Abstract Submitted
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Probing Kv2.1 Channel Dynamics Using Single Molecule Tracking AUBREY WEIGEL, Colorado State University - School of Biomedical Engineering, MICHAEL TAMKUN, Colorado State University - Department of Biomedical Sciences, DIEGO KRAPF, Colorado State University - Department of Electrical and Computer Engineering — Kv2.1 potassium channels localize into micron-sized clusters in live neurons. This exceptional characteristic is essential for cellular function. Nevertheless, the physical mechanism behind Kv2.1 cluster formation and maintenance is largely unknown. We are investigating the dynamics of clustered Kv2.1 channels using total internal reflection fluorescence microscopy to track single molecules with nanometer accuracy in real time. Human embryonic kidney (HEK) cells are employed as a model system. HEK cells are induced to express biotinylated Kv2.1 channels fused to green fluorescent protein (GFP). Single channels are detected with streptavidin-conjugated red quantum dots (QD). GFP fluorescence provides characteristics of clusters as an ensemble while the red QDs enable tracking of individual channels. We study the dynamics of single channels inside the clusters and at the cluster interface in terms of their mean square displacement (MSD) and cumulative distribution function. Our results show a bimodal distribution of channels (clustered and non-clustered) and indicate that both Kv2.1 populations experience anomalous subdiffusion independent of cluster perimeter.

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