Dear Editors,

We were invited by Kim Wagner to submit a protocol describing how to efficiently transduce GABAergic inhibitory neuron precursors before transplantation into a wild type host for *in vivo* analysis. We are enthusiastic about this opportunity to share our approach in a unique video format that we believe will aid researchers interested in using transplantation to study the processes of GABAergic interneuron development.

Herein, we detail a protocol to efficiently genetically modify GABAergic cortical interneurons with lentiviruses before transplantation for *in vivo* studies. We modeled this assay with cells derived from the embryonic medial ganglionic eminence (MGE). The MGE gives rise to the majority of cortical GABAergic interneurons, which are implicated in phenotypes underlying autism, schizophrenia, and epilepsy. MGE cells are unique, because after transplantation into a host brain, they disperse and integrate in the host brain in a cell autonomous manner. MGE transplantation, and the genetic manipulation of MGE cells, is becoming a highly utilized technique and we believe that JoVE's video format will be able to elucidate how to perform these procedures in a simplified manner.

Our protocol describes two methods. First, we provide a description of steps to do transplantations of embryonic MGE cells into neonatal host cortices. Second, we show how lentiviruses can be used to quickly transduce the MGE cells before transplantation, allowing for genetic modification of these cells before transplantation for *in vivo* studies. We also show an application of this approach, using a combination of available Cre-driver mice and a Cre-dependent reporter lentivirus to express a gene of interest in specific cell lineages. We propose that this protocol will be of benefit to many labs studying both GABAergic neuron development and neuropsychiatric disorders.

**Author contributions**

Daniel Vogt: Wrote manuscript and performed experiments

Pei-Rung Wu: Wrote manuscript and performed experiments

Shawn Sorrells: Provided data and images, and also wrote manuscript

Christine Arnold: Provided data and images

Arturo Alvarez-Buylla: Wrote manuscript

John Rubenstein: Wrote manuscript