S57-2 Roles of Ca^{2+}-activated K^+ channel in immune system

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The intermediate-conductance Ca^{2+}-activated K^+ channel, $K_{Ca}3.1$ plays pivotal roles in the control of cell proliferation and differentiation in various cell types, including T-lymphocytes. We recently identified the novel spliced variants of $K_{Ca}3.1$ ($K_{Ca}3.1$-sp) from human and rodent lymphoid tissues, lacking the N-terminal domains of $K_{Ca}3.1$ ($K_{Ca}3.1$-wt), as a result from the alternative splicing events. The co-expression of $K_{Ca}3.1$-sp with $K_{Ca}3.1$-wt suppressed the trafficking of $K_{Ca}3.1$-wt to the plasma membrane in HEK-293 cells. IK_{Ca} current due to $hK_{Ca}3.1$-wt activity was also suppressed by $K_{Ca}3.1$-sp in dominant-negative manner in *Xenopus* oocyte expression system. In this symposium, we will describe that the alternative splicing events significantly contribute to the fine tuning of $K_{Ca}3.1$ activity in physiological and/or pathophysiological conditions in immune cells such as T-lymphocytes. In addition, we will demonstrate the significant changes in $K_{Ca}3.1$ expression in the pronounced inflammatory reactions in the delayed type hypersensitivity (DTH) model mice and the megakaryocytic differentiation of human leukemic K562 cells. Moreover, effects of $K_{Ca}3.1$ blockers/openers on them will be also shown to suggest that $K_{Ca}3.1$ is a potential target for drug development with respect to, for example, the novel pharmacotherapy of DTH and primary promyelocytic leukemia.