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**Author contributions:**

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Experiments: SJ

Data analysis: SJ

Human NKX2-2-CreERT2 iPS cell line generation: EG

Writing – original draft: SJ, HW

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**Competing interests:** Authors declare that they have no competing interests.

**Data and materials availability:** Single-cell RNA-seq data will be made publicly available upon peer-reviewed publication on the GEO database. Cell lines (embryonic pluripotent stem cell and

induced pluripotent stem cell lines), along with plasmids and viral constructs will be made freely available to investigators at academic institutions for non-commercial research upon request (correspondence to Hynek Wichterle).

**Code availability:** Custom MATLAB and R codes will be made available on Github.

**Public datasets mentioned:**

Mouse in vivo single-cell RNA-seq data: E-MTAB-7320

Human in vivo single-cell RNA-seq data: GSE171890