Special Issue

T Cell Ca^{2+} Signal Dynamics: An Emerging Landscape for Therapeutic Strategies

Message from the Guest Editors

T lymphocytes have evolved a considerable reliance on the induction and management of the intracellar Ca2+ signal. The foundation of the adaptive immune response is critically dependent on the T cell's recognition of an antigen and the immediate transduction of antigen recognition via the T cell receptor's recruitment of a multiplex Ca2+ signal. T cell-activated Ca2+ signals then proceed according to a complex trajectory, with an initial increase in cytoplasmic Ca2+ due to inositol 1,4,5-trisphosphate-mediated release from internal Ca2+ stores, followed by a Ca2+ influx phase due to the activation of plasma membrane-localized Orai Ca2+ channels gated by ER Ca2+ store depletion signals. Importantly, in the absence of the successful deployment of the Ca2+ influx signal, which can occur over protracted periods of T cell engagement with antigen-presenting cells, T cells fail to be adequately activated, resulting in impaired immune function. Thus, there are several key points where the regulation of the T cell Ca2+ signal is important, from the management of ER Ca2+ store status to pathways linked to PM Ca2+ channel activation, all of which warrant closer examination.

Guest Editors

Dr. David W. Thomas

Department of Pharmaceutical Sciences, Thomas J. Long School of Pharmacy, University of the Pacific, Stockton, CA 95211, USA

Dr. Marc André Lécuyer

Institute for Neuroimmunology and Multiple Sclerosis Research, Göttingen, Germany

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Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland
Tel: +41 61 683 77 34
biomolecules@mdpi.com

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Department of Cellular and Molecular Medicine, Faculty of Health and Medical Sciences, University of Copenhagen, Blegdamsvej 3C, DK-2200 Copenhagen, Denmark

Prof. Dr. Lukasz Kurgan
Department of Computer Science, Virginia Commonwealth University, Richmond, VA 23284, USA

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