Malyshev Igor, J Clin Cell Immunol 2014, 5:5
http://dx.doi.org/10.4172/2155-9899.S1.017

OMICS Group Conferences
Accelerating Scientific Discovery

3rd International Conference and Exhibition on
Clinical & Cellular Immunology
September 29-October 01, 2014 DoubleTree by Hilton Baltimore-BWI Airport, USA

Physiological organization of immune response based on the homeostatic mechanism of matrix reprogramming: Implication in tumor and biotechnology

Malyshev Igor
University of North Texas Health Science Center, USA

It is accepted that the immune system responds to pathogens with activation of antigen-independent innate and antigen-dependent adaptive immunity. However many immune events do not fit or are even inconsistent with this notion. The existing model of immune response does not explain how the immunity recovers the homeostasis. A new homeostatic model of the immune response was developed. This model consists of four units: A sensor, a regulator, an effector and a rehabilitator. The sensor, macrophages or lymphocytes, recognize pathogenic cells and generate alarm signals. The regulator, antigen-presenting cells, Tregs and myeloid-derived suppressor cells, evaluate the signals and together with sensor cells program the effector. The effector, programmed macrophages and lymphocytes, eliminate the pathogenic cells. The rehabilitator, M2 macrophages restrict inflammation, provide angiogenesis and reparation of tissue damage, and restore the homeostasis. We suggest the terms "immune matrix" for a biological template of immune responses to pathogens and "matrix reprogramming" for the interdependent reprogramming of different cells in the matrix. In an adequate immune response, the matrix forms a negative feedback mechanism to support the homeostasis. The cellular and phenotypic composition of a tumor immune matrix ("matrix signature") was defined. A tumor abnormally programs 1) the sensor, macrophages, to a protumor M2 phenotype by secreting anti-inflammatory cytokines, 2) the regulator, Tregs, to the protumor Treg phenotype using chemokines, TGF-β and normal antigens, and 3) the effector, lymphocytes and macrophages, using M2 macrophages and Tregs. Besides, tumor reprogramed M2 macrophages begin performing their "rehabilitation" functions; they attenuate inflammation and activate angiogenesis in the presence of tumor, but not after elimination of it. This "mistake" of M2 macrophages induces protumor programs. Thus tumor reprograms the homeostatic negative feedback mechanism of matrix into a pathogenic positive feedback mechanism. M2 macrophages play a key role in this transformation. Therefore, macrophages are an attractive target for biotechnology. Based on our hypotheses, we are developing a cell biotechnology method for creation of macrophages with a stable antitumor phenotype. We have shown that such macrophages almost doubled the survival time of mice with tumor.

Biography

Malyshev Igor is a Head of the Department of Pathophysiology and Head of the Laboratory of Cell Biotechnology, Medical School at the Moscow State University of Medicine and Dentistry, Head of the Laboratory of Stress, Institute of General Pathology and Pathophysiology, Moscow and Adjunct Professor of Biomedical Sciences, University of North Texas Health Science Center, USA. He is a Member of the board of directors of the International Society for Adaptive Medicine and an Editorial board member of Journal of Biosciences and Medicines. He has published 3 books and monographs and 136 full length articles.

iymalyshev1@gmail.com