

Supplementary Figure 1. Reliable marking Olig2 expression by GFP in the GFP-Olig2 mESC reporter line. Representative images showing the overlap of GFP and Olig2 expression at day 10 and day 20 of differentiation. About 98% of GFP labeling co-localized with Olig2 expression at the both time points. Scale bar represents 50 μm . Abbreviations: mESCs, mouse embryonic stem cells.

Supplementary Figure 2. Maturation of mESC-OPCs *in vitro*. (A) Phase contrast images showing the morphology of the purified day 30 mESC-OPCs cultured in the absence (left panel) and in the presence of T3 (right panel). (B) Superimposed current recordings from GFP⁺ mESC-OPCs and GFP⁺ cells after 6-day culture in the presence of T3 under voltage clamp at different voltages (350 ms, 20 mV steps from -120 mV to +60 mV at a holding potential of -40 mV). Note the inward rectifier potassium currents (arrows) are absent in day 30 mESC-OPCs but appear after culturing in the presence of T3. Abbreviations: mESCs, mouse embryonic stem cells; OPCs, oligodendrocyte progenitor cells; T3, 3,3',5'-triiodo-L-thyronine.