

**ONRG/EOARD/IUPAB SEMINAR**  
***Mechanisms of Mechanotransduction in Living Cells***  
(1-4 August, 2006 Yerevan, Armenia)

The living cells are under the continuous effects of internal and external micro-mechanical forces (such as gravity, tension, pressure and shear). However, the nature of the cell mechanosensors and the metabolic pathway, through which the mechanotransduction in living cells is realized, is not clear yet. The elucidation of these mechanisms could bring us to a closer understanding of the mechanisms of functioning of the biological amplifiers and their ability to detect the extremely weak physical and chemical signals, for which the mechanical energy serves as a transient step for realizing their biological effects.

This problem is one of the global problems in modern Life Sciences and it was the subject for multisided discussion during the ONRG/EOARD/IUPAB Seminar “Mechanisms of mechanotransduction in living cells” (1-4 August, 2006 Yerevan, Armenia). The Seminar was organized by UNESCO Chair-Life Sciences International postgraduate Educational Center (Yerevan, Armenia) in collaboration with the Office of Naval Research Global (ONRG), European Office of Aerospace Research and Development (EOARD) and International Union for Pure and Applied Biophysics (IUPAB).

The Seminar consisted of the following 5 Sessions:

Session 1. Cell bathing aqua medium as an extra-sensitive mechanosensor

Session 2. The acoustic effect of electromagnetic fields

Session 3. Cell Membrane and Mechanotransduction

Session 4. Dynamic properties of intracellular structures

Session 5. Poster session

19 scientists from 13 countries had the plenary lectures during the Seminar. 27 MS and PhD students participated in the meeting from which 14 students had Poster presentations.

The extra- and intracellular aqua solution as a universal and extra-sensitive mechanosensor was suggested by the meeting co-organizers Profs. Sinerik Ayrapetyan from UNESCO Chair-LSIPEC (Armenia) and Igor Vodyanoy from ONR (USA) as the main subject for discussion during the meeting.

On the basis of multidisciplinary discussion of the data obtained by different laboratories on the messenger role of water molecules in mechanical signal transduction in cells, the cell hydration was suggested as a potential cellular marker for estimation of biological effect of mechanical vibrations and which could be used for standard harmonization of MV and EMF from the point environmental protection and public health.

The participants of the Seminar suggested to create a Joint International project on “The study of the role of cell hydration as a universal mechanosensor”. The suggestion of Prof. Gerald Pollack (USA) on the importance of establishing a new international journal “Water in Living Cell” was unanimously accepted by the participants.

In framework of the meeting a Round table on “Organization of Research Capacity Building in Biophysics and Environmental Protection” was organized. It was emphasized that the initiative of IUPAB in organization of regional network of postgraduate education in Biophysics would greatly promote the development of modern Life Sciences, Biotechnology and Environmental protection.

However, the absence of unique model for postgraduate education (according diploma), which could be acceptable for different countries, is the main barrier for developing horizontal collaboration in postgraduate education between different countries. This barrier could be removed if IUPAB in collaboration with UNESCO creates a unique postgraduate educational programs leading to MS and PhD, the diploma of which will be acceptable for all participant countries.

As the Biophysics is rather weak in regional countries, the preparation of science leaders in this field according to modern demands on the basis of national potential of single country is impossible without international supports.

The next barrier for educational collaboration between regional countries is the hard economical situation and the existence of ethnic conflicts between them. This barrier could be removed by the establishment of Distance Educational Systems (DES), giving the students of different countries an opportunity to obtain MS and Ph.D. degrees without leaving their home countries. This system will give us an opportunity to involve hundreds of participants from regional countries and will also help to solve another important problem - lack of modern scientific literature. The Center of Advanced Engineering and Technology Education of University of Colorado at Boulder (USA) expressed its readiness to provide the technical assistance in establishment of DES in Countries of South Caucasus and Asia Minor.