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Biomechanical Characteristics Closely Related with Immune Functions of Dendritic Cells

Fuzhou Tang[1], Jin Chen[1], Shichao Zhang[1], Zuquan Hu[1], Lina Liu[1], Long Li[1], Yan Ouyang[1] and Zhu Zeng[1,*]

[1]School of Biology & Engineering / School of Basic medical Sciences, Guizhou Medical University, Guiyang 550025, China.

[*]Corresponding Author: Zhu Zeng. Email: zengzhu@gmc.edu.cn.

Abstract: As potent antigen presenting cells, dendritic cells (DCs) are utilized to deliver the signals essential for the initiation of immune responses. The motility of DCs is crucial for migration of immature DCs (imDCs) in peripheral tissue and the interaction between mature DCs (mDCs) and naïve T cells in the secondary lymph node. From biomechanical viewpoint, the deformability of cells is necessary for their motility. Deformation of cells can be divided into active deformation (e.g. chemotaxis) and passive deformation (e.g. migration under shear stress of blood flow). However, there is no detailed study on the deformability of DCs including imDCs and mDCs. In this study, the active and passive deformations of DCs under various culture conditions were respectively measured by atomic force microscopy and micropipette. The results showed that DCs at different differentiation stages displayed various deformabilities, their passive and active deformation depended on matrix stiffness, mDCs had higher active deformation and Young's modulus as well as lower passive deformation. It's significant for further understanding the immunoregulatory functions of DCs.

Keywords: Dendritic cells; biomechanical characteristics; deformability; immunoregulatory function

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