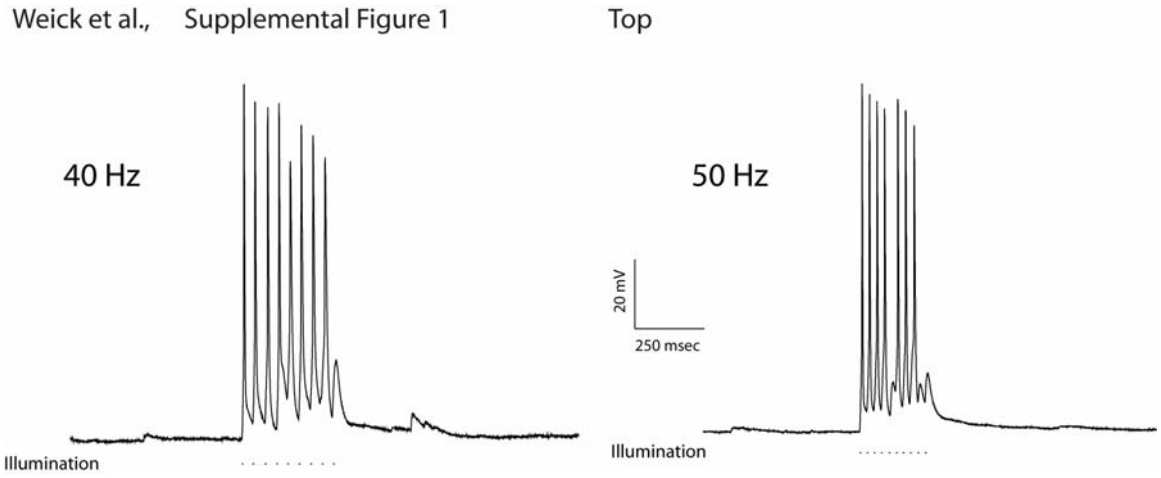
**Supplemental Figure 1.** hESC-derived neurons can achieve relatively rapid ChR2-induced spike frequencies. Current-clamp traces from a 25-week-old neuron presented with 470nm light stimuli at 40 and 50Hz frequencies.

**Supplemental Figure 2.** Post-synaptic currents are induced in hESC-derived neurons during and following trains of light stimuli and are distinguishable from ChR2 currents. (A) Voltage-clamp trace from a ChR2-expressing neuron presented with 470nm light stimuli. Notice relative absence of PSCs prior to light stimuli. (B) Current deflection in a ChR2-expressing neuron presented with 470nm light stimuli (left trace) is coincident with light stimuli while PSC in a ChR2- cell is delayed (right trace). ChR2 currents also display rise times consistent with exposure length while PSCs display more rapid rise times.

Weick et al., Supplemental Figure 1




Weick et al., Supplemental Figure 2