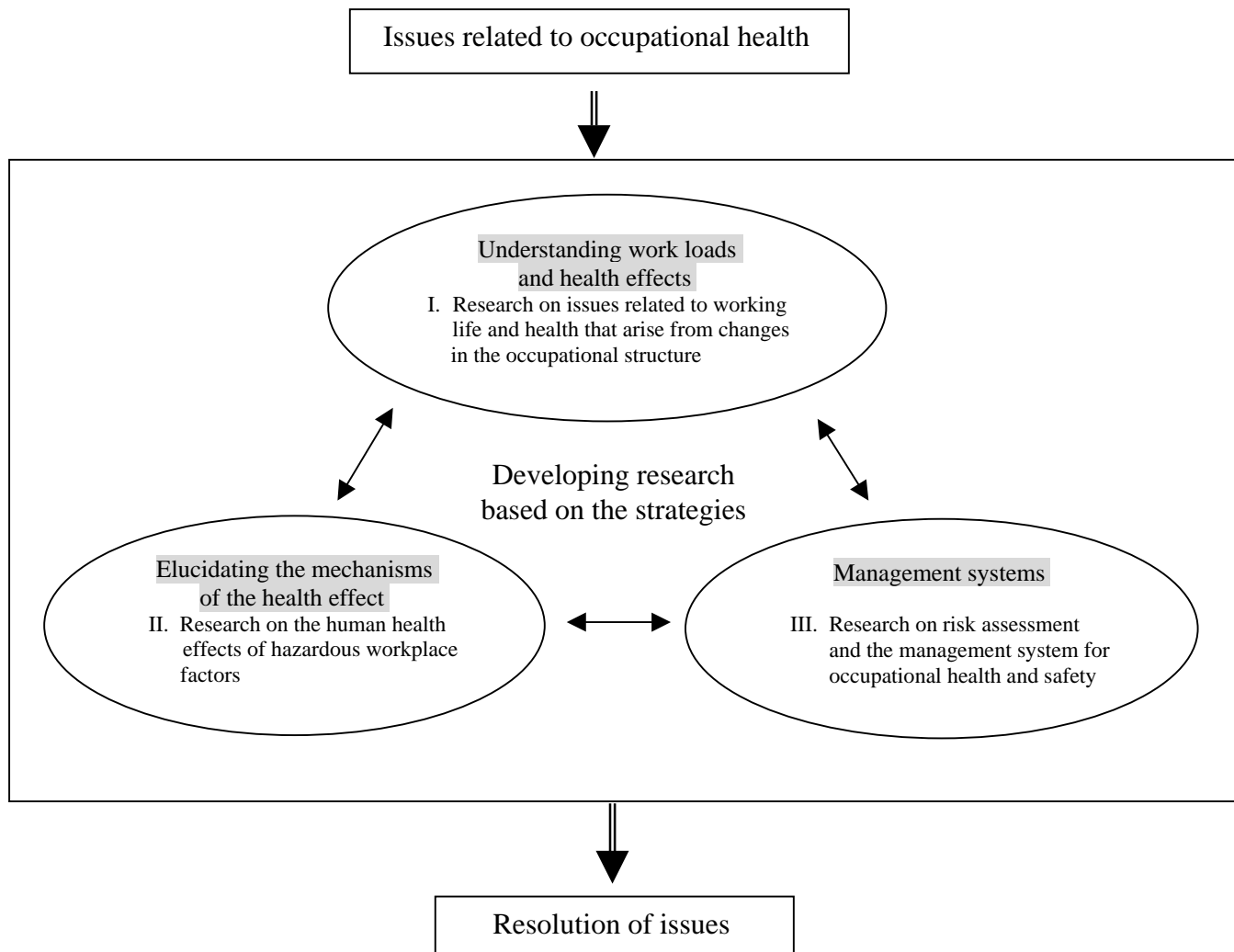


Figure: Correlation and roles of the three key research areas in resolving issues related to occupational health

(2) Measures for conducting research

It has been recognized that the effective implementation of the strategies in the conduct of research on these three key research areas and 18 priority issues will entail the support of all stakeholders. With the limited human resources and funding opportunities, it becomes even more important to make the best use of these existing resources to bring to fruition the objectives of the strategies. The commitment of research institutions and individual researchers supported by government agencies to promote the coordinated research on occupational health will be necessary. This will ensure the success of the strategies and ultimately improve the safety and health of all workers. The following section describes the approaches in developing and conducting research on occupational health.

1. Promotion of public awareness on occupational health research

The contribution of the workforce to the growth and stability of the nation has long been established. To improve the health and safety of this subset of the society through coordinated occupational health research will benefit not only the worker and the employer but also the nation. Increasing public awareness through

dissemination of research results and developmental education will secure the support and participation of the public that are essential to the successful implementation of the strategies.

2. Information dissemination to institutions and individuals concerned with occupational health research

Participation and cooperation in research should be promoted by offering information on all the aspects of the research strategies. A system to facilitate the exchange in information on the progress and results of research among all interested parties should be established to further strengthen the commitment to implement the strategies.

3. Strengthening the functions of research institutions and enhancing cooperation among researchers and research institutions

The functions of institutions that are engaged in occupational health research should be strengthened and cooperation among research institutions and researchers should be enhanced systematically and continuously. Furthermore, researchers should be encouraged to form voluntary cooperative research groups. Cooperation with foreign institutions that are engaged in occupational health research is also important.

4. Providing opportunities for recognition of research contributions and for human resource development

The human resource is an essential link in the effective conduct of occupational health research. Opportunities for growth and development of research capabilities should be promoted through personnel exchanges among academic research institutions and partners in the private sector, and through international exchange.

In the long run, personal development should be encouraged by promoting challenging research agenda that seeks to resolve daunting issues that will attract the participation of “young brains”. A new framework should be set up to develop a curriculum that will produce specialists in occupational health in graduate schools and universities. An environment for occupational health personnel in the private sector to conduct voluntary research activity should be prepared.

5. Securing research funds

The necessary research funds should be secured by utilizing various funding sources including (1) official funds provided by concerned agencies such as the Ministry of Health, Welfare and Labour, the Ministry of Education and Science, the Ministry of Environment, Ministry of Economy, Trade, and Industry, and the Ministry of Agriculture, Forestry and Fisheries; and (2) private funds provided by scientific research promotion bodies and industry bodies. Effective use of these funds should be guaranteed through agreements between the implementers and the funding agencies.

6. Capability building and effective use of research institutions and facilities

A research support system—including an IT system—should be established to promote occupational health research. Existing institutions and facilities should be open to external researchers by promoting joint research and common use facilities.

7. Carrying out research based on the analysis and assessment of the current situation

Efforts should be made to recognize the occurrence of new issues on occupational health in Japan and abroad. Methods to resolve important issues should be identified through situational analysis and critical review of occupational health research results in Japan. Defining areas where research is necessary, factors that obstruct progress of research and practical use of research results will guide the occupational health community on the necessary steps to take in resolving these emerging issues. Furthermore, based on the results of the evaluation of progress of research on the three key research areas and 18 priority issues, the course of the next stage of research development will be decided.

8. Promotion of research based on the established strategies

The operationalization of these measures described will entail the active participation of research institutions and researchers. Activities that will support and promote occupational health research are essential to guarantee the successful implementation of the strategies. For this purpose, academicians and experts engaged in occupational health research should closely monitor the progress of these strategies and the National Institute of Industrial Health is expected to assume responsibility as the executive office. The National Institute of Industrial Health will also function as repository and clearing house of a wide range of information on occupational health research.

3. Anticipated Results

The progress of research on the three key research areas and eighteen priority issues mentioned in this strategy report is expected to facilitate the advance of occupational health in Japan and produce the following results:

- 1. National agreements on securing workplace health and safety**
- 2. A healthy and comfortable environment and improved productivity in many workplaces**
- 3. Establishment and promotion of a consistent and sustainable health management system that will cover all workers**
- 4. Resolution of important issues that remained unsolved in the 20th century, including occupational health in small and self-employed undertakings and the effects of exposure to hazardous chemicals on health of workers**
- 5. Appropriate action plan for new issues that will occur as a result of changes in the occupational structure, the aging of the society, and the persistence of low birthrate in the 21st century**
- 6. A reduction in occupational and work-related diseases, health care costs, administrative expenses and lost productivity**

4. The 18 priority issues

***Key research area I* Research on issues related to working life and health that arise from changes in the occupational structure**

I-1. Diversification of work styles and health

[Importance and urgency]

The occupational structure in Japan is rapidly changing. The total number of workers in Japan increased by 27% from 50.94 million in 1970 to 64.62 million in 1999. In the same period, the number of employees increased by as much as 125% in the service industry, 67% in the construction industry, 47% in wholesale, retail and restaurant businesses, and 25% in transportation and communication industries. The manufacturing industry and agricultural and forestry industries, on the other hand, registered a decrease in the number of workers by 2% and 64%, respectively. The changing demographic profile clearly illustrates the growth of the tertiary industries.

Work styles are also diversifying. Numerous changes are being made in working hours' systems in terms of arbitrary work, flexible working hours, diversified night shifts and shift systems, changes in work and employment styles as a result of an increase in part-time and temporary employment, growth of new businesses such as all-night shops and nursing and welfare businesses, overseas expansion of enterprises, and the introduction of computer systems to the workplace. These changes have introduced occupational health issues associated with mental exhaustion and burdens of night work. Nonetheless, occupational health services remain inadequate. The consequence of alternative work schedules, long working hours and night work in particular, require urgent attention from the occupational health community. The seriousness of these issues is highlighted by the fact that more than 5.77 million employees in 1999, excluding workers in agricultural and forestry industries, worked for 60 hours or more per week. Night work becomes a compelling issue for research based on the 1997 estimate that 6.7 million workers undergo night work from 10 p.m. to 5 a.m.

[Research content]

Although the need to conduct research on occupational issues related to working styles has already been recognized by the scientific community, most of the previous efforts focused on the physiologic consequences. Research must also be designed to determine the contribution of social determinants to the health of workers in the milieu of a changing occupational society. An interdisciplinary study extending over the social and behavioral sciences, therefore, becomes necessary. Some concrete research issues that will be pursued are as follows:

- (1) Establishment of methods for early recognition of health problems related to the diversification of working styles
- (2) Epidemiological research on the effects of diversified working styles, including shift systems, on the health of workers
- (3) Methods of establishing shift systems that imposes less burden on the human body and is adapted to job characteristics
- (4) Research on the improvement of new working styles to protect and promote health and quality of life
- (5) Research on the improvement of standards of occupational health in the tertiary industries

[Anticipated results]

The diversification of work and employment styles will be further accelerated by the dictates of effective business administration, changes in the occupational health awareness of workers, and the convenience demanded by service users. Research will contribute in identifying interventions that will take into account the inevitable changes in organizational structure and at the same time promote the health and welfare of workers.

I-2. Information technology (IT) and occupational health

[Importance and urgency]

Information technology has become a cornerstone of progress in many work environments. According to a report published by the Ministry of Labour in 1999, around 98% of business establishments are equipped with computers and 39% of these establishments are linked to internal and external computers via an online network. The presence of internal LANs and use of the Internet signal the integration of IT to the workplace.

Information technology not only produced opportunity for more efficient work management system but also increased the choices in work styles and schedules. Teleworking has reduced commuting stress and offered employment opportunities to many people, including the elderly and physically challenged. On the other hand, 80% of teleworkers suffer from eyestrain and 70% complain of stiffness in the shoulders.

Looking into the conditions how information technology is utilized from the viewpoint of occupational health becomes an urgent matter to curb the adverse health consequences. Research will lead to the promotion of work organization models appropriate for IT-intensive work. Reduction in mental and physical stress placed on workers caused by intense use of IT equipment will be necessary to secure their health and safety. Concrete suggestions on health improvement and promotion will be useful to workers in the mainstream industries and to workers involved in arbitrary work. The research efforts will prepare the occupational health community to better address the fluidity of work organization produced by the rapidly evolving telecommunication technology.

[Research content]

The adaptability of workers to computerized workplaces greatly differs between individuals and depends to some extent on the age and training. With the aging Japanese society, efforts must be made to allow elderly workers the opportunity to become competitive in world of information technology without adverse health consequences. Also, with the advent of telework, workers should be able to perform their duties with autonomy utilizing self-judgement and self-administration. Therefore, research should be conducted on the following issues related to the occupational health of workers who utilize information technology:

- (1) Psychosocial and physiological research on adaptability of workers to computerized workplaces
- (2) Research on the work burden resulting from of a high-degree computerization and construction of networks that cover the entire workplace
- (3) Development of human-technology guidelines on the introduction and use of information technology in workplaces
- (4) Measures to promote occupational health of teleworkers

[Anticipated results]

Occupational health research on information technology will not only promote autonomous working styles but also contribute to the expansion of employment opportunities for elderly and physically challenged persons bringing along significant social benefits to the nation. Research results will directly contribute to securing the health of workers who need wide-ranging self-regulatory measures in terms of health, work environment improvement, and work management.

I-3. Mental health and occupational stress

[Importance and urgency]

The recent economic conditions in Japan brought about by globalization and fierce trade competition have affected occupational demographics, company management practices and working styles. These changes have led to loss of job security due to company downsizing, increasing work demands, and deviation from normal work schedules, among others. From the prevailing situation emanated factors that contribute to occupational stress.

According to a study on workers' health conducted by the Ministry of Labour in 1997, 63% have complaints of severe anxiety because of stresses in their work – 20% more than the number of complaints registered in 1982. The ratio of workers who attributed their sick leave to workplace stress reached 45.6%, and mental disease accounted for about 15% of all reasons for sick leave of one month or more. Worker suicides increased to about 13,000 by 1998. It is estimated that depression accounts for about 70% of the suicide deaths among workers. Occupational stress also increased the frequency of consultations with psychiatrists by 1.4 to 2.3 times and the occurrence of depression by 5 to 14 times.

The International Labour Organization (ILO) has recognized that occupational stress is one of the most serious factors affecting the health of workers. Mental health, in particular, needs to be addressed urgently in all the industrial sectors. (For effects of occupational stress on health other than mental health diseases, see “I-4 Prevention of work-related diseases.”)

Because of the high toll the problem has created in terms of personal and social losses, it becomes imperative to implement research on mental health and measures to counter occupational stress.

[Research content]

Much research on occupational stress has focused on the psychosocial and physical work factors that cause mental health problems. However, there remain many unresolved issues. Limited research has been done on quantitative assessment of occupational stress, varied reactions to occupational stress, and differences in responses to occupational stress. Concrete research issues are presented below:

- (1) Development of methods to assess mental health
- (2) Research on the effects of healthy workplaces on mental health
- (3) Research on the reinstatement of people with mental health problems
- (4) Development of methods for quantitative analysis of occupational stress and responses to stress
- (5) Factors to determine differences in individual responses to stress
- (6) Practical measures to counter stress in work places and assessment of the effectiveness of such measures
- (7) “Organizational diagnosis” method to assess the culture and climate in companies and business sites
- (8) Research on the effect of various working styles on mental health

[Anticipated results]

- (1) The mechanisms how occupational stress affects the health of workers can be resolved and preventive measures can be established. As a result, health care expenses and labour costs will be reduced.
- (2) Guidelines on the design of work organization that will promote the mental health of workers as a group and of individual workers may be formulated.
- (3) The quality of work and working life of worker will be improved.
- (4) Comfort and safety in workplaces will be secured for people suffering from mental health problems.

I-4. Prevention of work-related diseases

[Importance and urgency]

Much information is available on the health effects of individual workplace hazards. Japan has taken advantage of this knowledge. At present, occupational diseases caused solely by exposure to specific hazards in workplaces are decreasing. However, limited progress has been achieved in preventing work-related diseases caused by the combination of occupational factors and non-occupational factors that include lifestyle, socio-cultural and environmental factors, and individual susceptibility.

Occupational factors recognized as risk factors for work-related diseases include organizational structure, working hours, labour density, handling of heavy materials, repetitive actions, unwanted postures, occupational stress, chemicals, and other physical factors. According to a report of the World Health Organization (WHO), work-related disease is a general term for those diseases partially caused, accelerated, aggravated, or exacerbated by work factors. Diseases and disorders known to be aggravated by adverse working conditions are diabetes mellitus, cardiovascular diseases (hypertension and ischemic heart disease), cerebrovascular disease, musculoskeletal disorders (pain in the neck and upper extremities, low back pain), chronic nonspecific lung diseases (asthma and bronchitis) and gastrointestinal diseases (stomach and duodenal ulcers).

Among these medical problems, musculoskeletal disorders accounted for 62% of the occupational diseases registered in Japan in 1999. The October 1996 morbidity statistics from the Ministry of Health and Welfare provided the following estimates in the number of Japanese afflicted with the selected diseases: diabetes mellitus: 240,000; hypertension: 740,000; ischemic heart disease: 140,000; cerebrovascular disease: 390,000; asthma: 170,000; and stomach and duodenal ulcers: 130,000. Labour and individual losses are considerable because many of these patients were inevitably forced to take prolonged sick leave.

The proportion contributed by work factors to the diseases of these workers cannot be established with certainty. However, it cannot be denied that work factors play a role in the development of some diseases. As an example, studies have shown that occupational stress increases the risk of ischemic heart disease by 1.3 to 4 times. Research will provide the necessary inputs for the prevention of work-related diseases.

[Research content]

The causal relationship between workplace factors and some diseases has been established. Little is known, though, about the mechanisms workplace factors interact with personal and other non-occupational factors to cause or aggravate work-related diseases. The interventions needed to comprehensively prevent work-related diseases are lacking. To gather data to adequately address these issues, research will be directed to:

- (1) Clarify the mechanism and contribution of occupational factors in causing, aggravating, accelerating or exacerbating the following work-related diseases:
 - a. cardiovascular diseases
 - b. musculoskeletal disorders
 - c. chronic nonspecific lung diseases
- (2) Develop methods to monitor the national morbidity and mortality rates of work-related diseases
- (3) Elucidate the effects of occupational stress on the immune system and on cancer
- (4) Develop interventions to prevent work-related diseases caused by multiple factors
- (5) Develop guidelines for prevention of each work-related disease

[Anticipated results]

- (1) Baseline data on the prevalence of work-related disease will be established.
- (2) The relation between work-related diseases and occupational factors will be made clear.
- (3) Effective preventive measures will be formulated and the prevalence of work-related diseases will be reduced.
- (4) Productivity will increase.

I-5. Health of elderly workers

[Importance and urgency]

The life expectancy in Japan is 77 years for men and 84 years for women, the longest in the world. This translates to an aging worker population. The number of workers 60 years and older increased from 7.32 million (11% of the entire labour population) in 1990 to 9.24 million (14%) in 1998. The labour force participation rate among the workers 60 years and older in Japan is larger than that in any country in Europe or the U.S.. The rate in Japan was 33% in 1996, significantly higher than in the U.S. (20%) and Germany (7%). It is expected that the aging of Japanese society will accelerate during the period from 2007 to 2010, when baby boomers will be in their sixties.

On the other hand, there is a continuing decline in the birth rate. The population is estimated to increase slightly from 126.7 million in 1999 to a peak of 127.8 million in 2007 but it will decrease to 100.5 million in 2050. The dual trends of a declining population and an aging society occurring simultaneously will greatly affect the occupational landscape.

Employment of people 60 years and older has already become an important issue, because the age at which pensions are paid has been raised. At present, 29.6% of companies in Japan have introduced an employment extension system and 53% have introduced a reemployment system.

Employment distribution by the type of industry is also affected by the changing demographics. Many elderly workers are employed in secondary industries. However, these industries have registered negative growth rates and may not be able to absorb the rising number of elderly workers in the future. Older workers will be forced to seek employment in tertiary industries.

There is concern that occupational health issues among the elderly will differ from those of younger workers. The Ministry of Health and Welfare statistics for 1997 showed that 65% of workers 60 years and older have chronic diseases. This is four times as high as the rates seen in workers 29 years or younger. The occurrence of diseases associated with aging (regardless of the conditions at work) will have an impact on productivity and health care cost. The risk of work-related accidents will most likely be higher among elderly workers due to the natural decline in their physical and mental faculties. With the rapid aging of the Japanese society, it becomes imperative that the elderly be integrated into a workplace where their safety and well-being will be guaranteed.

[Research content]

Sufficient research data on occupational health measures to support the continued employment of workers of advanced age has not yet been undertaken. Joint research with countries where measures to cope with an aging workforce are well placed is important. Research is needed on the following areas:

- (1) Assessment of mental and physical effects of work demands on elderly workers
- (2) Methods to assess physical and mental capabilities of elderly workers and individual susceptibility
- (3) Mental and physical health care approaches for elderly workers
- (4) Working methods, hours and styles for elderly workers
- (5) Case studies on labour accidents in relation to aging
- (6) Design of work environments and facilities suitable for all workers regardless of age
- (7) Research on innovative approaches that will promote employment and work satisfaction of the elderly

[Anticipated results]

- (1) Prevention of labour accidents and occupational diseases of elderly workers
- (2) Improvement of productivity
- (3) Increase in job opportunities that will allow elderly workers to function optimally and to develop their potentials
- (4) Reduction in social security expenses as a result of gainful employment of elderly workers
- (5) Promotion and maintenance of mental and physical health of elderly workers
- (6) Reduction in health insurance expenses charged to companies because of reduction in medical expenses
- (7) Promotion of social contribution, improvement of quality of life, and revitalization of the society

I-6. Health of women workers

[Importance and urgency]

The 1999 figures show that there are 55.52 million Japanese women aged 15 or over. Of them, 21.16 million are employed. In 1997, of the proportion that is employed, only 54% are regular workers while the rest are part-time, temporary or others.

Unlike their men counterparts, a large proportion of women workers have interrupted employment service. The protracted leave from work extends from the time the working mother gives birth until the child is ready to start school. However, more Japanese women are now delaying if not totally abandoning the prospects of pregnancy. And as more highly educated women come into the labour market, the number of women workers who wish to continue to work is gradually increasing.

It is expected that changes in labour laws will attract more women to join the workforce in the coming years. The legislative body has created a social environment where men and women work on equal terms thereby allowing the entry of women into the workforce. The Equal Employment Opportunities Law was amended in 1997 to penalize discrimination based on gender. Additionally, the Labour Standards Law was revised to remove regulations prohibiting overtime, holiday, and night work for women.

However, the gender issue remains. The susceptibility of the reproductive system of women to workplace hazards is not well understood. The risk of injury or disease in relation to the peculiar reproductive cycle of women, such as menstruation, pregnancy, childbirth, and the menopause, is also not well documented. Furthermore, the physical characteristics of women differ from those of men. For example, their muscular strength is generally weaker and they are apt to suffer from physical problems such as osteoporosis and anemia.

In spite of the contribution of women to the nation's economy, the present occupational health measures are generally insufficient to address the susceptibility issues involving this population. Conducting research to ensure the health and safety of women workers is important in order to create a working environment that is gender-sensitive.

[Research content]

Although numerous occupational health studies involving women workers exist, information on the differential susceptibility of men and women to workplace hazards remain elusive. How hazards affect the different stages of the reproductive life of women is also not known. To effectively protect the health of women workers, research efforts will be focused on the following agenda:

- (1) Establishment of work environments that will ensure the health and safety of every worker, regardless of sex
- (2) Interventions to protect working mothers engaged in night work, shift work, and work requiring overtime
- (3) Prevention of work-related musculoskeletal disorders in women workers
- (4) Assessment of effects of occupational hazards on the reproductive system
- (5) Prevention of reproductive effects from hazards at work
- (6) Assessment of the effects of work demands on working mothers
- (7) Medical examinations and health care to promote reproductive health
- (8) Countermeasures against workplace violence and sexual harassment
- (9) Social support to reduce the multiple roles imposed on women workers

[Anticipated results]

- (1) The promotion and protection of the health of women workers, including working mothers
- (2) Improvement of the quality of life by harmonizing work and home life schedule of women workers
- (3) Improvement of productivity
- (4) Equal participation of men and women in nation building
- (5) Arrest in the decline of birthrate

Key research area II Research on the human health effects of hazardous workplace factors

II-1. Hazard assessment for chemicals

[Importance and urgency]

Many chemicals are used in large quantities in the workplace. However, the effects of chemical exposure on the endocrine, reproductive, immune, and nervous systems are not well defined.

The endocrine disruption actions of chemicals are matters of great concern considering that repercussions also affect the reproductive system and viability of the next generation. Exposure to low concentration chemicals may cause health problems in an adult and may affect the developmental stages of embryos. It is also reported that problems in the reproductive organs are often caused by occupational exposure to chlorofluorocarbon substitutes.

Immunologic issues are also high in the list of priority in the occupational health community. The incidence of occupational allergic diseases such as asthma and dermatitis are high in Japan. Atopic workers might be susceptible to sensitizing agents in the workplace. Occupational asthma may be triggered by workplace agents. Pre-existing asthma may be exacerbated by factors in the work environment.

The presence of neurotoxic agents in the workplace is not only a health issue but also a safety concern. Perception disorder, motor disturbances and impaired consciousness consequent to chemical exposure may lead to a serious accident. Other nervous effects of chemicals such as memory defects, agnosia, and emotional lability may be difficult to distinguish from manifestations of normal aging and may complicate occupational health interventions in an aging society.

Hazard assessment is extremely important in providing information on the injurious effects of chemicals. It becomes even more important because information on the human effects of chemical exposure is available only for a small number of chemicals. Research on the toxic effects of chemicals in the workplace, including knowledge on metabolism and biokinetics, should be encouraged through the introduction of state-of-the-art scientific technology. The understanding obtained will ultimately be useful for the promotion of occupational health.

[Research content]

Research will focus on the effects of chemicals on the endocrine, reproductive, immune, and nervous systems. Specifically, research efforts will have the following thrusts:

- (1) Epidemiological studies on the health problems caused by chemicals in workplaces
- (2) Development of biomarkers and diagnostic approaches for adverse health effects of chemicals
- (3) Studies on the mechanism of toxic effects including that of differential effect between sexes
- (4) Dose-effect information
- (5) Assessment of the effects of long-term, low concentration exposure to chemicals on the health of workers
- (6) Research on the effective surveillance system for health effects caused by chemical exposure

[Anticipated results]

- (1) Reduction in health injuries caused by chemical exposure
- (2) Early detection of health problems from chemical exposure
- (3) Resolution of the social problems caused by chemicals such as endocrine disruption
- (4) Effective use of hazard assessment information for risk management
- (5) The creation of a safe and healthy environment for the next generation

II-2. Effects on genes and occupational cancer

[Importance and urgency]

A number of chemicals in the workplace have been shown to introduce mutations on DNA, which can lead to cancer. The disruption of endocrine functions has also attracted much public attention in recent years and has been assumed to be relevant to disturbance of gene functions.

Other than a small number of well-characterized chemicals, little information is available on the toxic effects, including that on the genes, of the more than 50,000 chemicals being used in domestic industrial sites. Furthermore, newly introduced industrial chemicals, uncontrolled materials, and industrial waste may have structures similar to chemicals known to affect genes. The effect of low-concentration, long-term exposure to chemicals on the genes is a serious issue that needs to be addressed.

Although the number of Japanese workers exposed to individual occupational carcinogens is limited, the total number is large because a number of carcinogenic factors are present. More than 300,000 workers may be at risk of developing cancer based on the results of the special medical examination system. The potential population with cancer risk is estimated to exceed one million if accidental exposures, workers exposed to hazardous work but otherwise excluded from the national survey and the exposure to uncontrolled chemicals are taken into consideration. Because of the serious effects on the health of workers, this issue is high in both importance and urgency.

[Research content]

To aid in formulating appropriate control measures against agents that affect genes, the following research thrusts will be pursued:

- (1) Establishment of methods to evaluate the effects on genes by introducing state-of-the-art technologies (including microarray analysis of gene expression, prediction of biological effects based on a structure-activity relationship, etc.)
 - 1-1) Development of methods to accurately evaluate the effects on genes, placing emphasis on the effects of low-concentration, long-term exposure and multiple hazard exposure
 - 1-2) Development of high-throughput hazard assessment methods that can process a great number of industrial chemicals
- (2) Epidemiological research on the effects on genes with cancer as endpoint:
 - 2-1) Establishment of method to precisely evaluate risks through systematic and time-series analyses of exposure and health effect indices based on rational prediction
 - 2-2) Implementation of epidemiological research based on the method developed
- (3) Prediction of high-risk groups based on the analysis of genetic polymorphism

[Anticipated results]

Preventive measures that will reduce or eliminate exposure to chemicals that affect genes may be based on the results of research. The establishment of methods to evaluate the effects on genes will make appropriate risk assessment and management possible. The development of high-throughput methods of hazard assessment will realize appropriate measures against a great number of, and still increasing hazardous chemicals. Information on the molecular mechanisms of biological effects could be used for predicting the combined effects of multiple hazards, estimating human risks based on animal models, and establishing concrete countermeasures against chemicals.

An epidemiological research system designed to assess precisely the effects of chemical exposure on the genes will pave the way for effective risk assessment and management. Many social concerns can be allayed through risk communication. The future prospects of estimating individual differences in risks by analyzing genetic polymorphisms may influence the decision of placing individual workers in the appropriate work environments. However, this should be premised on the assumption that thorough investigations are made from an ethical viewpoint and the necessary conditions are in place to obtain social acceptability. With the progress in research, the goal of preventing occupational cancers and protecting the next generation may be achieved.

II-3. Effects of multiple hazard exposure

[Importance and urgency]

Exposure to single health hazard is rather uncommon in the workplace; commonly workers tend to be exposed to multiple hazards. Specifically, complex work processes prevailing in industries increase the likelihood of workers being simultaneously exposed to several hazards.

Multiple exposure of workers to workplace hazards may take any of the following forms: a) multiple chemical substances (solvents, mineral dust, etc.); b) multiple physical factors (noise, vibration, heat, cold, light, etc.); and c) combination of chemical and a physical factors.

A limited number of studies have provided information on the consequences of multiple exposure to hazards. The neurotoxicity of hexane is increased with simultaneous exposure to methyl ethyl ketone. The synergistic effects of asbestos and smoking have been shown in the case of lung cancer. Vibration white finger caused by segmental vibration is accelerated by a low temperature. Hearing loss has been demonstrated among workers exposed to a combination of noise and organic solvents.

Data on cumulative, multiplicative or synergistic effects of other instances of multiple exposures are currently not available. "Toxicity modification" caused by exposure to multiple chemicals at low concentration has become a serious issue in many workplaces. Though "toxicity modification" has been demonstrated in multiple exposures at high concentrations, this phenomenon remains obscure in multiple chemical exposures at low concentrations.

Research should bridge the gap in hazard assessment methods for multiple exposure. At present, the permissible concentration levels for exposure to mixture of chemicals set by the Japan Society for Occupational Health have been based solely on the supposition that the effects on the human body are cumulative. This generalization makes the assessment method unreliable. Of special interest is the assessment dilemma posed by chemical interactions leading to potentiation of carcinogenic effects. For instance, the toxicity of the carcinogenic substance may be heightened when an individual is rendered immunocompromised by simultaneous exposure to a noncarcinogenic agent.

Better understanding of the interactions of multiple hazard exposure that influence the risk of injury or disease is important for setting permissible limit standards. Research information will be essential in the formulation of control methods appropriate for multiple hazard exposure.

[Research content]

Coordinated basic, experimental and epidemiologic research will focus on the following areas:

- (1) Development of a model of multiple hazard exposure and health
- (2) Establishment of a quantitative assessment method to determine the degree of contribution of each hazard to disease development
- (3) Large-scale epidemiology study on the health effects of multiple hazard exposure
- (4) Animal experiments on multiple exposure, focusing on carcinogenicity and developmental toxicity
- (5) Animal and applied research on the toxicity of multiple chemical exposure at low concentration
- (6) In vitro and practical studies on the toxicity of multiple hazard exposure
- (7) Research on the multiple hazard effects of physical and chemical hazards
- (8) Research on the effects of exposure to carcinogenic substances among immunocompromised individuals

[Anticipated results]

Research efforts directed towards understanding the effects of multiple hazard exposure could improve methods of hazard assessment and control. Realistic risk assessment methods can be established on multiple hazard exposure in actual working sites based on the research information gathered. Consequently, appropriate occupational health management related to multiple hazard exposure can be implemented

II-4. Individual differences in effects on health

[Importance and urgency]

Studies on the genome have disclosed the existence of genetic polymorphism in individuals. An example is the single-base mutations at specific sites on DNA. Such single nucleotide polymorphism is seen in 500 to 1000 bases of the human DNA. It is estimated that one out of tens to hundreds of people potentially has a mutation that may cause a genetic disease. Genetic polymorphism has also been associated with the incidence and progression of lifestyle related diseases.

Though much medical progress has been achieved with gene analysis, the information available is still insufficient to be of use for risk management. Nonetheless, the future direction that human genome analysis is expected to give great promise of unraveling the influence of genetic factors on an individual's response to drugs and chemicals. The identification of the gene responsible for individual differences in drug sensitivity could herald the evolution of "made-to-order" medicine. The ability to predict individual susceptibility to occupational hazards based on genetic polymorphism would lead to a breakthrough in risk management and communication.

[Research content]

Research needs to be directed to the following areas:

- (1) Design of innovative approaches to harmonize genetic studies and epidemiology
 - 1-1) Inventory and cataloguing of genetic information, occupational exposure and health status
 - 1-2) Human genome studies to identify genes predictive of susceptibility to hazards and specific health consequences.
 - 1-3) Clarify the relationship between genetic polymorphisms and individual differences in health effects
 - 1-4) Research on the mechanisms how genetic polymorphism may influence individual differences in sensitivity to hazards
- (2) Research on the usability of genetic information to risk management and risk communication
 - 2-1) Determine how genetic information may be used in the placement of high-risk workers in the appropriate work environment
 - 2-2) Evaluate the social, ethical and legal implications of utilizing genetic information for risk management

[Anticipated results]

The information generated from experimental and epidemiologic research could provide the bases of concrete measures to reduce risks of health consequences due to genetic polymorphism. Research at the molecular level will spawn highly reliable data that could be effectively used in risk management and risk communication.

II-5. Ergonomic factors and workload

[Importance and urgency]

Ergonomic risk factors are ubiquitous in the workplace. Job content, work organization and equipment design can cause stress leading to fatigue and other health problems. Improper handling of heavy materials may cause low back pain. This disorder, common among transport and assembly line workers, accounts for about 50% of all reported occupational diseases in Japan. The Ministry of Labour in 1999 reported that about 78% of computer users complained of fatigue. The symptom was attributed to inadequate workspace, poor lighting condition, or inappropriate equipment placement in the workplace.

The advent of new information technology in the workplace is expected to bring rapid changes in production systems and work organization. Furthermore, the operation of more complicated and advanced equipment will increase the physical and mental stress on workers. Thoughtful consideration in occupational health management will be necessary to prevent not only the onslaught of physical disorders but also of labour accidents due to human error. Research on ergonomic factors becomes indispensable, not only for the prevention of fatigue and disease but also for the realization of a more comfortable workplace.

[Research content]

Research on ergonomics to reduce workload and to foster comfortable work environment will be directed to the following areas:

- (1) Investigation into the causes of human errors (errors in judgement, etc.) and establishment of data base management system for preventive measures
- (2) Formulation and effective use of measures to reduce loads on the human body to prevent musculoskeletal disorders
- (3) Assessment of effects of changes in technology and production systems on the safety and health of workers
- (4) Development of guidelines for job design taking into consideration individual characteristics of workers (age, gender, handicapped person, etc.)
- (5) Assessment of the effects of new work styles involving VDUs on the health of workers and the establishment of guidelines for maintaining health (for workers who use mobile equipment, teleworkers, etc.)
- (6) Establishment of an ergonomics education system and guidelines for the design and the practical use of equipment

[Anticipated results]

Ergonomics research on issues of safety and accidents, work methods and planning, and handling of heavy materials, will define conditions under which many workers may work comfortably. Improvement in productivity, decrease in labour accidents and promotion of a healthy and creative work environment may be achieved. Comfortable work environment will be established by providing appropriate health care services and education for VDU workers. The data generated by research on VDU users' needs and requirements could be fed back to information technology developers to encourage the hardware and software design that are ergonomically sound.

Key research area III Research on risk assessment and the management system for occupational health and safety

III-1. Risk assessment and development of health effect index

[Importance and urgency]

According to ILO estimates, there are 1.1 million work-related deaths per year in the world. This figure exceeds the number of victims of traffic accidents or wars. Approximately one-quarter of the occupational fatalities are related to chemical exposure. In Japan, the number of injuries and diseases caused by occupational exposure to chemicals has remained unchanged for years.

Experimental and epidemiological studies are necessary to generate information that will lead to better understanding of the health effects of chemicals. Comprehensive strategies to reduce the risk due to chemical exposure must be formulated based on the evidences obtained in such scientific studies. Consequently, there is a great need for expanding the practice of risk assessment that integrates the data on toxicity, exposure and human health effects. Research is likewise needed to develop more precise and highly sensitive indices for monitoring exposure levels and health effects. Research efforts should also explore the possibility of health effects due to hazardous factors other than chemicals in the workplace.

The development of a comprehensive risk management system for the hazardous factors in the workplace rests on the information generated by research activities directed towards health risks. Research results will provide the rationale indispensable for setting management standards in the workplace.

[Research content]

The incidence of adverse health consequences due to occupational exposure to hazardous agents depends on the intrinsic toxicological properties of such agents and the magnitude of exposure. Appropriate exposure limits and other management standards are to be determined based on identified hazards and permissible risks. Health effects indices are needed in such risk assessment and risk management processes. Hence, efforts should be made in the research and development on the following subjects:

- (1) Research on the current situation of exposure in the workplace and incidence of health effects; risk assessment of each hazardous factor and proposals for management standards.
- (2) Comprehensive assessment of health risks in the workplace.
- (3) Development of more sensitive health effects indices specific to relevant hazards.
- (4) Development of valid exposure and health effects indices applicable to long-term and low-level exposure.
- (5) Studies on risk assessment methods to establish exposure thresholds and other management standards based on epidemiological and experimental data; methods of extrapolation to estimate human health effects from animal experiments.
- (6) Studies on systematic toxicity test methods and organized risk assessment frameworks for the agents with no hazard data currently available.
- (7) Studies on comprehensive assessment methods and integrated management strategies for risks relevant to work and work environment that cover all types of factors in the workplace, including chemical, physical and biological hazards.

[Anticipated results]

Accumulation of hazard data would stimulate and advance the practice of risk assessment. The results of research will serve as the basis for setting management standards and effective risk communication. All of these efforts directly contribute to the improvement of risk management system in the workplace and the prevention of occupational health disorders.

International programs are currently in progress to establish global management systems of hazardous chemicals, including standardization of the test methods of chemical toxicity, examination of the health effects of existing chemicals, and development of a globally harmonized system for the classification and labeling of hazardous chemicals. The needs for fundamental research are often recognized and pointed out in these activities. Reliable and excellent research outcomes will contribute to the establishment of sound management of chemicals in the workplace and to the promotion of workers' health not only in Japan but globally as well.

III-2. Effective methods of risk communication

[Importance and urgency]

Of the more than 50,000 chemicals being used in Japan today, only 700 are regulated in accordance with the Industrial Safety and Health Law. The remaining chemicals are under self-imposed controls. It is essential, then, that a risk management system be established through a comprehensive inventory of available information on chemical toxicity. With the introduction of new chemicals into the work environment as a result of technical innovations, an effective means of information dissemination on the risk and health effects of chemical exposure becomes necessary.

At present, only the Material Safety Data Sheets (MSDS) are being used as a tool for risk communication. No other format for collecting data on hazards other than chemical ones exist. Furthermore, it is the duty of persons responsible for the implementation of health management and promotion programs to be able to disseminate needed information to all concerned in a workplace to maintain a safe and healthy work environment.

Risk communication and occupational health education are vital to raise and maintain the level of occupational health awareness in Japan today. The desired methods for accomplishing this goal should point to documented proof and evidence as bases for the implementation of workplace occupational health programs. Every occupational health activity needs to be justified with definitive proof. "Evidence-based" occupational medicine should be the rule rather than the exception. The implementation of effective risk communication should take advantage of information technology to disseminate the message to widest possible audience.

[Research content]

As such, development efforts are to focus on:

- (1) Effective means of risk communication to the intended audience
- (2) Establishing a database that includes information on hazardous substances, labour accidents caused by long hours of work, interventions and approaches to improve work environment, inventory of occupational health experts, existing network accessible to small enterprises, and links to similar databases around the world
- (3) Developing innovative methods to promote and teach occupational health suitable for diverse work styles
- (4) Updating existing toxicity data on chemicals currently in use to serve as bases for the preparation of MSDS
- (5) Cooperation with the international community in harmonizing chemical labeling and hazard identification; and promoting/implementing its use in Japan
- (6) Developing risk communication tools using toxicity and occupational chemical exposure data to facilitate assessment and evaluation of health risks
- (7) Developing methods for the effective use of occupational health statistics in the practice of "evidence-based" medicine

[Anticipated results]

- (1) A more effective risk management system that will more promote self-regulation of hazardous substances
- (2) Dissemination of uniform and reliable information on the health risks of chemical exposure nationwide
- (3) A decline in the incidence of labour accidents and occupational diseases
- (4) A system of delivering reliable occupational health data to all enterprises, including small businesses, utilizing information technology
- (5) A rational approach to the development and implementation of occupational health activities nationwide
- (6) More effective risk management and control of occupational hazards nationwide

III-3. Development of measurement system and control technology for work environment

[Importance and urgency]

Japan has, for more than 25 years, adopted a method of directly monitoring the magnitude of occupational hazard exposure. This effort has resulted in the improvement of work environments and the reduction in the incidences of occupational diseases. The gains yielded through the implementation of an effective hazard monitoring system underscores the importance of measurement data on the development of hazard control strategies.

Existing assessment and control methods have been effectively used for recognized health hazards. However, the introduction of technical innovation has also resulted in the introduction of new substances and other potential health hazards into the workplace. Approaches to measure and evaluate multiple hazard exposure must also be developed. The occupational health community faces the challenge of establishing methods to identify, evaluate and control these newly introduced hazards and address the issue of multiple hazard exposure.

Because of financial and technical constraints, it becomes necessary to develop practical and low-cost hazard assessment and control strategies to expand their utilization by establishments. Technologies to monitor and manage work environments must also be expanded to cover complex work environments such as welding and construction sites.

[Research content]

Research activities must focus on the development of innovative but practical hazard assessment and control approaches. Management technologies must not only aim to reduce or eliminate hazards in the workplace but also to improve the productivity and image of the company while taking steps to conserve energy and consider regional and global concerns. The following topics will be the thrust of research activities:

- (1) Development of methods to evaluate new chemicals introduced or to be introduced
- (2) Development of methods to monitor and evaluate work environment which are not covered under the current regulations, such as outdoor work and temporary and irregular work
- (3) Introduction of the state-of-the-art technologies in hazard assessment of ambient contaminants
- (4) Development of small and light-weight sensors and instruments for real-time hazard monitoring
- (5) Development of real-time continuous measurement methods for personal exposure assessment
- (6) Improvement of the performance and efficiency of industrial ventilation
- (7) Development of control technologies such as anti-vibration equipment, dust collectors and exhaust gas processors
- (8) Development of monitoring and evaluation strategies for noise and vibration that will be utilized for health risk management and setting of comfort levels
- (9) Development of practical and comfortable personal protective equipment

[Anticipated results]

It is envisioned that the newly developed hazard assessment methods could cover more chemicals than presently possible. Appropriate methods to evaluate hazards would be adopted in workplaces not previously monitored because of technical constraints. Information generated will allow the precise evaluation of multiple hazard exposure and the effective control of such workplaces. A better understanding of the health risk factors in the workplace by both employers and employees could be achieved. All these will lead to the improvement of occupational safety and health, decrease in labour losses and increase in productivity.

III-4. Business administration and occupational health and safety management system

[Importance and urgency]

Occupational safety and health activities in many countries are guided and regulated by legislation and compliance enforcement. This set up promotes a reactive attitude towards workplace improvement after limiting opportunities for creative and progressive occupational safety and health management. The amendment or creation of laws and regulations will not be sufficient to cope with the fast changing occupational environment. The responsibility to control safety and health hazards should be shared by the employers and employees to ensure a sustainable and responsive occupational health and safety management system. Voluntary self-regulation forges an enabling condition for efficient and timely improvement of safety and health conditions. Following the success of the United Kingdom in the implementation of a self-regulating system, several countries have adapted similar occupational safety and health management schemes.

In April 1999, the Ministry of Labour of Japan published guidelines to promote such management systems to keep in pace with the global trend. Building and harnessing the capabilities of safety and health personnel are seen to be essential in the effective design, implementation and evaluation of occupational safety and health programs. Approaches to demonstrate cost-effectiveness of safety and health measures will aid in expanding the practice of self-regulating system. Tailor-made systems applicable to specific employment styles are needed to spread the use of this strategy beyond traditional work environment. The guidelines also recognize the importance of increasing awareness and securing the cooperation and commitment of company managers and workers to implement an effective industry-based program on safety and health. Research information will provide the basis for the nationwide promotion and implementation of enabling occupational and health systems at the company level.

[Research content]

Accordingly, efforts are aimed to explore the following issues:

- (1) Development of self-regulating management system involving workplace diagnosis and assessment that will deal with the numerous occupational health concerns in the enterprise
- (2) Assessment of occupational health activities and research into cost effectiveness
- (3) Research on a management system suitable for smaller enterprises
- (4) Development and systematization of information, education and technologies necessary for self regulating management programs
- (5) Development and implementation of management systems for occupational health and safety suitable for Japan

[Anticipated results]

The contribution of self-regulating management systems for occupational health and safety as a management strategy in an enterprise will be demonstrated in terms of improved productivity. The recognition that occupational health activities are essential to the growth and development of the enterprise will be achieved. Because the relationship between worker safety and health and productivity has been demonstrated, enterprises will be motivated to invest their resources to further enhance existing preventive activities.

Success stories highlighting the gains yielded by enterprises implementing these strategies will increase the confidence of other establishments to use similar systems to improve working conditions. It is likewise expected that enterprises will take all measures to promote occupational safety and health within them and to comply with regulations with minimal government intervention. Consequently, a safe and comfortable work environment will be created, and the health of workers will be secured.

III-5. Measures to promote occupational health in small and self-employed undertakings

[Importance and urgency]

Eighty percent (46.08 million) of all employees in the secondary and tertiary industries in Japan are employed by small enterprises. Around 7.65 million people are self-employed mostly in small-scale undertakings. Small-scale enterprises account for the 52% production output of the manufacturing industry. The Small and Medium Enterprise Basic Law, revised in 1999 for the first time in 36 years, recognized a small-enterprise as a “source of vital power for the economy of Japan”. The policy idea was changed from “correction of gaps between large-scale enterprises and small enterprises” to “the diversified and vital development of small enterprises”.

However, the small-scale and self-employed undertakings still suffer in terms of access to occupational health and safety services and in the implementation and promotion of occupational safety and health programs in their workplaces. This discrepancy between the small-scale and self-employed undertakings and the large-scale enterprises are reflected in the labour statistics. For example, safety and health education is being conducted in only 39% of the small companies while the rate is almost 100% for large-scale enterprises. Only 20% companies with four or less employees perform health examination activities against 100% for large-scale enterprises. The occurrence of labour accidents is 18 per 1000 workers for smaller enterprises having 10 to 29 employees. This figure is significantly higher compared to the accident rate of 3 per 1000 workers in large-scale enterprises.

The labour demographics profile has shown that small-scale enterprises employ more potentially susceptible workers. Small establishments are employing more workers aged 55 and above. There are also more women workers and part-time workers in the small establishments. The rapid change in the Japanese economy will further drive workers to seek employment in small and self-employed undertakings. An increase in the number of SOHO (Small Office Home Office) workers, and a growth in housework support services, including nursing and care, is foreseen.

These issues must be addressed urgently as the country faces the rise of new occupational health problems. The occupational health community must be competent to guarantee the safety and health of this vulnerable population.

[Research content]

Much research has been conducted on occupational health in smaller and self-employed undertakings. However, these efforts tended to focus on assessing the working conditions. Little practical research has been done to give solutions to problems identified. Research to develop appropriate intervention strategies is needed.

Concrete research issues are as follows:

- (1) Development of occupational health management system for small and self-employed undertakings
- (2) Research to evaluate the practicability and effectiveness of support systems as such incentive schemes and cooperative efforts of small and self-employed undertakings to improve the working conditions
- (3) Development of risk assessment methods for specific industrial sectors, particularly the tertiary industries
- (4) Development of low-cost and effective control technologies for small and self-employed undertakings
- (5) Development of a model network to link occupational health activities of self-employed undertakings with regional health activities
- (6) Research to improve occupational health in the agriculture, forestry and fishery industries

[Anticipated results]

- (1) Establishment of systems to support occupational health in small-scale and self-employed undertakings
- (2) Promotion of low-cost and effective control technologies
- (3) Decline in incidence of labour accidents and occupational health problems and the overall improvement in workers' health
- (4) Establishment of link between productivity and safety and health of workers

III-6. Improvement of the quality of working life through health promotion

[Importance and urgency]

Present trends in occupational health management include improving the worker's quality of life and total health promotion. The resources invested into these programs will respond to the medical problems of workers. The 1999 occupational morbidity statistics showed that 4.9 million workers are afflicted with some form of ailment or health disorder. Twenty five percent of the workers have hyperlipidemia; 14% with liver dysfunction; 10% with hypertension; 9% exhibited a dip in hearing at 4000 Hz on audiometry; 9% have abnormalities on electrocardiogram; and 8% have elevated blood sugar. It, then, becomes imperative to promote and maintain the health of all workers and create work environments where even people with health problems can be gainfully employed.

Efforts to reintegrate ailing and physically challenged individuals into the workplace must be pursued to forestall the potential economic burden from the prospect of unemployment. The 1996 guidelines from the Ministry of Labour specified measures to be taken to facilitate this reintegration. Ailing and physically challenged workers may continue to be employed in an appropriate work environment under conditions of reduced working hours, limited workload and improved work methods. Facilities and equipment designed to suit the capabilities of the worker is also stipulated.

Periodic medical examinations, health guidance, total health promotion plan activities, and intervention approaches to design comfortable work environment are some measures currently being implemented in the workplace. However, information is needed to evaluate the effectiveness of certain medical diagnostic tools in promoting the health of workers. The usefulness of periodic health check and health advisory in health promotion must also be assessed.

Though the laws are in place to ensure reintegration of workers with medical and physical problems into the workplace, insufficient information exists in determining appropriate work postings and acceptable workload or demands. It is therefore essential to initiate the establishment of a system that will promote the health of workers and at the same time allowing them to lead productive lives for as long as possible.

[Research content]

In pursuit of these aims, research will generate the following information:

- (1) Guidelines to evaluate the health and productivity of workers
- (2) Health management systems based on total health risk assessments taking into consideration the occupational and general environment and lifestyle of workers
- (3) Methods of medical examinations and health advisory appropriate for health promotion
- (4) Development of a sustainable and long-term health system for workers
- (5) Development of methods to assess workload, work demand and worker capabilities to aid in the creation of a workplace that will promote employment of people with medical or physical problems
- (6) Development of a comprehensive health management system, including health promotion activities, that will, at the same time, protect the privacy of the workers

[Anticipated results]

- (1) Assessment indices used for health maintenance and promotion will be defined clearly and effective measures will be taken
- (2) Quality of work life will be improved
- (3) Workplaces where people with health problems can continue to work and a barrier-free society will be created
- (4) Revitalization of enterprises will be promoted

III-7. Harmonization with international standards on occupational health and promoting international cooperation

[Importance and urgency]

The global orientation of industrial and commercial activities – from design and manufacture of goods to the delivery of services – has made international collaboration a must. In the field of occupational health, collaborative efforts have been undertaken in establishing international standards and guidelines. The ILO conventions and recommendations and ISO standards are examples of multinational endeavor. Action plans of the Inter-Governmental Forum on Chemical Safety (IFCS) include registration of chemical emissions and transportation, and the standardization of classification and labeling of chemicals.

International cooperation has also pursued to promote and strengthen occupational health in developing countries. The experience which developed countries have in controlling traditional and newly introduced occupational safety and health hazards will assist developing countries in their fight to improve working conditions.

Still, many problems obstruct the establishment of international standards in occupational health. Differences in occupational health systems among countries make the task of harmonizing difficult. Conflicts in interests among countries, employees, employers and industrial sectors hinder international cooperation.

The benefits of collaborative efforts must be promoted domestically to encourage international cooperation. Japan, as a member of the international community, should contribute to the establishment of an international occupational health framework by sharing its experience, technology, skills and knowledge.

The international community also has an enormous social responsibility of sustaining the viability of a large portion of the global population. Resolving the occupational health problems of developing countries, through collaborative research efforts, will ensure a vital global society for the next generation.

[Research content]

Research on international cooperation in the field of occupational health should explore the following areas:

- (1) Harmonization of international standards
 - 1-1) Development of a data collection system that will reflect the information necessary to establish and harmonize standards
 - 1-2) Establishment of a new occupational health framework that will integrate occupational health standards and best practices of countries involved in the collaborative efforts
 - 1-3) Development of innovative approaches to educate and train workers, employers and occupational health personnel based on a framework established by cooperating countries
- (2) Harnessing opportunities for cooperation with developing countries
 - 2-1) Assessment of current occupational health conditions in developing countries that will serve as basis for cooperative research
 - 2-2) Development of an effective system that will facilitate exchange of information, technology and expertise on occupational health matters
 - 2-3) Design of a collaborative activity that will generate information on the prevention and early detection of occupational diseases
 - 2-4) Promotion of participatory and cost-effective occupational health management systems in small-scale enterprises based on local and international experience

[Anticipated results]

- (1) Global contribution to the positive coexistence of work and health through the establishment of international standards
- (2) Prevention and early detection of new occupational health problems
- (3) Improvement and promotion of existing occupational health management systems
- (4) Strengthened occupational health research ability in Japan
- (5) Promotion of interdisciplinary and international research activities