Journal of Biomechanical Engineering

Editorial

2016 Richard Skalak Award

Each year, the Editors-in-Chief and the editorial board members of the ASME *Journal of Biomechanical Engineering* identify the most meritorious papers published in the journal in the previous calendar year, and an external committee selects the top paper of the year from that list. The authors of this paper are the recipients of the Richard Skalak Award, named after an early leader within the ASME Bioengineering community. Richard Skalak (1923–1997) played a leadership role in the formative decades of the discipline of biomedical engineering through his technical contributions in biomechanics, his educational influence on students, and his service to many developing societies and journals. Richard Skalak believed in several central approaches to bioengineering and several central values in working with people. In bioengineering, these were: (1) the useful combination of mathematical and computational modeling with experimental results, to better inform the new biological understanding that is derived and (2) the inclusion of both microscale and macroscale phenomena in understanding complex biological systems. In terms of mentoring students and collaborating with colleagues, these were: (1) share ideas freely, (2) listen to ideas of others and integrate the best into new developments, and (3) show tolerance and respect for others at all times. These tenets help guide us as a community and as a journal, and we are honored by the opportunity to contribute to Richard Skalak's legacy by giving an award bearing his name. The Editors thank the 2016 Skalak Award committee: Ross Ethier (chair), Gerard Ateshian, Alison Marsden, David Merryman, and Lori Setton.

The Skalak Award winner for 2016 was "Epigenetic Changes During Mechanically Induced Osteogenic Lineage Commitment" by Julia C. Chen, Mardonn Chua, Raymond B. Bellon, and Christopher R. Jacobs. The paper was published in J. Biomech. Eng., **137**(2), p. 020902.

ABSTRACT: Osteogenic lineage commitment is often evaluated by analyzing gene expression. However, many genes are transiently expressed during differentiation. The availability of genes for expression is influenced by epigenetic state, which affects the heterochromatin structure. DNA methylation, a form of epigenetic regulation, is stable and heritable. Therefore, analyzing methylation status may be less temporally dependent and more informative for evaluating lineage commitment. Here, we analyzed the effect of mechanical stimulation on osteogenic differentiation by applying fluid shear stress for 24 h to osteocytes and then applying the osteocyte-conditioned medium (CM) to progenitor cells. We analyzed the gene expression and changes in DNA methylation after 24 h of exposure to the CM using quantitative real-time polymerase chain reaction and bisulfite sequencing. With fluid shear stress stimulation, methylation decreased for both adipogenic and osteogenic markers, which typically increases availability of genes for expression. After only 24 h of exposure to CM, we also observed increases in expression of later osteogenic markers that are typically observed to increase after 7 days or more with biochemical induction. However, we observed a decrease or no change in early osteogenic markers and decreases in adipogenic gene expression. Treatment of a demethylating agent produced an increase in all the genes. The results indicate that fluid shear stress stimulation rapidly promotes the availability of genes for expression, but also specifically increases gene expression of later osteogenic markers.

