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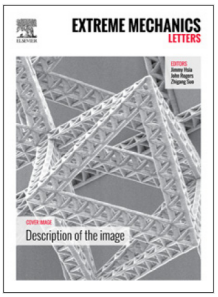

Molecular mechanisms of mechanosensing and mechanotransduction in living cells

Alen Trubelja, Gang Bao

PII: S2352-4316(17)30189-X
DOI: https://doi.org/10.1016/j.eml.2018.01.011
Reference: EML 350

To appear in: *Extreme Mechanics Letters*

Received date : 2 November 2017
Revised date : 27 January 2018
Accepted date : 29 January 2018

Please cite this article as: A. Trubelja, G. Bao, Molecular mechanisms of mechanosensing and mechanotransduction in living cells, *Extreme Mechanics Letters* (2018), https://doi.org/10.1016/j.eml.2018.01.011

Molecular Mechanisms of Mechanosensing and Mechanotransduction in Living Cells

Alen Trubelja and Gang Bao

Department of Bioengineering, Rice University, Houston, Texas, USA

Abstract

Living cells can sense mechanical forces or deformation, and convert them into biological responses. However, although many details of mechanical, chemical and biological interactions in cells have emerged over the past few decades, the exact molecular mechanisms of mechanosensing and mechanotransduction remain elusive. This review examines some possible molecular mechanisms responsible for sensing and transducing mechanical signals by living cells, and the tools developed for making molecular-level mechanical measurements. The opportunities and challenges in further developing molecular mechanobiology are discussed.

Keywords: molecular biomechanics, mechanosensing, mechanotransduction, protein conformational change

Introduction

Mechanical forces are an inextricable part of living systems, be they plans or animals, and act at different levels, ranging from whole body, to organs and tissue, to cellular and molecular levels [1-3]. For example, many normal and diseased conditions of cells are dependent upon or regulated by their mechanical environment. Cells generate mechanical forces and experience both internal and external forces throughout their lifecycle [4]. Some cells, such as bone and endothelial cells, are subjected to forces as part of their 'native' physiological environment. Some other cells, such as muscle and cochlear outer hair cells, perform a mechanical function by