Temperature Effects on Action Potential Propagation in Myelinated Axons

Xinlin Song, Hengtong Wang, Yong Chen, and Yingcheng Lai

Abstract Temperature is the important factor of the activity of the biological system. Especially, temperature affects the action potential propagation along the myelinated axon. We use Hogking–Huxley-like cortical model as the node of Ranvier and the internode conductance κ as the characteristic of the myelinated axon to describe the action potential propagation under temperature. The critical κ could exist to make the action potential propagate along the myelinated axon and rise with increasing temperature. Thus, the optimum of temperature existing with different internode conductance κ is investigated to show that the information propagating on the neural system has the suitable temperature.

X. Song (✉) · Y. Chen
School of Physics and Nuclear Energy Engineering,
Beihang University, Beijing 100191, China
e-mail: xinlinsong70@buaa.edu.cn

H. Wang
School of Physics and Information Technology,
Shaanxi Normal University, Xi'an 710119, China

Y. Lai
School of Electrical, Computer, and Energy Engineering,
Arizona State University, Tempe, AZ 85287, USA