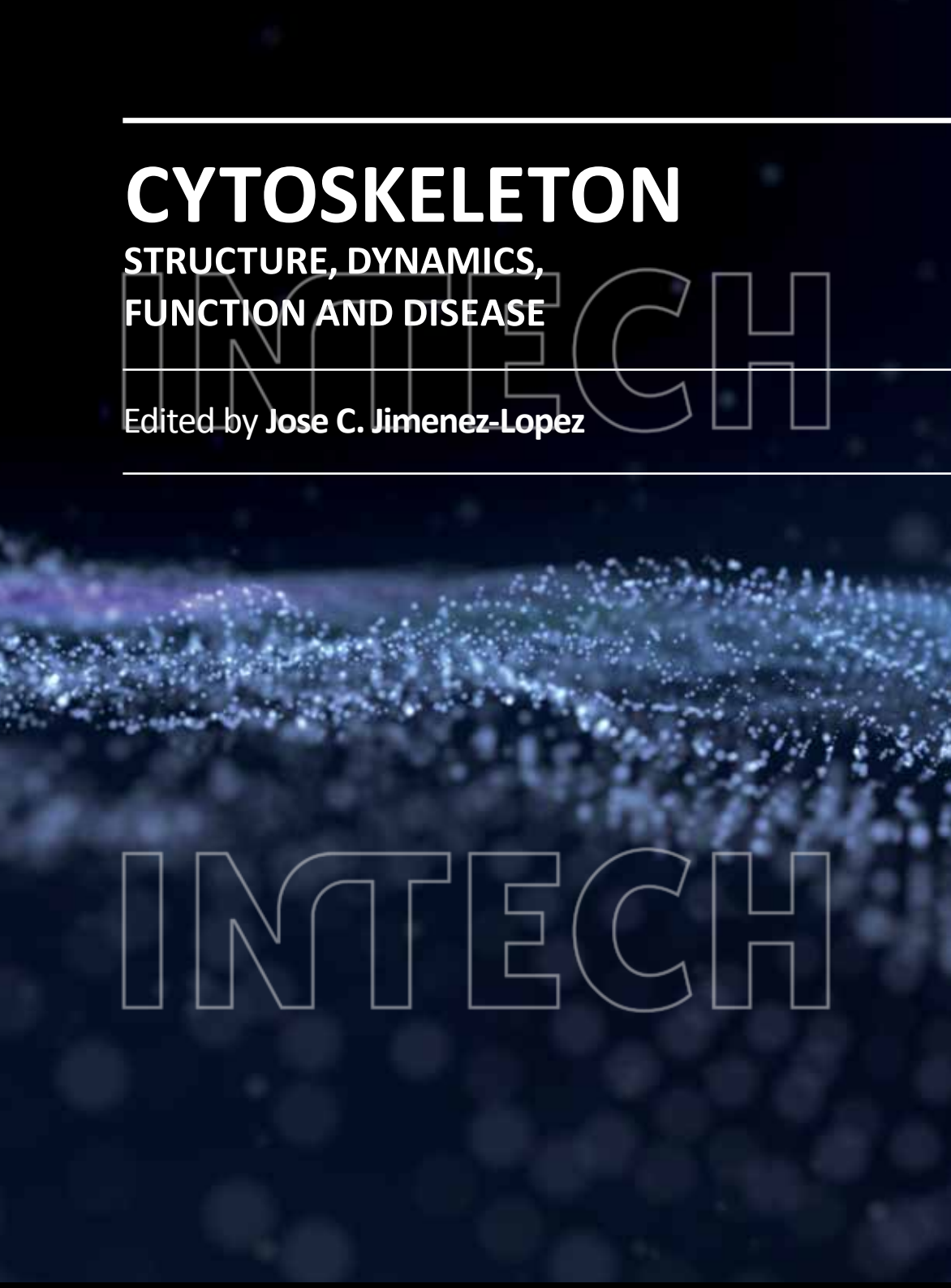
CYTOSKELETON

STRUCTURE, DYNAMICS, FUNCTION AND DISEASE

Edited by **Jose C. Jimenez-Lopez**



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The Interplay between Cytoskeleton and Calcium Dynamics

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Abstract

Cell motility is a complex cellular event that involves reorganization of cytoskeleton. This reorganization encompasses the transient polarization of the cell to facilitate the plasma membrane ruffling, a rearrangement of cortical actin cytoskeleton required for the development of cellular protrusions. It is known that extracellular Ca^{2+} influx is essential for cell migration and for the positive-feedback cycle that maintains leading-edge structures and ruffling activity. The aim of this review is to summarize our knowledge regarding the Ca^{2+}-dependent signaling pathways, Ca^{2+} transporters and sensors involved in cell migration. Also, we show here reported evidences that support for a crosstalk between Ca^{2+} transport and the reorganization of the cytoskeleton required for cell migration. In this regard, we will analyze the role of store-operated Ca^{2+} entry (SOCE) as a modulator of cytoskeleton and cell migration, but also the modulation of this Ca^{2+} entry pathway by microtubules and the actin cytoskeleton. As a main conclusion, this review will show that data reported in the last years support a role for SOCE in shaping cytoskeleton, but at the same time, SOCE is strongly dependent on cytoskeletal proteins, in an interesting interplay between cytoskeleton and Ca^{2+} dynamics.

Keywords: calcium, microtubules, actin, STIM1, ORAI1, cell migration, cortical cytoskeleton

1. Introduction

Calcium ions (Ca^{2+}) are essential intracellular transducers for cell signaling because of their role to bind Ca^{2+}-sensitive proteins that mediate key activities in signaling pathways. Upon cell stimulation through a variety of receptors and other types of physicochemical stimulations such as depolarization of plasma membrane, changes in osmolarity, physical distortion