

E0038

Water Water Everywhere: How Aquaporin Works. Nathan Theobald, Ashley Bray, Rebecca Denison, Martie Dowis, Simon Schmidt, Tony Schuler, Trisha Williams, Pete Nielson and Karen DeBoer. Kettle Moraine High School SMART Team, Wales, WI 53183, Mentors: Dr. Emad Tajkhorshid, Dr. Klaus Schulten, Univ. of Illinois, Urbana, IL 61801, Dr. Peter Agre, Johns Hopkins Univ., Baltimore, MD 21205.

Our SMART team has worked extensively with several scientists, including Nobel Laureate Dr. Peter Agre, to form an understanding of the protein aquaporin. This protein transports water molecules in and out of the cell in single file without letting anything else pass through it, not even ions. The computer model that Dr. Tajkhorshid and Dr. Schulten created demonstrates this process in great detail. Dr. Tajkhorshid sent this model to our team in the PDB file GlpF (*E. coli* glycerol facilitator).

Due to mutations or the absence of AQP proteins, diseases such as nephrogenic diabetes insipidus (kidney), congenital cataracts, and mercurial poisoning can occur. Other diseases related to this protein are edema, brain contusions, bacterial meningitis, and brain tumors, which happen because there are too many AQP proteins.

Dr. Peter Agre was attempting to find the mechanisms for human diseases when doing his research with AQP, while Dr. Tajkhorshid was interested in molecular dynamics and the mechanisms of proton exclusion.