

## **Advances in Axonal Biomechanics and Mechanobiology: A Nanotechnology-Based Approach to the Study of Mechanotransduction of Axonal Growth**

**Authors :** Alessandro Falconieri, Sara De Vincentiis, Vittoria Raffa

**Abstract :** Mechanical force regulates axonal growth, elongation and maturation processes. This force is opening new frontiers in the field, contributing to a general understanding of the mechanisms of axon growth that, in the past, was thought to be governed exclusively by the growth cone and its ability to influence axonal growth in response to chemical signals. A method recently developed in our laboratory allows, through the labeling of neurons with magnetic nanoparticles (MNPs) and the use of permanent magnets, to apply extremely low mechanical forces, similar to those generated endogenously by the growth cone or by the increase of body mass during the organism growth. We found that these extremely low forces strongly enhance the spontaneous axonal elongation rate as well as neuronal sprouting. Data obtained don't exclude that local phenomena, such as local transport and local translation, may be involved. These new advances could shed new light on what happens when the cell is subjected to external mechanical forces, opening new interesting scenarios in the field of mechanobiology.

**Keywords :** axon, external mechanical forces, magnetic nanoparticles, mechanotransduction

**Conference Title :** ICSRD 2020 : International Conference on Scientific Research and Development

**Conference Location :** Chicago, United States

**Conference Dates :** December 12-13, 2020