**Supplementary Figure 1** Specificity of different anti-Kv4.2 antibodies. Immunofluorescence labeling in primary visual cortex of wild type mice (Kv4.2<sup>+/+</sup>) and mice in which Kv4.2 was eliminated by targeted gene deletion (Kv4.2<sup>-/-</sup>), stained with mouse-anti-Kv4.2 (NeuroMab) and goat-anti-Kv4.2 (Santa Cruz). Notice that in Kv4.2<sup>-/-</sup> mice the NeuroMab antibody produces no detectable staining. In contrast, in Kv4.2<sup>-/-</sup> mice the Santa Cruz antibody stains numerous cell bodies. Scale: 100 μm.

**Supplementary Figure 2** Specificity of different anti-Kv4.3 antibodies. Immunofluorescence labeling of somata (arrow) and dendrites in superficial layers of primary visual cortex of wild type mice (Kv4.3<sup>+/+</sup>) and mice in which Kv4.3 was eliminated by targeted gene deletion (Kv4.3<sup>-/-</sup>), stained with mouse-anti-Kv4.3 (NeuroMab) and goat-anti-Kv4.3 Santa Cruz). Notice that in Kv4.3<sup>-/-</sup> mice the NeuroMab antibody produces no detectable staining. In contrast, in Kv4.3<sup>-/-</sup> mice the Santa Cruz antibody produces punctate staining of somata (arrows) and dendrites. Scale: 50 μm.