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International Conferences on Environmental Mutagens in Human Populations—Opportunities, Accomplishments and Challenges

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Abstract

A major mission for organizing the series of International Conferences on Environmental Mutagens in Human Populations is to bring science and scientists to the sites where the field of environmental health is in developmental stages and environmental health is a serious concern. The mission has been fulfilled in each of the previous conferences that were held in Egypt, Czech Republic, Thailand and Brazil. These conferences have led to significant enhancement of regional scientific expertise from the acquisition of scientific knowledge and from the generation of sustainable collaborative programs.

Keywords: Environmental mutagens; Population monitoring; Biomarkers; Genetic susceptibility; Mutagenesis; Carcinogenesis

1. Introduction

The field of environmental mutagenesis has been gaining international recognition for many years. The well-recognized pioneers who had promoted this field, particularly at the international level, are the late Dr. Alexander Hollaender and the late Dr. Frits Sobels. Through their independent efforts, they had organized workshops in countries where the field of environmental mutagenesis were non-existence. From these activities, many scientists in these countries had received education and training to initiate their careers and scientific societies that were committed to the field of environmental mutagenesis. With dedicated effort from many scientists, the initiatives from the late Hollaender and the late Sobels continued to flourish and became sustainable programs. Many of these programs are subsequently promoted by the EMS-Hollaender Fund for International Programs of the Environmental Mutagen Society and the International Association for Environmental Mutagen Societies. One sustainable program is the series of

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conferences known as the International Conferences on Environmental Mutagens in Human Populations.

During 1987 and 1988, Wagida Anwar from Egypt worked as a visiting scientist with William Au at the University of Texas Medical Branch, Galveston, Texas. Besides conducting research studies, they also considered opportunities in organizing outreach activities such as conferences. They recognized that the ongoing series of International Conferences on Environmental Mutagens have been organized once every 4 years but these conferences are held specifically in well-developed countries. There was a lack of such conferences of the similar caliber that were held in developing countries. They also recognized that many scientists from the latter countries would not have the resources to travel long-distance to attend International Conferences in Expensive Cities. Therefore, they decided to organize a series of conferences that would be held in countries where the field of environmental mutagenesis is in the developmental stages and where environmental health is of major concern locally and regionally. The overall objectives are to enhance the awareness of and to identify solutions to human environmental health problems, to facilitate interactions and to foster international collaborations.

Au and Anwar planned to have the first conference in Cairo, Egypt, the hometown of Wagida Anwar. They brought their idea to Dr. Sobels (at that time, Dr. Hollaender had passed away already) with the anticipation that they would have to answer a lot of difficult questions, such as their experience in organizing international conferences and the financial commitment to the conference. At that time, the answers to the two questions would have been “no”, except that the two were committed to take on the challenge. Dr. Sobels listened to the presentation carefully and appreciated their honest answers to his questions. He maintained his positive attitude towards the proposal. His only recommendation for change was that they should consider organizing only one meeting and evaluate the outcome before considering additional conferences. Most important of all, he felt that the proposed

Fig. 1. Organizers for the international conferences (L. to R.): Dr. Michael Waters (Chairman of International Advisory Board), Dr. Lucia Ribeiro (Chairwoman of the 4th Conference), Dr. William Au (Chairman of the International Series of Conferences), Dr. Wagida Anwar (Chairwoman of the 1st Conference) and Dr. Radim Sram (Chairman of the 2nd Conference). Dr. Malyn Chulasiri (Chairwoman of the 3rd Conference) was absent from the photograph.

conference would succeed and he would take an active role in soliciting international sponsorship. The tremendous trust he had placed on the two junior and untested scientists was extremely stimulating and the trust instilled confidence in them. The three worked together for the following 3 years to develop the scientific program, solicit financial support and organize the conference. With the help from Dr. Sobels, the conference received support from many sponsors, notably the EMS-Hollaender Fund for International Programs and the International Association for Environmental Mutagen Societies. The Cairo Conference was so successful that the participants requested the organization of additional conferences according to the similar topic. Subsequent meetings were organized by Dr. Au in collaboration with Dr. Sram, Dr. Chulasiri and Dr. Ribeiro in Czech Republic, Thailand and Brazil, respectively (Fig. 1). All conferences were tremendously successful and they generated numerous new collaborations and sustainable programs. The following is a brief description of the accomplishments and unique challenges for each conference. Different areas of accomplishments are highlighted for each.

2. The Cairo Conference

The First International Conference on Environmental Mutagens in Human Populations (1st ICEMHP) was held in Cairo, Egypt, 19–24 January 1992. Wagida Anwar and William Au were co-chairpersons for the conference. The objective of the conference was focused on the state of knowledge on environmental, biological, genetic and reproductive problems affecting humans from exposure to environmental mutagens. The 6-day conference was organized into symposia, oral contributed presentations, poster sessions and workshops. The conference attracted over 200 participants and 199 abstracts from 31 countries. More than half of the participants were from the Middle East and Africa. Invited speakers were requested to submit manuscripts of their presentations for publication in the meeting monograph. The monograph was published in Environmental Health Perspectives [1]. With 56 manuscripts in 338 printed pages, the monograph is an impressive issue. These accomplishments certainly justified international status of the conference and the value of hosting the meeting in countries where the field of environmental mutagenesis is in the developmental stages.

The enormous interest generated from the conference led to the development of many high profile and sustainable programs. The most visible of them is that the conference sparked the organization of the Pan African Environmental Mutagen Society (PAEMS). Since then, the society has organized a scientific conference throughout Africa approximately once every 3 years: Cairo, Egypt, 1993; Cape Town, South Africa, 1996; Harare, Zimbabwe, 1999; Cairo, Egypt, 2003. The latter conference was chaired by Wagida Anwar who also assumed the presidency of PAEMS. Many international collaborative projects were initiated based on interactions in the 1st ICEMHP. For example, Au and Anwar developed one of the first molecular epidemiology projects in Egypt [2,3]. Dr. Anwar became the first recipient of the EMS-Hollaender International Fellow award, 2001.

The success of the 1st ICEMHP and the PAEMS conferences has attracted the attention and long-term support from several external sources, particularly from the National Institute of Environmental Health Sciences, USA.

3. The Prague Conference

The second International Conference on Environmental Mutagens in Human Populations (2nd ICEMHP) was held in Prague, Czech Republic, 22–25 August 1995. Radim Sram and William Au were the co-chairmen of the conference. A total of 220 scientists from 30 countries attended this conference. The high scientific level of all presentations and the enthusiasm among the participants provided strong endorsement for continued organization of the conferences in the 4-year period. Another positive characteristic was that the monograph from the conference was published in Environmental Health Perspectives within 9 months [4].

As shown in the manuscripts from the conference [4], novel and relevant information were presented. For example, developing strong international cooperation by the genetic toxicology community was highly recommended. The emphasis for these collaborative studies were: the use of biomarkers in molecular epidemiology that can be interpreted with confidence in

term of health risk, the application of data for diseases prevention, the importance of conducting prospective studies and the banking of tissue samples for future investigations. The updated genetic activity profile software from the US Environmental Protection Agency was presented. The data can be used for the characterization of exposures to environmental mutagens in highly polluted areas. The new concern regarding endocrine disruptive chemicals in the environment, e.g. pesticides on reproductive functions, was presented. The enormous database regarding mutation of the p53 tumor suppressor gene and increased risk for cancer was reviewed.

Several presentations were made regarding the measurement of health effects among populations exposed to fallouts from the Chernobyl accident. Results from the large scale studies on the effect of polymorphic metabolizing genes (GSTM1, GSTT1, NAT2 and CYP1A1) on the expression of different biomarkers was presented. A presentation was made on the use of the challenge assay on chromosomes to detect DNA repair deficiency in exposed populations. A colorful presentation on the use of the fluorescence in situ hybridization (FISH) assay to detect aneuploidy in human sperm was well received.

For the first time, results from the Teplice Program, an extensive environmental and population studies in Northern Bohemia, Czech Republic, was presented in an international conference. The data indicated that the measurements of PAH exposure and DNA adducts were the best indicators for exposure to industrial discharge to the environment. In addition, results on DNA adducts in placenta were related to the intensity of pollution in the studied areas.

The conference definitely highlighted the serious and potentially overlooked environmental pollution and health problems in the former Eastern European Communist countries. More importantly, the conference gathered a critical mass of scientists and provided the opportunity to develop collaborations to address the problems. The conference enhanced the value of the ongoing Teplice Program [5]. In addition, the collaborations developed during the meeting were timely for these scientists to respond to the new research funding mechanism from the European Union. The emphasis was to award grants to collaborations between member and non-member States in Europe.

4. The Bangkok/Khao Yai Conference

It is extraordinary to conduct an international meeting in two cities. To organizers of such a meeting, it would have been a dreadful responsibility. However, the Thai organizers achieved the goal without any complications. The meeting convened in Bangkok for 2 days. Then, the participants (over 200) and their luggage were bused to Khao Yai, a remote city in the mountains, which was a 6 h drive from Bangkok. At the end of the meeting, the participants were bused back to Bangkok for their departure. Khao Yai was obviously a major contrast to Bangkok in terms of size, social activities and geographical setting. Its small size and remoteness actually created tremendous opportunity for the participants to interact with each other for 3 days. By organizing the meeting in Thailand, scientists from many countries in the surrounding region were able to attend an international conference. Notably were scientists from countries like Laos, Sri Lanka and Vietnam that had no scientific programs in the field of environmental mutagenesis.

The theme for the Third International Conference on Environmental Mutagens in Human Populations (3rd ICEMHP) in Thailand was “Understanding Gene and Environmental Interactions for Disease Prevention”. The theme was addressed in the following nine important topics: Mechanisms of Mutagenesis and Carcinogenesis, Methods to Detect Exposure and Effects of Genotoxic Agents, Metabolic Influences on Cancer Susceptibility, Genetic Susceptibility Influencing Disease Outcome, Prospects for Cancer Prevention, Influences of Environmental Mutagens in Different Countries, Germinal and Reproductive Effects of Environmental Mutagens, forum on Issues in Safety and Health Assessment and Forum on Developing Sustainable Studies on Environmental Health. Manuscripts from presentations in the conference were published in Mutation Research [6]. The conference monograph was published within 10 months from the conference.

Several unique events took place in the 3rd ICEMHP Conference. One was the presentation of an International Mutation Research Award for Excellence in Scientific Achievement to Dr. Minako Nagao, National Cancer Institute, Japan. Another was the presentation of Continuing Educational Credits from the

American Medical Association through the University of Texas Health Center at Tyler by Dr. Arthur Frank. Five participants with outstanding presentations were awarded each with a 5-year free subscription to the scientific journal, *Environmental and Molecular Mutagenesis*.

From the successful organization of the 3rd ICEMPH, the Thailand Environmental Mutagen Society (TEMS) became better organized and better recognized locally and internationally. TEMS was invited to be a counterpart of the Toxicology Association of Thailand and was awarded the opportunity to organize the 3rd International Conference of Asian Society of Toxicology (3rd ASIATOX) in 2003. Cooperation and collaboration among the members were increased significantly. For example, members from Chulalongkorn University, Mahidol University (two faculties), National Cancer Institute and National Institute of Dermatology received funding from the National Center of Genetic Engineering and Biotechnology for a large project to investigate the health impact of natural mutagens and carcinogens. A member, Suparp Keithubthew, received a EMS-Hollaender International Trainee fellowship. With the training, she developed a molecular epidemiology program in Thailand [7].

TEMS became more successful in raising funds in support of a variety of functions. For example, funds were provided to eight Thai scientists from four universities and one Burmese health personnel to obtain technical training, to the Ministry of Interior to help flood victims in northern and southern Thailand in 2000 and 2001, to a Mahidol student who was ill with cancer to defray the hospital expenses and to a junior scientist for travel expenses to present a paper in the 8th International Conference in Environmental Mutagens in Shizuoka, Japan in October 2001.

With the organization of three highly successful international conferences, the series become a well-respected international activity. Therefore, the International Association for Environmental Mutagen Societies officially adopted the series into its portfolio of activities. The series can now enjoy the recognition and support from the EMS-Hollaender Fund for International Programs, the National Institute of Environmental Health Sciences, the International Association of Environmental Mutagen Societies, The University of Texas Medical Branch, etc.

5. Florianopolis-SC Conference

The 4th International Conference on Environmental Mutagens in Human Populations (4th ICEMHP) was held in Brazil. The conference followed the similar structure and pattern already seen in the previous conferences. The major emphasis of the Brazil Conference was the application of genomic information to environmental mutagenesis and health. The conference was officially opened after two keynote addresses by directors of two federal agencies: Dr. Kenneth Olden of the National Institute of Environmental Health Sciences and Dr. Henry Falk of the Agency for Toxic Substances and Disease Registry. The scientific program of the conference included topics such as the identification of genes involved with environmental diseases, use of genomics in understanding toxicological responses and the functional evaluation of polymorphic genes for susceptibility. Specific symposium topics were: (1) mechanisms of mutagenesis and carcinogenesis, (2) biomarkers for mutagen exposure and for prediction of health risk, (3) health impact of environmental pollutants, (4) genetic and acquired susceptibility to environmental disease, (5) genome-based technology for toxicology and health, (6) health impact of food-borne mutagens and antimutagens and (7) unique concerns for environmental health in Latin America.

The 4th ICEMHP was held at the Costão do Santinho Resort, on the coast of Florianopolis-SC, Brazil, an ecological paradise with a large area covered with the Atlantic Forest and preserved dunes, where the sea, trees, and mountains awaited everybody. Like the previous meetings, the quality of science was outstanding. There were over 600 participants in the conference representing 27 countries. Besides the outstanding oral presentations, there were approximately 300 poster presentations. Therefore, participants in the conference achieved scientifically and socially rewarding experience.

6. Challenging situations

Anyone who is involved with organizing international conferences would agree that these meetings take extraordinary dedication and perseverance to overcome unique challenges. The most significant

challenge is that each conference needs to be financially self-supportive, with a budget of approximately US$ 150,000. Other challenges include problems caused by differences in language, time zone, means of communication, currency, customs, regulations and laws. In addition, the ICEMPH are held in less developed countries which are located in regions with generally less stability in politics and economy than well-developed nations. For example, the 1st ICEMHP Conference in Egypt was delayed by 1 year due to the Gulf War. The 2nd Conference was held in Prague soon after the former Eastern European Communist countries became independent. These countries were in the middle of drastic social and financial changes. The 3rd Conference was held in the middle of the Asian financial crisis. The 4th Conference was held in the middle of the global financial hardship, the war in Iraq and the threat of Severe Acute Respiratory Syndrome (SARS) infectious disease. Nevertheless, due to the tremendous effort of the organizers and the generous support of sponsors and participants, each conference was highly successful in overcoming challenges and in achieving the objectives. The local organizing committees for the conferences should be recognized for their dedication, perseverance and unique contributions. In addition, all the invited speakers were aware of the financial status of the conferences. Therefore, they have contributed their own funds to help defray the cost to attend the conferences.

7. Conclusion

The ICEMHP Conferences can be considered a unique and valuable international scientific outreach program. It is not an exaggeration to state that the ICEMHP Conferences provide outstanding value to many scientists that could not have been possible in other means. All participants gain academic knowledge and social value that were useful for improving scientific careers and quality of life. Future success of this series of conferences will be based on continued improvement of the scientific and social value of the conference, and generous contributions from dedicated scientists and sponsors.

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The success of this series of international conferences could not have been possible and sustainable without the dedicated support of many individuals and sponsors. Their valuable contribution to each of the conferences are listed in the specific conference monographs [1,4,6]. The Introduction chapter in this monograph lists the individuals and sponsors who have made valuable contributions to the Brazil conference.

References

[1] W.W. Au, W.R. Anwar, R.W. Tennant, Environmental mutagenesis in human populations at risk, Environ. Health Persp. 101 (Suppl. 3) (1993) 1–340.
[2] W.A. Anwar, S.Z. Abdel-Rahman, R.A. El-Zein, H.M. Mostafa, W.W. Au, Genetic polymorphism of GSTM1, CYP2E1 and CYP2D6 in Egyptian bladder cancer patients, Carcinogenesis 17 (1996) 1923–1929.
[3] S.Z. Abdel-Rahman, W.A. Anwar, H.M. Mostafa, M.A. Abdel-Aal, Ghoneim, W.W. Au, The CYP2D6 extensive metabolizer genotype increases the risk for bladder cancer, Cancer Lett. 119 (1997) 115–122.
[4] W.W. Au, R.J. Sram, Environmental mutagens, Environ. Health Persp. 104 (Suppl. 3) (1996) 421–690.
[5] R.J. Sram, Teplice Program: Impact of Air Pollution on Human Health, Institute of Experimental Medicine, Prague, Czech Republic, 2001.
[6] W.W. Au, M. Chulasiri, W. Kusamran, M.D. Waters, Understanding gene and environmental interactions, Mutat. Res. 428 (1999) 1–376.
[7] S. Kietthubthew, S. Hutcha, W.W. Au, Genetic and environmental interactions on oral cancer in southern Thailand, Environ. Mol. Mutag. 37 (2001) 111–116.