

Reba Howard



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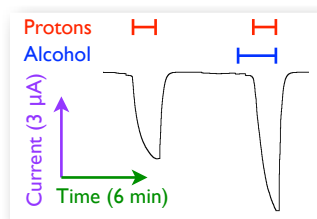
Research

The Howard research group uses simple model systems—including bacterial proteins, frog cells, and computer simulations—to study how drugs such as alcohol affect electrical signaling in the human brain (Howard *et al.*, 2011a).

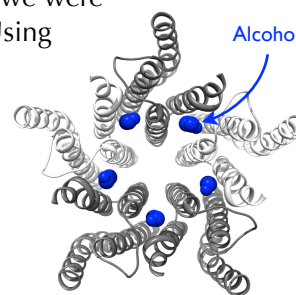
Our primary approach is *two-electrode voltage clamp electrophysiology* in oocytes from African clawed frogs, a straightforward but powerful method to study cellular electrochemical activity. Students in the Howard group have the opportunity to gain expertise in this widely used technique, as well as nucleic acid mutagenesis and purification, reagent preparation, electrophysiological measurements and analysis, protein oxidation and reduction, and molecular modeling and dynamics, among other things.



Our research applies recent advances in biochemistry, chemical biology, pharmacology, and biophysics to the critical and fascinating subject of drug use and abuse. For example, we recently demonstrated that alcohol enhances the amount of current conducted by certain ion channels (Howard *et al.*, 2011b). By mutating



specific amino acid residues in the ion channel proteins, we were able to increase or decrease their sensitivity to alcohol. Using these data, we collaborated with computational chemists to simulate the binding of alcohol to the protein. We are now testing the predictions of our binding models, and continuing to probe for additional important drug-protein interactions.



We are actively recruiting Skidmore College undergraduates to join the lab! Please contact rhoward@skidmore.edu for more details.

References

Howard RJ, Slesinger PA, Davies DL, Das J, Trudell JR, Harris RA (2011a) Alcohol binding sites in distinct brain proteins: the quest for atomic level resolution. *Alcohol Clin Exp Res* 35: 1561–73.

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Howard RJ, Murail S, Ondricek KE, Corringer P-J, Lindahl E, Trudell JR, Harris RA (2011b) Structural basis for alcohol modulation of a pentameric ligand-gated ion channel. *Proc Natl Acad Sci USA* 108: 12149–54.

Featured Article (August, 2011) Raising a glass to GLIC. *Nature Structural Biology Knowledgebase* <http://www.sbkf.org/update/2011/08/full/sbkf.2011.31.html>