**Digital Holographic Microscopy associated with Traction Force Microscopy applied to the local analysis of cardiomyocytes contractility**

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**Abstract:**

Cardiomyocytes are the fundamental structure and functional unite of a heart. The analysis of their mechanical properties can help to elucidate the mechanisms related to cardiovascular problems, the leading cause of natural death. It is known that some of these properties are controlled by the entropic dynamics of the fibers into the cells, but the physical basis of this theory remains unclear, besides, little is known about their dynamics and force distribution. The in vitro study of these cells is fundamental to the increase the knowledge of their functions and behaviour. One of the techniques that are used to investigate the mechanical dynamics of cells is the Traction Force Microscopy (TFM). This technique measures the dynamics of the cell stress on a flexible substrate, analysing the motion of nanobeads incorporated into the substrate. In this work, we developed Digital Holographic Microscope (DHM) based on a compact system, associated with a TFM setup. The DHM comprises a powerful method for surface and materials analysis, which allows to obtain quantitative intensity and phase information of objects, been a non-invasive and efficient tool for analysing biological material. We determined local topographic changes of living cardiomyocytes through three-dimensional phase maps reconstructed from digital holograms and we associated the results with the force pattern in real time using the same sample. We applied this association to the local analysis of frequency beating profile, which showed that the cells present different frequencies and phase profiles depending on the distance of their nucleus. We believe that these two techniques are complementary and can provide information regarding to the homogeneity of the contraction field of these cells and this work will contribute to the basic understanding of cardiomyocytes physiology.

**Biography:**   
Isis V. de Brito joins University of São Paulo as a Postdoctoral Fellow in in the Laboratory of Microrheology and Molecular Physiology. She received her Ph.D. from the same university (2015) and her Masters from the University of ABC (2009). Her primary research interests are in the field of Optics and Rheology with applications in biosciences and medicine. Specifically, she is interested in Digital Holographic Microscopy, Speckle, Non-Linear Photorefractive Optics and Traction Force Microscopy. She, as a good Brazilian, is passionate about cooking and loves to be around people.