REPORT

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Occupational/Environmental Cancer at the International Congress on Cancer prevention & Early Detection: A Workshop Report

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ABSTRACT

The Occupational/Environmental Cancer Workshop was organized as part of the International Congress on Cancer Prevention & Early Detection in Tehran, January 29-30, 2017. There were 42 participants representing professionals from ministry of health, public health sector, medical universities, and research organizations., as well as the young scientists, postdoctoral and PhD-students. The participants were intensively engaged in the workshop, the discussions were very active and various proposals were prepared in 4 subgroups dealing with environment, occupational exposures, issues on the use of asbestos and silica, and on the registration and recognition of environment/work–related cancers.

Keywords: Occupational, Environmental Exposure, Cancer, I.R. Iran

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For millennia, much of human cancer did not happen. In current terms, it was prevented by skin melanin, along with physical activity, diet, and other life-style habits of our ancestors. Humans did not live long, but they usually died of causes other than cancer. The sweeping transformation of daily life in the industrialized world and globally over the past 60 years, for both people and institutions, has driven up the burden of cancer. These changes, together with the increasing average age of our population, will double the number of cancer cases diagnosed annually by 2050[1]. Estimates based on broad range of scientific evidence indicate that more than 50 % of cancers can be prevented. However, there is a source of inertia and delay that siphons off brainpower, time and resources: the many disagreements between researchers over exactly how much of cancer is preventable, implying that we should wait to act until we are sure. Such debates will never be resolved; they are the fiber of academic discourse and market claims. Different approaches come up with different numbers. Arguments about the magnitude of attainable cancer prevention obscure the fact that we already know that more than half of cancers can be prevented, exacting a huge human burden on a global scale. Each passing year leaves a substantially greater portion of world population at risk for cancer, despite our current knowledge. Early interventions by health authorities were hampered by inadequate knowledge, but greater understanding of the areas requiring focus slowly grew in the late twentieth century. We now have a moral responsibility to act and reduce the burden of cancer with currently available tools[2].

The twentieth century saw a revolution in public health and preventive medicine, which accelerated with scientific and medical advances during a time of unprecedented material growth as the century drew to a close. Industrial carcinogens opened the era of cancer prevention, and developments in the medical sciences, in toxicology in particular, have been fundamental to the progress in occupational cancer prevention[3]. However, it was the application of the new field of chronic disease epidemiology that fostered many of the most important advances in understanding and tackling occupational cancers[4]. Occupational cancer rose to prominence, as epidemiologists and toxicologists identified increasing numbers of suspect human carcinogens, and public anxiety was spurred by revelations of the toxicity of asbestos, and by the disastrous global legacy of the asbestos industry[5,6]. The inertia of some industries, not least of the tobacco industry, to accept the obtained scientific results and to adopt costly controls to protect workers or consumers (in the case of tobacco) was not new[7]. The uncertainties inherent in epidemiological and toxicological studies were too often cited as justification for delaying or concealing, rather than incorporating the lessons of research, as the asbestos saga, or the global tobacco epidemic, have sadly shown.

Worldwide, there are some 100,000–140,000 asbestos-related deaths every year, and in high-income countries, the compensation for asbestos-related diseases is likely to reach several hundred billion euros over the coming years[8]. All forms of asbestos are now recognized as carcinogenic, and to date, more than 50 countries, including all the Member States of the European Union, have banned or restricted the use of asbestos. However, chrysotile asbestos continues to be mined and exported to developing countries by e.g., China, Russia, and Brazil, and India is the largest importer. The World Health Organization and the International Labor Office have now both called for an international ban of use of all asbestos.

Incidence and mortality of cancer is increasing in Iran,

similar to other low and middle income countries[9]. Lung, bladder, mesothelioma, skin, head and neck, and hematologic cancer are associated with occupational exposures[10-15]. Reports on cancer incidence rates in Iran is based on pathology based cancer registry, in which the results for some cancers are highly underestimated, especially for lung cancer which is usually diagnosed in advance stage without pathology examination[16]. On the other hand, bladder cancer is a common cancer in Iran. However, few studies have so far evaluated impact of occupational exposures on the risk of different cancer types in Iran[11,17]. The industrialization process, transitional and growing economies in these countries would expose the population to occupation carcinogens and significantly contribute to the cancer risk in these countries. In Iran, the large firms, mines, oil and petroleum industries have employed a large number of people who are exposed to occupation carcinogens in their everyday life. Unfortunately, few evidence has been reported on potential impact of occupation exposure in the cancer risk. Therefore, occupational cancer requires a particular attention by researcher, policy makers, and industries. Organizers of the International Congress on Cancer Prevention & Early Detection in Tehran, January 29-30, 2017, decided to highlight the importance of this issue and organized a workshop on environmental and occupational exposure. During the Workshop, it became evident that asbestos is still being used in I.R. of Iran, and asbestos-related diseases are an important health problem. Asbestos mine in Iran was closed in the beginning of 2000, but asbestos is now imported from countries which have active mines. Mesotheliomas, the asbestos-related malignancy of the pleural tissue, are diagnosed in pulmonary hospitals[18].

Even though the health hazards of old scourges, such as asbestos and silica dusts, are now well understood, they remain significant causes of occupational cancer, also in I.R. of Iran. By the 1970s, the traditional industries were already in decline in the western world, while the chemical industry had been expanding rapidly since the Second World War. One chemical in particular, vinyl chloride monomer (VCM), used in many countries in plastics production, was assumed to be safe. However, evidence from laboratory animals revealed in 1973 that it could cause angiosarcoma of the liver, a rare tumor. Soon it was revealed that VCM workers in many countries had developed this rare type of liver cancer[19]. This then resulted in rapid actions to reduce exposure to VCM in chemical plants.

During the latter part of the twentieth century, it became clear that carcinogenesis was a multistep process. The milestones in the complexities of the neoplastic disease include sustaining proliferative signaling, evading growth suppressors, resisting cell death, enabling replicative immortality, including angiogenesis, and activating invasion and metastasis[20]. Biomarkers now play a significant role in the identification of the key events in this process. In recent decades, one of the most studied genes in epidemiology has been the TP53 tumor suppressor gene. Its role in causing liver and skin tumors is the focus of much research activity. Intermediate biomarkers, such as chromosomal damage and altered DNA repair, point toward evidence of early, non-clonal and potentially non-persistent effects, which if halted or reversed may decrease the risk of full-blown malignancy. The role of so-called 'molecular epidemiology' in the study of cancer etiology and prevention is also on the rise.

There are currently many international initiatives addressing occupational, environmental and consumer issues in relation to the control of toxic and potentially carcinogenic substances. Improved control technolo-

gies and the adoption of risk assessment and risk management legislation have radically altered attitudes and led to far better control of exposure to chemicals, mixtures of chemicals, and physical agents, such as ionizing and non-ionizing radiation[21,22].

However, newer concerns over cancer have arisen with the rapid introduction of technologies such as mobile phones, the use of which became widespread before studies of their potential health hazards were embarked upon[3,23]. Today's wide interest in developing engineered nanomaterial-based products has also been cautioned by the previous lessons learnt from asbestos fibers[24-26].

Regardless of these dangers however, the challenges facing the modern world cannot be met without the creation of new technologies. Some of these technologies will inevitably have adverse health consequences, a small proportion of which may be unforeseen under current regulatory approaches, but the fact remains that many of these new technologies have the potential to enormously improve lives.

To conclude, despite the huge advances in cancer prevention in industrialized countries in recent decades, specialist advice and expertise have not kept pace with the rapid changes in either the work or general environment, nor have they kept up with consumer products[6,27] Unless this shortfall is adequately dealt with, cancer prevention will continue to be of high priority in occupational health-related research, with a significant focus on diminishing the unnecessary burden of cancers worldwide. The Workshop showed that 1. Occupational/Environmental cancer continues to be an important field of cancer prevention and preventive health in I.R. of Iran; 2. There are research questions relevant to cancer prevention in a wide field of domains from air pollution, water treatment processes, construction and mining industries, oil and gas industries to traffic and consumer products. 3. It is of great importance to organize continued training and education for health sector on issues of occupational safety and health, health promotion and preventive technologies. Occupational cancers need to be recognized, starting from the most obvious ones such as mesotheliomas caused by asbestos fibres. Workers in asbestos mining and milling, in the construction and building trades, demolition workers, shipbuilding trades and many other occupations have had sufficient exposures in the past for the induction of cancers in various organs, especially in the respiratory tract.

The interest to act in occupational cancer prevention is there. There is also a cohort of professional experts who are willing to learn more and ready to find ways to implement the already available knowledge for the recognition of work-related cancers and in building up ways for preventing them.

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