ABSTRACT

This dissertation contributes to elucidation of some mechanisms of the mammalian cell submembrane signaling. Major part of the research was conducted on mast cells and basophils activated *via* the high affinity IgE receptor, FcεRI, or *via* the cell surface glycoprotein Thy-1. New roles of actin cytoskeleton in mast cell signaling via FcεRI and Thy-1 are described. Discovery of new transmembrane adaptor protein non-T cell activation linker, NTAL, short time before the initiation of work on the thesis led to the increased attention paid to this protein. Dramatic changes of signaling in mast cells deficient in NTAL, or with up- or down-regulated expression of this protein are described. NTAL was also found to be one of proteins phosphorylated following the Thy-1 aggregation. Spatiotemporal distribution of surface glycoprotein Thy-1 at different levels of resolution and some biochemical properties of cells activated *via* Thy-1 are depicted. Screen for nonreceptor hitherto unknown protein tyrosine phosphatases in mast cells and basophils was conducted and initial analysis of spatiotemporal distribution and function of phosphatase PTP20 in mast cell signaling was performed. Next, the role of reactive oxygen and nitrogen species in the regulation of mast cell protein tyrosine phosphatases was summarized. New method for isolation of plasma membrane sheets from nonadherent immune cells was established and verified. Topography of STAT3 in signaling of freshly isolated hepatocytes and HepG2 cells was detected. Potential applications of the achieved outcomes in understanding and treatment of asthma, Noonan syndrome, Williams syndrome, East Coast fever, and diabetes mellitus are discussed.