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SciTechnol

Hiroshi Kobayashi, J Clin Exp Oncol 2018, Volume 7
DOI: 10.4172/2324-9110-C1-008

23rd International Conference on
Cancer Research & Pharmacology
March 26-27, 2018 Edinburgh, Scotland

T cell functions under acidic conditions

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It has been well known that solid cancer nests are acidified and immune cells infiltrate into such acidic cancer nests. However, immune cell functions under acidic conditions have not been focused. Our group has investigated the TCR signaling under acidic conditions with Jurkat T cells and human peripheral primary T cells. In Jurkat T cells, the phosphorylation of CD3 and ZAP-70 was induced by the CD3 stimulation at pH 6.3 as well as pH 7.6. Calcium ions were mobilized by the CD3 stimulation at pH 7.6 and the mobilization was strengthened by the co-stimulation with CD28. In contrast to alkaline pH, no calcium ion mobilization was induced by the CD3 stimulation or co-stimulation of CD3 and CD28 at pH 6.3. Neither the stimulation of CD3 nor the co-stimulation of CD3 and CD28 induced the expression of interleukins at pH 6.3. The same results were obtained in human peripheral primary T cells. These results suggest that the downstream pathway of the TCR-signaling does not work in T cells infiltrated into acidic cancer nests. This may be a reason for attenuation of immune cell functions in cancer nests.

Biography

Hiroshi Kobayashi has received his PhD in Biochemistry from University of Tokyo in 1974. After his Postdoctoral training at Colorado University Medical Center, he started to study adaptation strategies of microorganisms to acidic environments at Chiba University in 1978. His research has been focused on mammalian cell functions under acidic conditions from 1996 at Graduate School of Pharmaceutical Sciences, Chiba University. His current challenge is to develop cancer chemotherapy specific to acidic nests. He retired in March 2012 and is currently a Professor Emeritus at Chiba University. He works as an Associate Editor of International Immunopharmacology published by Elsevier B.V. from 2014.

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