Armenia/Arménie

UNITWIN/UNESCO Chairs Programme

Progress report

UNESCO Chair in Life Sciences

UNESCO Chair in Life Sciences

Report established by: Prof. Sinerik Ayrapetyan, UNESCO Chairholder in Life Sciences
International Postgraduate Educational Center.

I. Activities

1. Academic activities

Education

Courses
- MSc and PhD courses in Biophysics, Neuroscience and Pain, Biotechnology and Biomedical engineering, conducted according to the specialization program credits.
Geographical coverage: national, regional (Eastern and Central Europe), international (Africa, Asia/Pacific, Western Europe and North America).
- Methodological trainings, seminars to teach students the methods necessary for their research studies.
Geographical coverage: national, regional, international.
- English language training.
Geographical coverage: national, regional, international.

Training
- Theoretical and practical courses in Magnetobiology and Neuroscience
Geographical coverage: national, regional (Eastern and Central Europe), international (Asia/Pacific, Western Europe and North America).
• “The study of the molecular and cellular mechanisms of nonthermal biological effect of Microwaves” funded by the Armenian Government.
• “The study of the molecular and cellular mechanisms of biological effect of Electromagnetic fields and Acoustic Waves from the point of their application and environmental protection” funded by the Armenian Government.
• “Synthesis of new organic semiconducting polymer materials having high radiowave absorption rate” funded by European Office of Aerospace Research and Development (EOARD) through ISTC (# 1571P partner project).
• “The comparative study of the effects of extremely low frequency electromagnetic fields and infrasound on water molecule dissociation and generation of reactive oxygen species” funded by European Office of Aerospace Research and Development (EOARD) through ISTC (# 1592P partner project).

**Intended use of results**

• Development and construction of research equipment;
• New methods for environmental control and dosimetry of non-ionizing radiation from the point of public health;
• Physiotherapeutic treatment of various diseases.

2. **Interuniversity Exchanges/ Partnerships**

• Naira Hunanyan, PhD, student at UNESCO Chair-LSIPEC, was awarded a fellowship to be conducted at University of California, San Francisco (host professor: Barber, Diane L. Professor and Vice Chair, Department of Cell and Tissue Biology).
• Dr. Arsen Hunanyan, PhD, a researcher from UNESCO Chair-LSIPEC was awarded a postdoctoral fellowship to be conducted at New York State University at Stony Brook (host professor: Prof. Victor Arvanian, Dep. of Neuroscience and Behavior).

• In the framework of an exchange program between the UNESCO Chair in Life Sciences and Babol University of Medical Sciences (Iran), UNESCO Chairholder Prof. Sinerik Ayrapetyan visited Babol University as an invited professor and held lectures for professors and students of the University.

• In the framework of the same exchange program, two associate professors from the same university, Dr. Ehsanollah Moosavi and Zoleika Moazezi visited our Center, got acquainted with our research and educational potential and held lectures for the students of our Center.

• UNESCO Chairholder Prof. Sinerik Ayrapetyan visited The Beritashvili Institute of Physiology (Georgia) for negotiation to renew the research collaborations between both institutions. The first step for refreshment of these collaborations would be the joint organization of UNESCO/IBRO international Symposium on Neuroscience on October 21-23, 2008 in Yerevan, Armenia.

3. Publication and multimedia materials

Periodicals

• The dose-dependant effect of hydrogen peroxide on neuromembrane chemosensitivity, 2007 (in English).
  Author(s): Arsen Hunanyan, Sinerik Ayrapetyan. Publisher(s): Electromagnetic Biology and Medicine.

• The comparative study of the effects of 4Hz Electromagnetic Fields, infrasound- treated and Hydrogen Peroxide containing physiological solutions on Na pump-induced inhibition of heart muscle contractility, 2007 (in English).
  Author(s): Ayrapetyan G, Grigoryan A, Dadasyan E, Ayrapetyan S. Publisher(s): The Environmentalist.

• Two streams of attention-dependent beta activity in the striate recipient zone of cat's lateral posterior-pulvinar complex, 2007 (in English).
  Author(s): Wróbel A., Ghazaryan A., Bekisz M., Bogdan W, Kaminski J. Publisher(s): J. Neuroscience.
II. Outcomes

The non-ionizing radiation, like Static (SMF), Electromagnetic Magnetic Fields (EMF) and Infrasound (IS), is a significant component of environmental pollution, which is also generated by a number of natural sources, like earthquakes, tsunamis and others. However, our weak knowledge on the mechanism of the effects of EMF and IS on water properties serves as one of the main barriers for precise determination of their hazardous effects on living organisms from the point of environmental protection and public health.

During the reporting period, in the framework of a governmental grant, the nature of metabolic pathway responsible for biological effect of EMF and IS on neuronal and heart muscle function was elucidated. This study also serves as a subject of investigation for a research grant provided by EOARD (through ISTC) in the framework of which the effects of low Frequency Electromagnetic Fields and Infrasound on generation of reactive oxygen species (ROS) would be studied. It is predicted that the data obtained in this project would serve as a preliminary step for a biological study of the EMF and IS-induced changes of water dissociation and ROS effects on living organisms from the point of public health and environmental protection.

In the framework of the second research grant awarded by EOARD (through ISTC) it is expected to develop a method of synthesis of new polymers and co-polymers having high absorption properties. These polymers could be used for the protection of living organisms...
(including human beings) from Microwave radiation. The results of the project would be of interest for companies producing mobile phones and, generally, radio electric equipment for increasing the safeness of their product from a public health perspective.

The Memorandum of Understanding signed between the UNESCO Chair and Stony Brook University, State University of New York, would allow the Chair to adopt the SUNY M.S. and PhD educational programs in Life Sciences and organize an exchange visit by faculty and students from one institution to the other. This MOU would enable the Chair to realize its mission, i.e. to supplement the reformation of the postgraduate educational system in Life Sciences, thus promoting research and education in Armenia and the Region according modern demands.

During the reporting period the UNESCO Chairholder continued his responsibilities as a Member of International Advisory Committee of WHO for Electromagnetic Fields and Radiation Protection.

III. Forthcoming activities

Research projects

- The European Office of Aerospace Research and Development (EOARD) funded (through ISTC partner project) the project “*Synthesis of new organic semiconducting polymer materials having high radiowave absorption rate*”. The Center realized this project until the end of 2008.

- The European Office of Aerospace Research and Development (EOARD) funded (through ISTC partner project) the project “*The comparative study of the effects of extremely low frequency electromagnetic fields and infrasound on water molecule dissociation and generation of reactive oxygen species*”. The Center realized this project between 2008-2009.

- The Chair has prepared and submitted to ISTC a project: “*The comparative study of low intensity Millimeter Wave, Terahertz and Infrared effects on physicochemical properties of water and water solutions*”. The local collaborators are: Yerevan State University Radiophysics Faculty, Dept. of Microwave Engineering & Communication and the Institute of Radiophysics and Electronics of Armenian NAS. The international collaborators are: Research International Buffalo Office, Williamsville, USA (Prof. Marko Markov); London South Bank University, London, UK (Prof. Martin Chaplin); Nofer Institute of Occupational Medicine, Dept. Physical Hazards, Lodz, Poland (Prof. Marek Zmyslony); Medical University of Lodz, Dept. Toxicology, Faculty of Pharmacy, Lodz,
The Chair has prepared and submitted to ISTC a project: “The Application of Hydrogel as Non-Ionizing Radiation Sensor”. The local collaborators are: Yerevan State University, Department of General Physics. International collaborators are: Department of Bioengineering, University of Washington (Prof. Gerald H. Pollack); Department of Chemistry, Oklahoma State University (Prof. Barry Lavine); Research Group of BioNanoTechnology, Department of Chemical and Environmental Engineering, University of California, Riverside (Prof. Ashok Mulchandani).

The Chair, among 22 institutes from different countries from Europe, Asia and Africa, participated in an Integrated Project “Metal Compounds in Cancer Therapy” presented to EC FP7.

The Chair expressed its readiness to participate in the project "Pour une Clinique de la Globalité" initiated by the Association Pot d’Argile (France), in studying the molecular and cellular mechanisms of “Prior Effect”.

Conferences/Congresses/Meetings

Considering the fact that UNESCO celebrated the 100th Anniversary of the birth of Victor Hambardzumyan in 2008, the UNESCO Chair in Life Sciences (Yerevan, Armenia) initiated the organization of a series of scientific meetings dedicated to this Anniversary:
- UNESCO Chair in Life Sciences (Armenia), in collaboration with the Institute for Health & the Environment, University at Albany, SUNY (USA) and under the sponsorship of the World Health Organization (WHO) and the Office of Naval Research Global (ONRG) organized a UNESCO Seminar on: “Electromagnetic Fields: Mechanisms of Action and dosimetry” on October 24-26 2008, Yerevan, with the participation of about 60 leading scientists from all over the world.
- the UNESCO Chair in Life Sciences (Yerevan, Armenia), in collaboration with Beritashvili Institute of Physiology, (Tbilisi, Georgia) and under the sponsorship of the International Brain Research Organization (IBRO) is organizing an IBRO Symposium “Non-Conducting Membrane Mechanisms of Under-Threshold Signal Transduction in Neurons” (21-23 October 2008 Yerevan, Armenia). In the framework of the IBRO Symposium it is planned to organize an IBRO Bioethics Workshop on “Animal Issues in Scientific Research”. October 23, 2008, Yerevan.
the “All Armenian Research Council” NGO, in collaboration with the Governments of the Republic of Armenia and Nagorni Karabagh, will organize an “All Armenian Life Sciences Congress” (October 28-29, 2008, Stepanakert, NKR). The overall aim of this meeting is to create a data base of Armenian scientists from different countries and to establish a National Research Council in Life Sciences through which the integration of national potential could be realized.

Travel

As a member of the WHO International Advisory Committee (IAC), UNESCO Chairholder Prof. Sinerik Ayrapetyan was invited to participate in the 13th IAC meeting & Final Conference of the German Mobile Telecommunication Research Program on June 18-20, 2007 in Berlin, Germany.

IV. Development prospects

During the reporting period, the Chair organized weekly seminars on modern problems of cellular and molecular Biology for the lecturers, researchers and students of the Center and other Life Science institutions. Invited professors from abroad held lectures during these seminars.

The Chair organized Computer and English language courses for the students and researchers of the Center.

Considering the fact that the FSU educational system is still functioning in Armenia, which is not adequate to the market economy, the Chair has signed a Memorandum of Understanding (MOU) for 5 years with Stony Brook University, State University of New York. This MOU would allow the Chair to adopt the SUNY MSc and PhD educational programs in Life Sciences and organize an exchange visit by faculty and students from one institution to the other.

A similar Memorandum of Understanding is expected to be signed with the State University of New York at Albany in adopting MSc and PhD programs in Public Health.

The Chair has developed a new system of ranking of research institutes and universities on the basis of mean crude impact factor according to the Scopus and Thomson Science Citation Index.

As the absence of PhD, a unique diploma acceptable for regional countries is the main barrier for broadening partnerships in postgraduate education between different countries. The Chair plans to present to UNESCO Central Office a project on the reorganization of the Chair
to UNESCO Regional Postgraduate Educational Center in Life Sciences which could significantly promote the development of this field in the Region.