

Towards a new millennium

The turn of a millennium, is a solemn event — after all, it happens only once in a thousand years. Yet, nothing in our surroundings is supposed to change with a jerk, perhaps apart from our computers if they encounter some Y2K problems. The objective changes in our environment are gradual, like all day-to-day events. The first year of the new millennium will probably not differ dramatically from the last year of the previous one.

The millennium shift nevertheless gives us an excuse to stop and look both backwards and forwards. If we focus on the realm of occupational health, it is very obvious that work itself and work conditions have changed rapidly and fundamentally during the latter half of the 20th century. Many traditional forms of production, work procedures, and tasks have vanished, while many new ones have been introduced and developed further. Consider, for example, lumbering. Horses and handsaws were common in the 1950s; now giant, complex harvesters are substituting even the chain saw. Agriculture has undergone equally fundamental changes. To mention a few more examples, a foundry or a metal engineering shop is no longer what it was 30 years ago. Paper machines are bigger, faster, computerized, and more complex than before. Oil is being drilled offshore. Traffic and transport have increased tremendously. We have nuclear power plants — clean energy but a potential risk of major accident. Automation and robots are commonplace in the manufacturing industry, and computerization has been integrated into almost every type of work. Information technology has created an enormous number of jobs of a completely new character. Biotechnology is having its breakthrough. Entire branches of industry have disappeared from many industrialized countries, only to reappear in less developed ones. The list could go on almost indefinitely.

Such profound changes have had a deep impact on occupational health, both for the better and for the worse. Improved technology, even in conventional plants, and the birth of entirely new work environments and work processes, together with advances in occupational health research, occupational hygiene, and improvements in the quality of occupational health services, have changed the spectrum of work-related morbidity drastically, mostly but not always for the better. In the developed world, many chemical and physical occupational hazards have been controlled, with the result that many classical occupational diseases have almost disappeared or at least become milder. On the other hand, new diseases have entered the picture, for example, allergies and mesotheliomas. Long-term nonspecific effects, such as cancer and adverse pregnancy outcome, have certainly existed for a long time, but modern epidemiologic research has been able to link some of them to the work environment, the first requirement for successful prevention. General morbidity, such as cardiovascular diseases, allergies, musculoskeletal disorders, as well as mental ill health, has also been shown to be work-related in many instances. These categories of morbidity have substituted clinical occupational diseases as the number one problem in occupational health. Especially psychosocial problems and their health effects have received much attention lately.

This is not to say that more traditional problems have ceased to exist. Most countries have not yet reached such a level of sophistication. Newly industrialized and underdeveloped countries are repeating the mistakes of the Western world during its industrialization. Work conditions are often appalling, and occupational health expertise is lacking. In such countries all the old occupational diseases abound. But side by side with primitive workplaces, there can exist high-tech industries, perhaps belonging to

multinational companies, whose employees face exactly the same psychosocial problems as those characterizing the developed world. And even in highly developed countries there are dark spots. Among them are repair and maintenance work, construction, small-scale industry, many subcontractors, as well as many individual companies, belonging to various branches of industry, that neglect the rules of occupational hygiene, to mention a few examples only. It is usually these types of workplaces that provide registers of occupational diseases with "cases".

However, when it comes to traditional problems, the main issue in their remedy is not research; instead it is the implementation of already existing knowledge. Sufficient knowledge exists for the prevention of most classical occupational diseases. It is true that we, for example, do not know all the enzymes that become inhibited by lead exposure or all details of the mechanism by which asbestos causes lung cancer. But for preventing the toxic effects of lead or the cancers caused by asbestos exposure we really do not need that knowledge. We know the hard facts already, and they do not change even if new scientific details or repetitive research results are added. Instead, what we do need is forceful action on all levels, the legislative, the enforcement, and the plant floor level. The Collegium Ramazzini has provided an example of what such an action could be. A total ban of asbestos use would, in the long run, eliminate asbestos-related diseases. The Collegium's call for a ban is published in this issue.

What will the future offer us? Prediction is difficult because of the rapid speed of the changes. Many products that will be in common use 10 years from now have not yet even been invented. Predictions cannot take into account sudden, unexpected developments, such as really important inventions, deep economic recessions, downscaling of occupational health research or services, or even wars. They must be based on the extrapolation of existing trends even if it is almost certain that something unexpected will occur. The further forward we look, the more uncertain the predictions will be.

The present accelerating development of worklife — ever so greater performance demands, executives' frequent traveling, slimming of organizations, and increasing emphasis on so-called knowledge jobs, together with the aging of the work force — will probably continue. The polarization of jobs, already underway, into high-skill and low-skill tasks will probably accelerate. Many traditional blue-collar jobs have already turned white-collar, and more will follow. The physical demands of work will in general become lower, although sudden peaks can still occur. Fewer and fewer workers will be exposed to robust chemical and physical hazards, but low-level exposures to cocktails of chemicals will increase. What health effects such exposure can have is still not understood. Advances in information technology will influence worklife in many ways, and biotechnology is becoming increasingly important. Hence psychosocial problems will become relatively more important. Subcontracting, temporary employment, and mobility will probably become even more common, and therefore a growing proportion of workers will be difficult to reach through conventional occupational health services. New demands are put on occupational health professionals, and conventional skills will no longer be sufficient for successful occupational health care. New problems should be the focus of future research, not repetitive work concerned with old problems or endless ruminating on insignificant details of the action of known toxic agents. There are numerous good topics for innovative research, but many of them require unprejudiced and new approaches, improvements in methodology, and probably a multidisciplinary competence profile of the research teams rather different from what has hitherto been the convention.

This issue of the *Scandinavian Journal of Work, Environment & Health* has been devoted to a forward-looking view of what some 30 invited experts regard as important topics for future research. In the selection of authors and topics, the editors have given preference to what we believe should be central fields of future occupational health research, well knowing that everything could not be covered. We hope that their ideas will guide researchers in the selection of topics and approaches. We also stress the importance of improving and sharpening the methods of research. Several of the invited articles discuss methodological questions.

Rantanen, in his paper, outlines how the rapid changes in worklife will set new demands not only on the scope of research, but also on the conditions of operations for occupational health research. He stresses that many macro factors, such as globalization, fragmentation, the introduction of new technologies, new types of work organizations, and the increasing mobility of the work force, resulting in a variety of short employment arrangements, will set great challenges for the conditions under which research will and can be carried out in the future. Gone are the days when large, rather homogeneous workplaces with stable work forces were like laboratories for unveiling the adverse effects of chemical and physical factors, knowledge which could be used both for improving work conditions and for extrapolations to the realm of public health. It is not farfetched to say that such a new worklife scenario, which will hit us in the next few decades, will require profound reorientation of and rethinking in research institutions, which should actively support and train their staff to be creative and unprejudiced and encourage the members to acquire new skills and attitudes. Too high a mental pressure — publish or perish — is counterproductive to creativity; hence there must be time for meditation and brainstorming. Research institutions, especially rigid universities, should also seriously consider whether the present competence distribution of their staff is appropriate for the challenges set by the future.

In this issue several specific fields of research are discussed in detail. Not surprisingly, epidemiology has received much space. Epidemiologic methods have, during the last few decades, been crucial in revealing, for example, work-related carcinogens, work-related causes of cardiovascular diseases, work-related causes of several musculoskeletal disorders, and the impact of psychosocial factors, such as work stress or shift work, on both the mental and physical well-being of workers. Although epidemiologic research methods have improved during the last few decades, they are far from perfect. Miettinen shows how underdeveloped some of the concepts of this discipline still are. Without clear thinking, there cannot be good research. We hope that epidemiologists will take guidance from his article and that it thus will help develop their scientific thinking. In the coming years, the quality requirements of epidemiologic research will become tougher, and so will the requirements of acceptance for manuscripts to good journals. Fields in which refined epidemiologic methods will hopefully produce important new knowledge are, among others, cancer research, as illustrated by Blair and his co-workers. They stress that there are still many agents showing animal carcinogenicity that have not been sufficiently studied epidemiologically and that we know too little of work-related cancers among women and nonwhite workers. Pregnancy outcome research, as reviewed by Petter Kristensen and Bonde, and asthma-like disorders and cardiovascular morbidity, as described by Torén and Tage Kristensen, respectively, are other important fields.

The rapidly advancing knowledge of the genetic background of a number of diseases will deepen our understanding of them, help in the design of sharper studies, and shed light on the interaction between genetic and environmental factors, as both Vainio and Haugen point out. Better collaboration between epidemiologists and genetic researchers is certainly needed. Exposure assessment is difficult, but its importance for good epidemiologic research is crucial. Stewart discusses ways of improving the present situation. The dermal route of systemic exposure has often been neglected in the past. Benford and her co-workers discuss both how the methods of measuring dermal absorption can be improved and how to develop risk assessment from dermal exposure.

Indoor climate, sick buildings, and multiple chemical sensitivity have emerged as new important problems in the 1990s. It seems likely that these types of problems will receive attention well into the next century. Arnetz gives some suggestions for future research on multiple chemical sensitivity, while Schneider and his co-workers discuss problems related to the indoor environment.

The last few decades have seen severe industry-originating environmental catastrophes, such as Seveso, Bhopal, Chernobyl and Basle. Typical of all of these is that the authorities were unprepared and tried to suppress information and that the competence of the health officers first confronted with the

disasters was insufficient. The editors wish to stress the close connection between occupational and environmental health in this context and have therefore invited Bertazzi to give guidelines on the future handling of such accidents.

New demands on workers' skills and abilities are emerging at an ever accelerating speed. The mental capacity of humans has not advanced as fast as the demands set by worklife. For many, this discrepancy results in severe mental stress. More and more, problem-solving capacity and creativity are required, as is an ability to cope with rapid changes and new situations. One wonders when the ultimate limit will come. Especially persons in "knowledge" jobs are subject to great stress and the risk of burnout, as Kalimo points out. Such persons are in a key position if we wish to maintain our society's economic well-being. When will owners and managers realize that pushing key persons too hard is not only dangerous for their health but also counterproductive for the company and society as a whole?

These are problems of the "winners" in a polarized worklife. But there are also "losers", people whose mental capacity is insufficient for demanding jobs. Their mental health is also at risk of being impaired, but for different reasons. Their risk factors include unemployment, insecurity, unstable employment, and "bad" jobs. Mental understimulation and lack of control, well-known stress factors, are often features of menial jobs. Psychosocial problems at work, irrespective of category, are intertwined with private problems, and hence there is an interaction between public and occupational health aspects, as Aronsson discusses. Stress research will still remain an important area; the difficult question is how to influence companies to develop their organization in a "healthy" way. Both Theorell and Griffiths address this problem. In Griffiths' paper the role of qualitative research and intervention is highlighted — we hope that the near future will see more collaboration between traditional epidemiologists and "qualitative" researchers. The rapid aging of the work force in all the developed countries will impose many problems, not the least in shift work. Härmä and Ilmarinen address this problem. But the increased average age of employees will also cause many other health problems because of the increasing demands of worklife alluded to earlier. How to help elderly workers to cope with modern worklife, and the rapid changes characteristic of it, is indeed a challenge for future research.

Preserving and improving workers' well-being, both mental and physical, in a worklife that changes this fast and puts more and more pressure on employees will pose challenges both for research, training, and practical occupational health care. There is a need for rethinking and improving the quality of occupational health services. Achieving this goal needs both research to provide the necessary knowledge, means to communicate the knowledge to occupational health care units, better preventive health care practice, and skills to evaluate the process of delivering health care. Westerholm's paper deals with these aspects, and Miettinen concludes his by designating process evaluation as one of the future main tasks of epidemiologic research.

During the first 25 years of its life, the *Scandinavian Journal of Work, Environment & Health* has tried to convey new and relevant research information to its readers. Over the years its contents have changed as the focus of research has moved forward. Epidemiologically oriented articles have increased relatively, while clinical studies on occupational diseases have decreased. Nonspecific work-related disorders, such as cancer and musculoskeletal disorders have taken an increasing share of the space. The millennium shift will not bring an abrupt change in profile, but the editors hope that the steady development towards "modern" topics will continue. The multidisciplinary character of occupational health, both vis-a-vis research and practice, has been and will still be a hallmark of the Journal.

As I now retire at the age of 65, after having been the editor in chief for a quarter of a century, I can do it with a peaceful mind. The flow of manuscripts has been so good for the last 10 years that we have been able to be selective and publish only the best contributions. The Journal is now generally regarded as one of the most important in its field. Much of the credit for this goes to our editorial board members and our several hundred other referees. But without authors, there would be no journal; therefore our

authors also deserve warm thanks. The Finnish Institute of Occupational Health has continuously provided and still provides much-needed backup — offices, computer support and other counseling — and the other Nordic institutes have always been very supportive through their representatives on the Board of Directors. I feel confident that my successor, Mikko Härmä, who has gained experience over the last several years as the assistant editor in chief, together with our new co-editors, will further develop the Journal in a good direction. I wish them all the best in their demanding but also challenging and interesting task. I would also like to thank all my editorial staff members and other co-workers, who have come and gone during these 25 years, for their very fruitful collaboration and interaction. It has been wonderful to be the editor under such conditions. I am sad that it is now over, but one should leave the party while the going is good, as the saying goes. And the Journal will be left in good hands!

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