EUROMECH Colloquium 560
"Mechanics of Biological Membranes"
8 – 12 February, 2015, Ascona, Switzerland

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Background

The term "biological membrane" refers to biological structures on various length scales from cell membranes to thin soft tissues such as the capsules of the abdominal organs, the foetal membrane, the eardrum, heart valve leaflets, layers of the arterial wall or skin, to mention only a few examples. In-vivo, many of these structures also function as membranes in a mechanical sense, allowing dedicated formulations of mechanical problems. Biological membranes have inspired the search for and development of synthetic materials and engineered tissues with comparable characteristics. Fundamental research in biology and medical questions associated with these fields increasingly motivate investigations aimed at characterising, understanding and modelling the mechanical behaviour of biological membranes and their bio-inspired counterparts. These investigations, their implications, and future directions formed the scope of EUROMECH Colloquium 560.

Colloquium 560 brought together international leading experts and young scientists from all areas of research related to the mechanics of biological membranes, from both fundamental research and applied science. It was open for contributions that address fundamental questions, experimental techniques, mechanical models and numerical simulations.

Scope of Colloquium 560

The aims of Colloquium 560 were to:

Develop a common language;
Foster the interaction between the disciplines;
Identify common problems and strategies of solution;
Establish a strong link between research and technical or biomedical applications as well as clinical practice.

The scientific programme included 29 oral presentations, six of which were keynote lectures given by international experts which highlighted distinct aspects of the mechanics of biological membranes. These concerned:

Rupture of the foetal membrane;
Simulation of the tympanic membrane;
Characterisation of microcapsules;
Tissue engineering of cardiovascular membranes;
Clinically applicable skin grafts;
Heart valve implants for the developing world.

All contributions were followed by active discussion between participants.

Conclusions

The meeting was attended by researchers from different disciplines, including various fields of engineering, biology, physics, mathematics and medicine. The meeting showed that, in spite of the different areas of expertise, it is possible to develop a common understanding of current problems, which might be one of

the milestones towards their solution. At the same time, it underlined the importance of establishing and using an interdisciplinary “language” understandable for all researchers in the fields of interest.

The relatively small size of the meeting in combination with the convenient conference venue at Monte Verità hosting all participants provided an ideal basis to train such a language and foster the scientific exchange between the disciplines not only during the lectures but also during coffee breaks, lunch and dinner.

Many of the scientific results discussed during the Colloquium will be disseminated to the scientific community in a dedicated, peer reviewed special issue of the Journal of the Mechanical Behavior of Biomedical Materials. The feedback from participants was very positive throughout. We are very grateful to EUROMECH, the Congressi Stefano Franscini and the Swiss National Science Foundation for their support, making Colloquium 560 possible.