OMICS Group Conferences
Accelerating Scientific Discovery

International Conference and Exhibition on
Neurology & Therapeutics

May 14-16, 2012 Embassy Suites Las Vegas, USA

Tl^+ transport through the transient water pores in cell membranes induced by DMSO

Benlan Ye[2], Fei He[1], Weirong Liu[1], Shengchao Zheng[1], Li Zhou[1] and Zhi Qi[2]

[1]Department of Physiology, Medical College of Xiamen University, China.
[2]Medical College of Xiamen University, China

It is well known that dimethyl sulphoxide (DMSO) increases membrane permeability, which makes it widely used as a vehicle to facilitate drug delivery across biological membranes. However, the mechanism of how DMSO increases membrane permeability has not been well understood. Recently, molecular dynamics simulations have demonstrated that DMSO can induce water pores in biological membranes, but no direct experimental evidence is so far available to prove the simulation result. Using FluxOR Tl^+ influx assay and intracellular Ca^{2+} imaging technique, we studied the effect of DMSO on Tl^+ and Ca^{2+} permeation across cell membranes. Upon application of DMSO on CHO-K1 cell line, Tl^+ influx was transiently increased in a dose-dependent manner. The increase in Tl^+ permeability induced by DMSO was not changed in the presence of blockers for K^+ channel and Na^+-K^+ ATPase, suggesting that Tl^+ permeates through transient water pores induced by DMSO to enter into the cell. In addition, Ca^{2+} permeability was significantly increased upon application of DMSO, indicating that the transient water pores induced by DMSO were nonselective pores. Furthermore, similar results could be obtained from RAW264.7 macrophage cell line. Therefore, this study provided experimental evidence to support the prediction that DMSO can induce transient water pores in cell membranes, which in turn facilitates the transport of active substances across membranes.

Biography

Benlan Ye has completed her Ph.D at the Third Military Medical University, China. She is a professor and the Head of the Department of Physiology in Medical School of Xiamen University, China. She is also the director of the newly established Nursing Department in Medical School of Xiamen University, China. She has published more than 40 papers in reputed journals and awarded many prizes and honors for her outstanding work in science research and teaching.

yebl@sina.com