Mechanical tension in neurons: a new frontier for mechanics

M Taher Saif*[1]

[1]University of Illinois at Urbana-Champaign [Urbana] – United States

Abstract

Neurons have long been known to transmit information between each other, and support memory, learning, and cognition in animals. They were not considered as force actuators, unlike muscles. Here, we will discuss recent findings revealing that neurons are also contractile. They develop tension after forming junctions (synapses) with muscles or other neurons, and that this tension is necessary for their function. Without tension, their synapses fail to accumulate neurotransmitters that are essential for neurotransmission. Hence, without tension neurons fail to fire and cannot transmit information between each other. Neurons maintain a rest tension using acto-myosin machinery and a feedback mechanism for their functionality. Due to the central role of mechanical tension on neuronal function, mechanics of neurons is emerging as a new paradigm in neuroscience. This new frontier of solid mechanics may offer insights on mental health and diseases and inspire novel therapeutic approaches.

*Speaker