

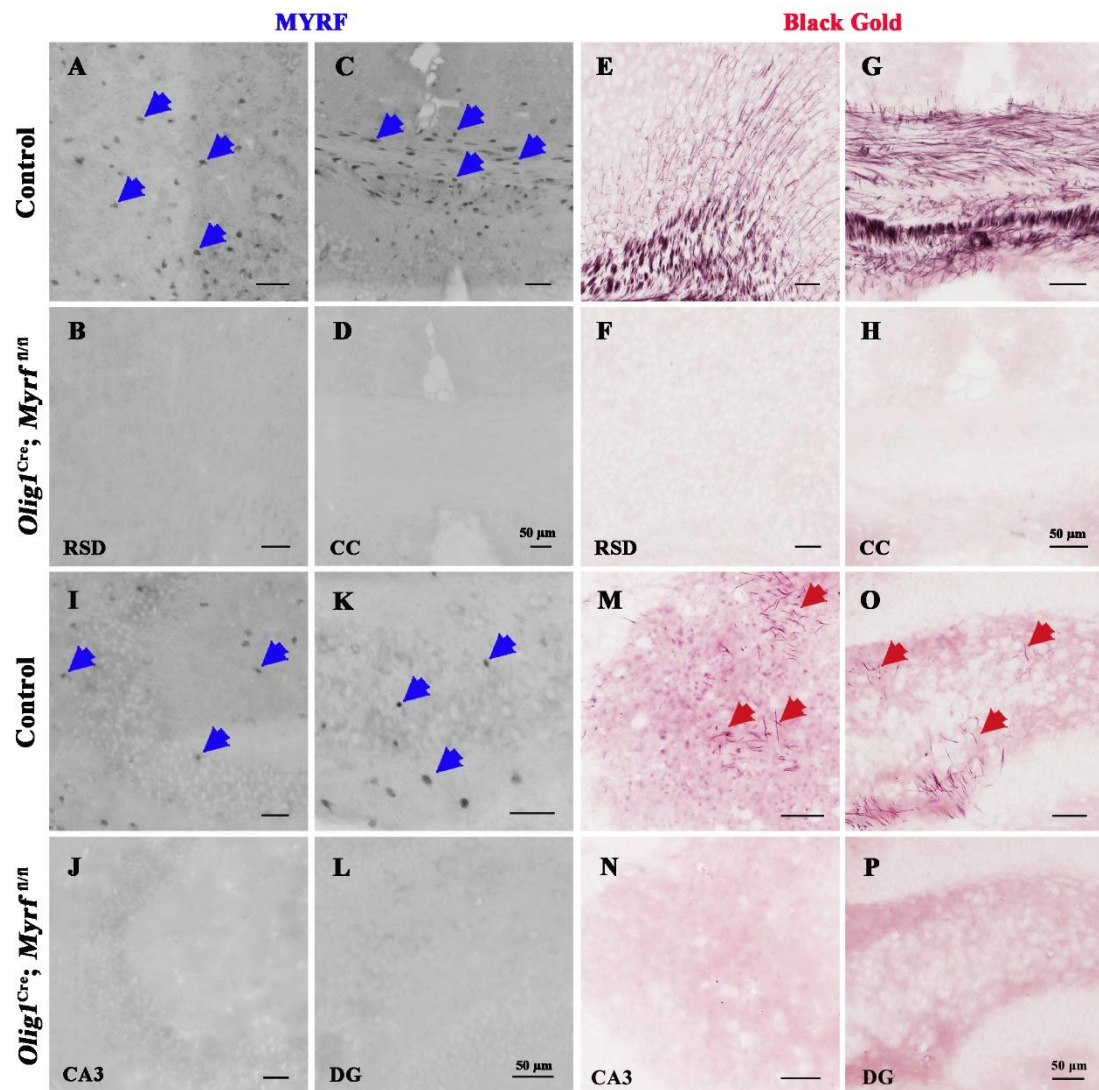
Supplementary information:

Supplementary Video

Video for continuous real-time recorded *Olig1*^{Cre}; *Myrf*-CKO mice behavior.

Figure S1-S3

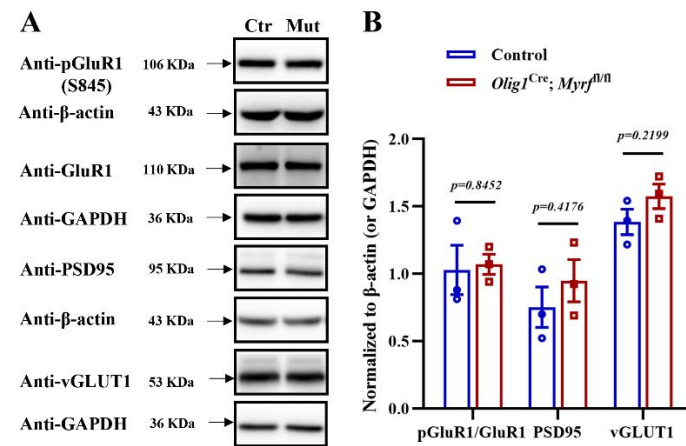
Figure_1_SuppInfo.



Myrf ablation affected oligodendrocyte differentiation and myelin formation. A-D. Immunofluorescent staining of anti-MYRF in the RSD (retrosplenial dysgranular cortex) (A-B) and CC (Corpus callosum) (C-D) of *Olig1*^{Cre}; *Myrf* CKO mice at P14. Scale bar: 50 μm. E-H.

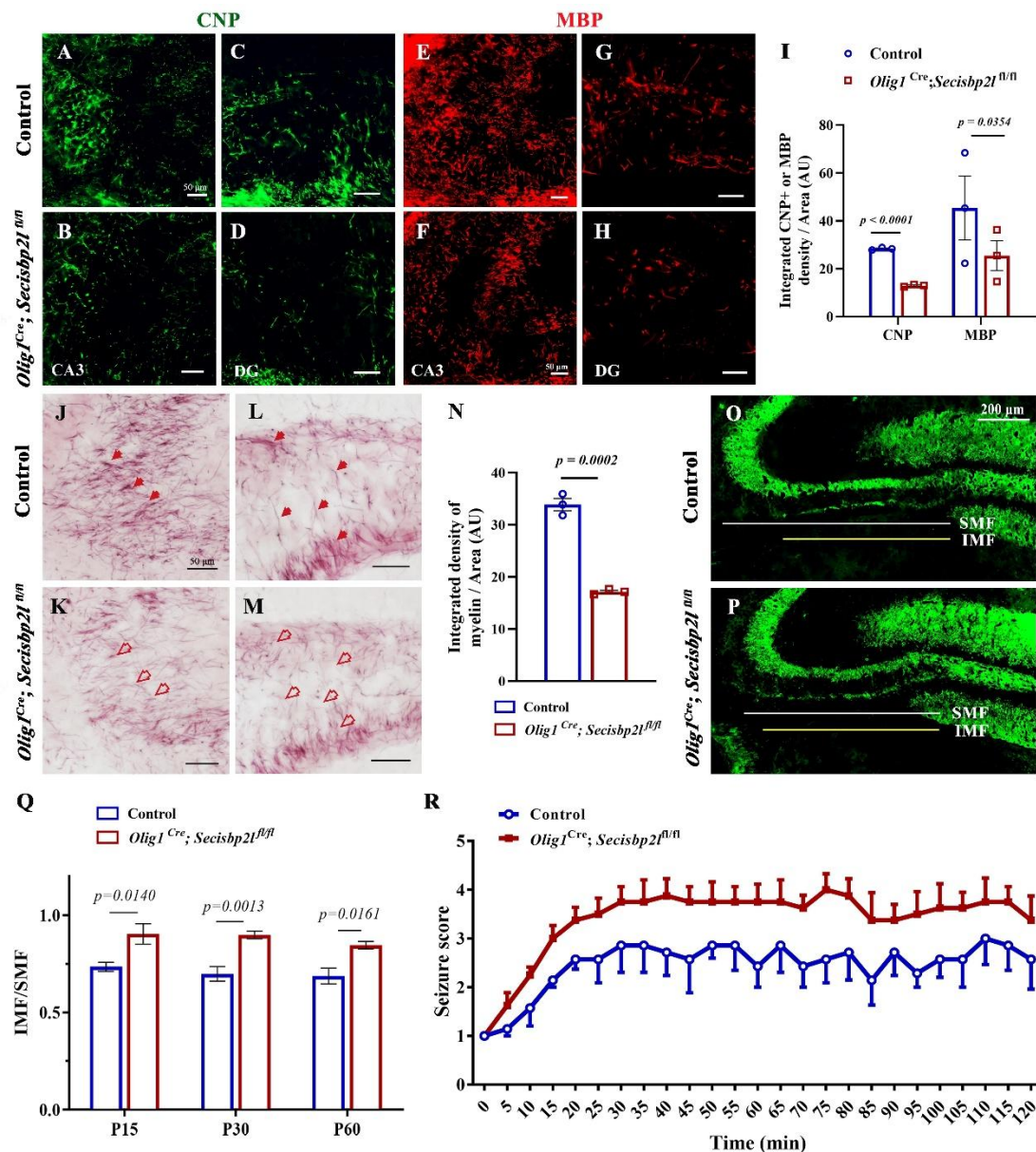
Representative pictures for gold myelin staining in the the RSD (retrosplenial dysgranular cortex) (E-F) and CC (Corpus callosum) (G-H) of *Olig1^{Cre}; Myrf^{CKO}* mice at P14. Scale bar: 50 μ m. I-L. Immunofluorescent staining of anti-MYRF in the CA3 (I-J) and DG (K-L) of *Olig1^{Cre}; Myrf^{CKO}* mice hippocampus at P14. Scale bar: 50 μ m. M-P. Representative pictures for gold myelin staining in the CA3 (M-N) and DG (O-P) of *Olig1^{Cre}; Myrf^{CKO}* mice hippocampus at P14. Scale bar: 50 μ m.

Figure_2_SuppInfo.



Myrf deficiency did not influence the level of pGluR1 in cortex. A-B. Western immunoblot for Glutamate receptor 1 (GluR1) serine phosphorylation and total protein expression levels of GluR1, PSD95 and vGLUT1 (A) quantified in (B). $n = 3$, p values were annotated on the bar graphs.

Figure_3_SuppInfo.



Secisbp21 deletion influence oligodendrocyte differentiation, mossy fiber length ratio and mice behavioral response to epilepsy. A-H. Immunofluorescence staining against anti-CNP(A-D) and anti-MBP(E-H) in *Olig1^{Cre}; Secisbp21*-cKO mice hippocampus at P15. Scale bar: 50 μm . I. Statistical analysis of the density of CNP or MBP immunostaining per unit of area (μm^2) at P15. AU, Arbitrary Units. $n = 3$. p values were annotated on the bar graphs. J-M. Gold myelin staining kit for axonal myelin sheath in the hippocampus of *Olig1^{Cre}; Secisbp21*-cKO mice at P30. Scale bar, 50 μm . N. Statistical analysis of the density of myelin fibers per unit of area (μm^2), $n = 3$. p values were annotated on the bar graphs. O-P. Immunofluorescence of anti-Calbindin in the hippocampus of *Olig1^{Cre}; Secisbp21*-cKO mice at P15. IMF, infra-pyramidal mossy fiber tract; SMF, super-pyramidal mossy fiber tract. Scale bar: 200 μm . Q. Normalized ratio of IMF to SMF at P15 to P60 in *Olig1^{Cre}; Secisbp21*-cKO mice hippocampus ($n = 3$, p values are shown in each group). R. Behavioral response to KA-induced seizure was altered in *Secisbp21* mutant mice. Seizure scores

were recorded every 5 min for control and *Olig1*^{Cre}; *Secisbp2*^{fl/fl} mice after KA induced (n=Control: 8; Mutant: 10).