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Tracking single Kv2.1 channels in live cells reveals anomalous subdiffusion and ergodicity breaking AUBREY WEIGEL, BLAIR SIMON, MICHAEL TAMKUN, DIEGO KRAPF, Colorado State University — The dynamic organization of the plasma membrane is responsible for essential cellular processes, such as receptor trafficking and signaling. By studying the dynamics of transmembrane proteins a greater understanding of these processes as a whole can be achieved. It is broadly observed that the diffusion pattern of membrane protein displays anomalous subdiffusion. However, the mechanisms responsible for this behavior are not yet established. We explore the dynamics of the voltage gated potassium channel Kv2.1 by using single-particle tracking. We analyze Kv2.1 channel trajectories in terms of the time and ensemble distributions of square displacements. Our results reveal that all Kv2.1 channels experience anomalous subdiffusion and we observe that the Kv2.1 diffusion pattern is non-ergodic. We further investigated the role of the actin cytoskeleton in these channel dynamics by applying actin depolymerizing drugs. It is seen that with the breakdown of the actin cytoskeleton the Kv2.1 channel trajectories recover ergodicity.

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