

# Gating charge displacement in a monomeric voltage-gated proton (Hv1) channel

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© 2018 National Academy of Sciences. All Rights Reserved. The voltage-gated proton (Hv1) channel, a voltage sensor and a conductive pore contained in one structural module, plays important roles in many physiological processes. Voltage sensor movements can be directly detected by measuring gating currents, and a detailed characterization of Hv1 charge displacements during channel activation can help to understand the function of this channel. We succeeded in detecting gating currents in the monomeric form of the Ciona-Hv1 channel. To decrease proton currents and better separate gating currents from ion currents, we used the low-conducting Hv1 mutant N264R. Isolated ON-gating currents decayed at increasing rates with increasing membrane depolarization, and the amount of gating charges displaced saturates at high voltages. These are two hallmarks of currents arising from the movement of charged elements within the boundaries of the cell membrane. The kinetic analysis of gating currents r