Impact of Chitinase-3-like-1 on M1 Macrophage Polarization and Functions

Huang, Guan-Yi (School: Taipei Municipal Jianguo High School)
Chen, Yu-Ruei (School: Taipei Municipal Jianguo High School)

In recent studies, scientists found that cancer is highly associated with inflammation and, macrophages, which play an important role in inflammatory response, is found to be interfered by the other factors and then may support the growth of tumor. Moreover, Chitinase-3-Like-1 is a protein which is over-expressed in tumor micro environment and promote tumor proliferation, transfer, and angiogenesis. Hence, we want to test whether this protein affects the polarization and other functions of macrophages. We found out that functions of M1 macrophages were suppressed with the addition of CHI3L1, including the expression of M1 macrophage signature genes, antigen presentation-related molecules, and antigen up taking and processing of M1 macrophages, which lead to inferior activations of M1 macrophages to CD4 and CD8. Furthermore, CHI3L1 could decrease Macrophage Mediated Antibody-Dependent Cellular Cytotoxicity. We verified that CHI3L1 could activate several signaling pathways in M1 macrophages, including p-AKT, p-ERK, p-JNK, p-STAT3. Furthermore, we will examine the concentration of nitric oxide in culture medium, major signaling pathways of CHI3L1 affecting M1 macrophages, and look for some medicines to block the receptor from combining with CHI3L1. After blocking the receptor, M1 macrophages can execute their functions, annihilate tumor cells and activate other leukocytes in the immune system, normally.