**Authentication of Key Biological and/or Chemical Resources**  
Briefly describe methods to ensure the identity and validity of key biological and/or chemical resources used in the proposed studies.

*Viral constructs:* Viral vector constructs will be obtained from standard vector cores facilities (University of North Carolina-Chapel Hill, MIT, Stanford University). Each viral construct will be confirmed for all subjects in all experiments with a combination of immunohistochemistry and in vitro physiology. In experiments utilizing custom viral vector constructs, such as the proposed c-Fos-tTA construct, the efficacy of transduction as well as functionality will be confirmed using standard immunohistochemical and in vitro physiological techniques. To ensure robustness and reproducibility, all viruses—custom and currently available—and their associated standardized protocols will be made available for use by external labs freely.

*Antibodies:* Antibody staining through standard immunohistochemical techniques is integral to my proposed Aims 1C, 2A, and 3C. To that end, I have chosen Invitrogen and Santa Cruz Biotechnology as the main suppliers given the robust and reproducible nature of their products between labs and over time, in addition to the widely available and reproducible protocols available (Liu et al. 2012; Ramirez et al. 2013; Redondo et al. 2014; Ryan et al. 2015). The functionality of all acquired antibodies will be initially confirmed by staining against common proteins leveraged in this proposal, including ChR2-mCherry and c-Fos. The remaining biologicals and chemicals utilized throughout this proposal, including mouse strains, surgical resources, and tissue fixation chemicals, are standard laboratory reagents that are not expected to vary between labs or over time, and do not have qualities that could influence the research data.