

## DISTINGUISHED LECTURE SERIES

**Ehud Isacoff, Ph.D.****Professor of Neurobiology  
Department Molecular & Cell Biology  
Berkeley University****“Can a Voltage Sensor also be a Gate?”****Friday, December 14, 2007  
10:00 am  
GBSF Auditorium, Room 1005**

In voltage-gated channels, ions flow through a single pore located at the interface between four membrane-spanning regions, one from each subunit, which form the pore domain. The gates of the pore are controlled by four peripheral voltage-sensing domains (VSDs). Within each VSD, positively charged arginines residues in the S4 segment move through a polar pathway moving outward by 3 ratchet steps upon membrane depolarization. When one of the arginines is replaced by a smaller uncharged side chain and that arginine position ratchets into the narrowest part of the pathway then it does not fill it completely and solution cations leak through. Since the movement of S4 depends on voltage this conducting state of the VSD is voltage dependent, so that the VSD is essentially a voltage-gated cation channel whose sensor and gate are both S4. Could such a mechanism be used in naturally occurring channels? We'll see.... If so, it would represent a unique solution to the sensor-gate coupling problem.

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