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Supplemental information

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Supplement Figures & legends

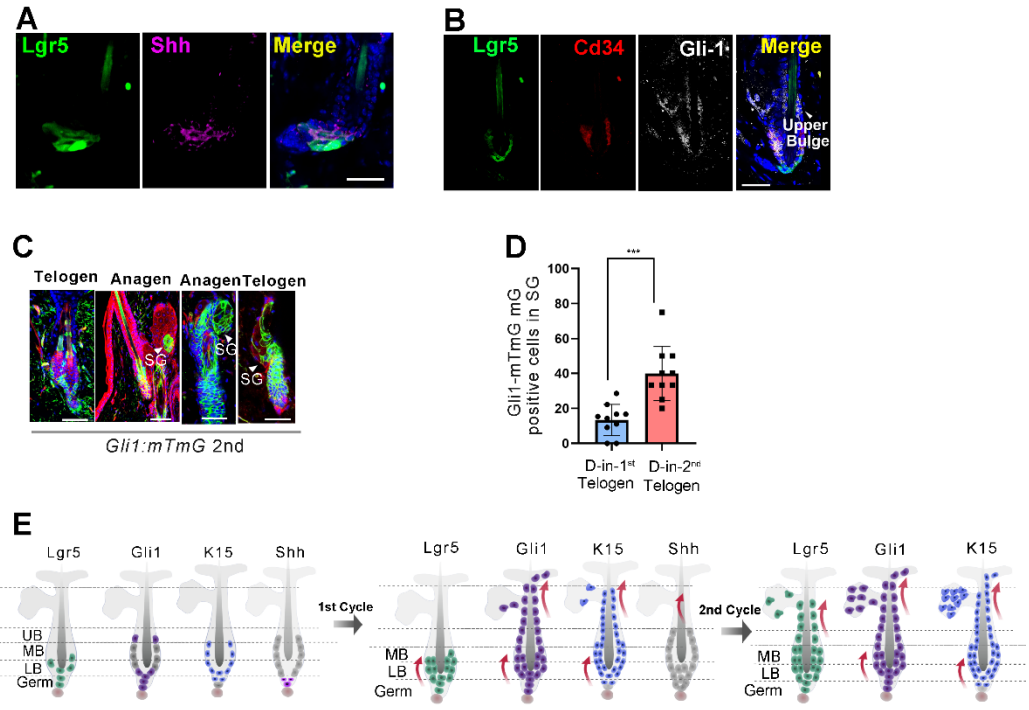

Figure S1. The contribution of different HFSCs to sebocytes, related to Figure 3. (A-B) The location of HFSCs bearing different markers as indicated in the figure. (C) Representative microscopic images showing the contribution of Gli1$^+$ HFSCs to sebocytes in *Gli1:mTmG* mice in the second depilation-induced hair cycle. (D) Quantitation of mGFP$^+$ cells within SGs in *Gli1:mTmG* mice at the first and second telogen after depilation. Data are represented as mean ± SEM, ***P < 0.005, t-test, n=5. (E) Schematic illustrations of Lgr5$^+$, K15$^+$, Gli1$^+$, and Shh progenies in the HF and SG as hair cycle progression. UB, upper bulge; MB, middle bulge; LB, lower bulge.

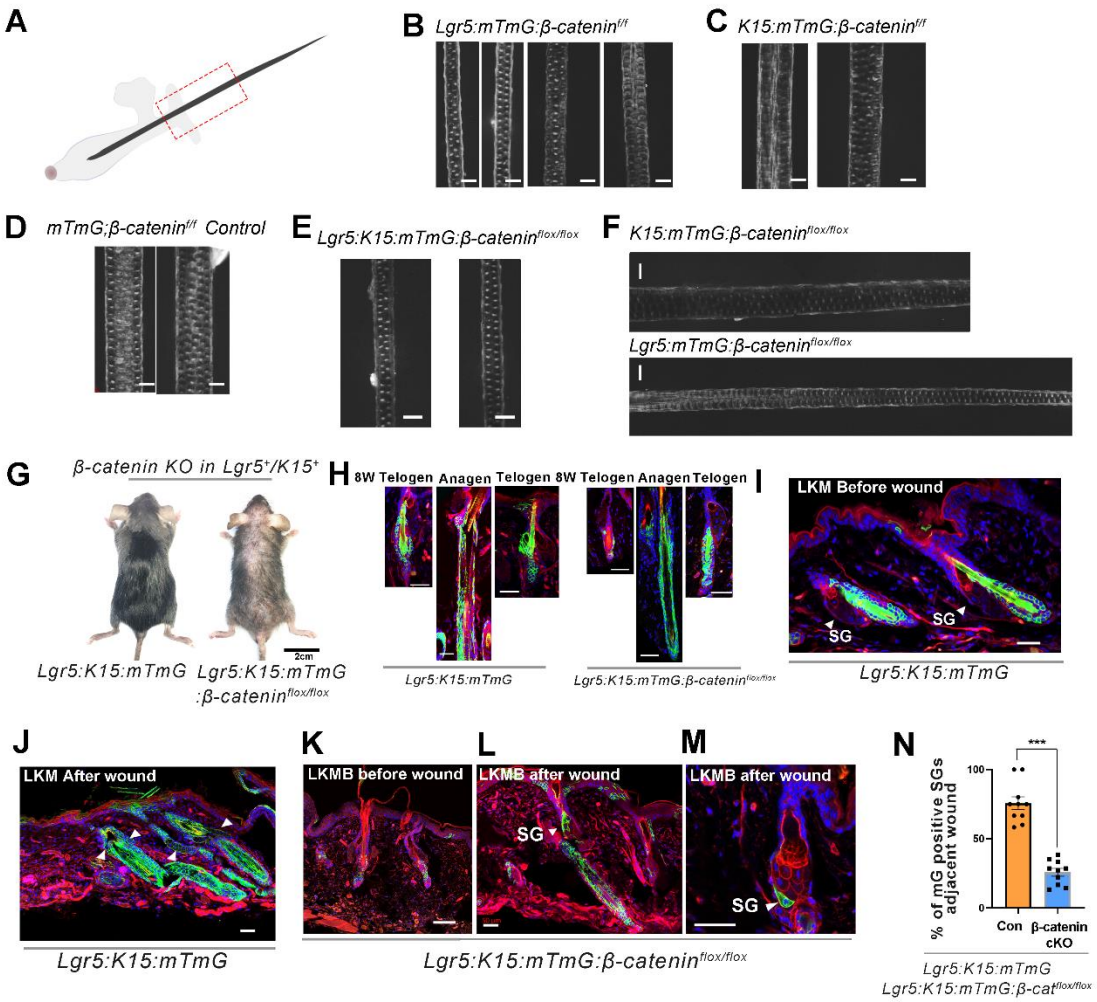

Figure S2. The influence of the loss of β-catenin in HFSCs on HF morphology and SG renewal, related to Figure 5.

(A) A schematic diagram depicting the hair follicle with hair shaft. (B-F) Light microscopy of hair shafts showing morphological changes in mice with loss of β-catenin in different HFSCs as indicated in the figure. (G) Hair coats in *Lgr5:K15:mTmG* and *Lgr5:K15:mTmG:β-catenin*$^{flox/flox}$ mice at 45 days after TAM and RU486 injections. (H) Tracing of Lgr5^{+} progenies in *Lgr5:K15:mTmG* and *Lgr5:K15:mTmG:β-catenin*$^{flox/flox}$ mice. (I-J) Tracing of the progenies of HFSCs in *Lgr5:K15:mTmG* before (I) and after (J) wounding to the skin. (K-M) Tracing of the progenies of HFSCs in *Lgr5:K15:mTmG:β-catenin*$^{flox/flox}$ mice before (K) and after (L-M) wounding to the skin. (N) mGFP-positive cells in the SG adjacent to wounds in *Lgr5:K15:mTmG* and *Lgr5:K15:mTmG:β-catenin*$^{flox/flox}$ mice were counted. Data are represented as mean ± SEM, ***P < 0.005, t-test, n=5. SG, sebaceous gland; LKM, *Lgr5:K15:mTmG*; LKMB, *Lgr5:K15:mTmG:β-catenin*$^{flox/flox}$. Scale bars, 50 μm in panels except for G.

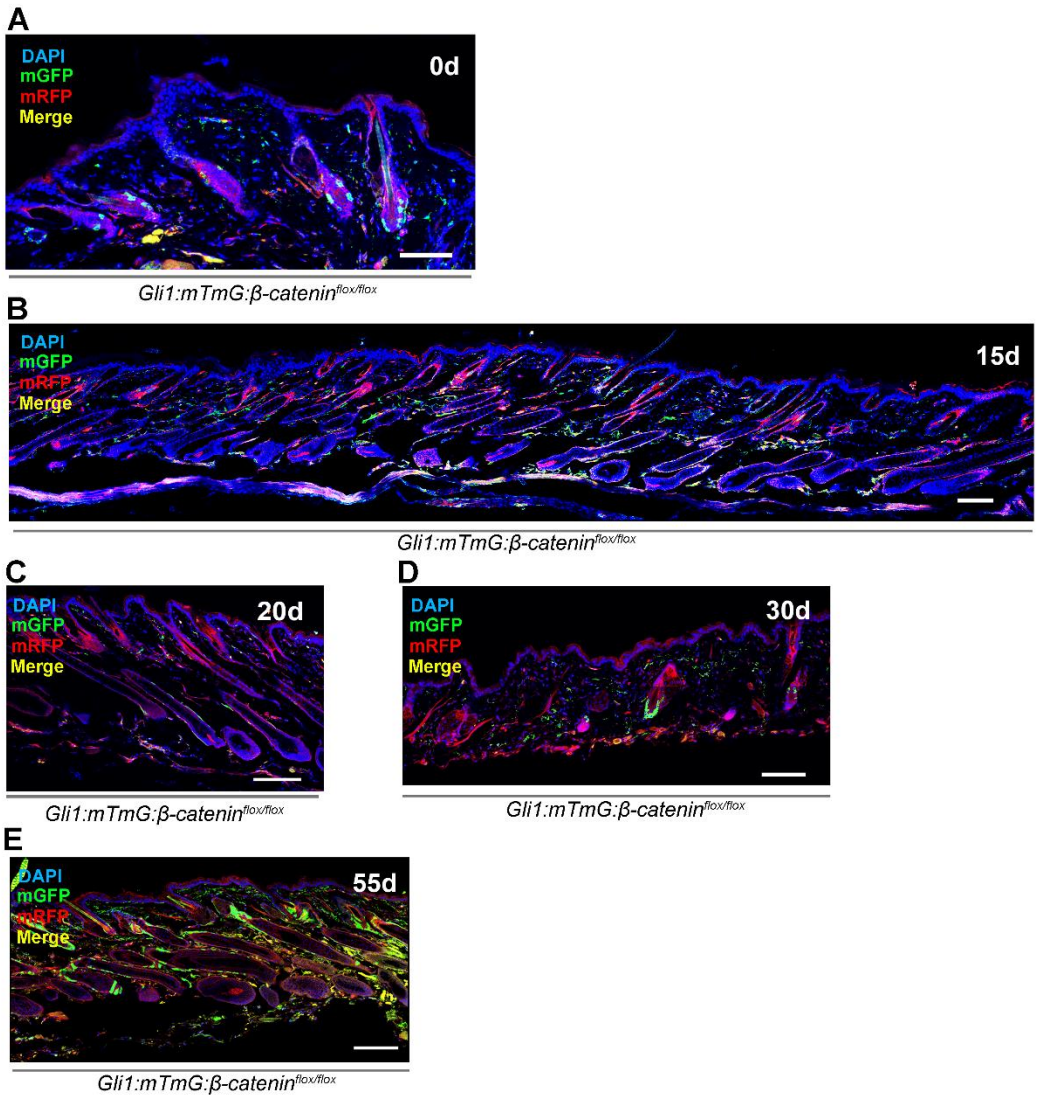

Figure S3. Tracing of Gli1⁺ HFSCs with loss of β-catenin, related to Figure 5G.

The progenies of Gli1⁺ HFSCs in the SG in *Gli1:mTmG:β-catenin*$^{flox/flox}$ mice were examined after depilation at different days (from day 0 to day 55). Scale bars, 50 μm.

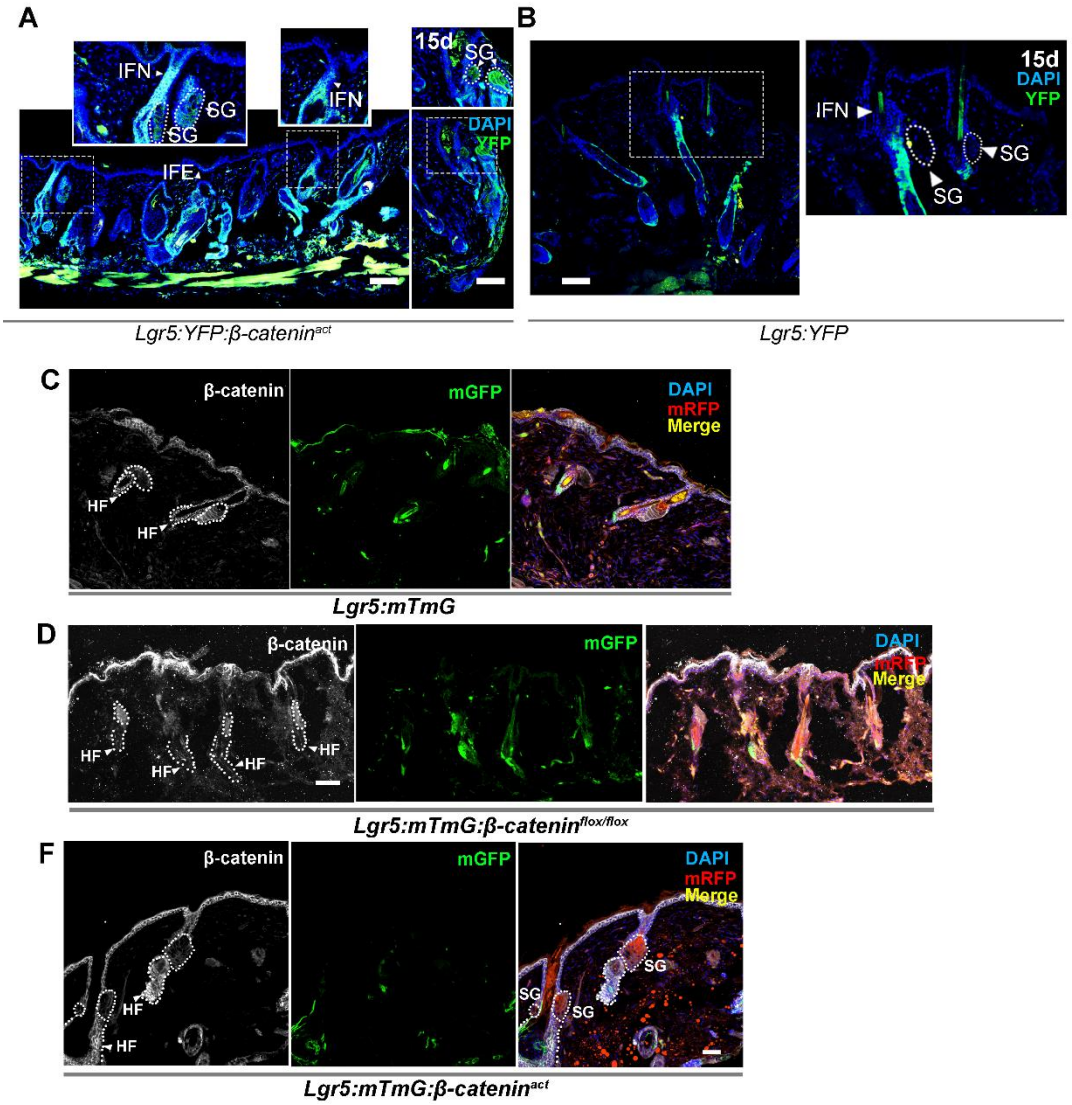

Figure S4. The influence of overexpression of β-catenin in Lgr5⁺ HFSCs on their differentiation into sebocytes, related to Figure 6.

(A-B) Lineage tracing of the progeny of Lgr5⁺ HFSCs with overexpression of β-catenin in the SG in *Lgr5:YFP:β-catenin*^{act} mice (A) and in control *Lgr5:YFP* mice. (C) Immunostaining for β-catenin in *Lgr5:mTmG* mice in 1st cycle telogen. (D) Immunostaining for β-catenin in *Lgr5:mTmG:β-catenin*$^{flox/flox}$ mice in 1st cycle telogen. (E) Immunostaining for β-catenin in *Lgr5:mTmG:β-catenin*^{act} mice in 1st cycle telogen. IFN, infundibulum; SG, sebaceous gland; HF, hair follicle. Scale bar, 50 μm.

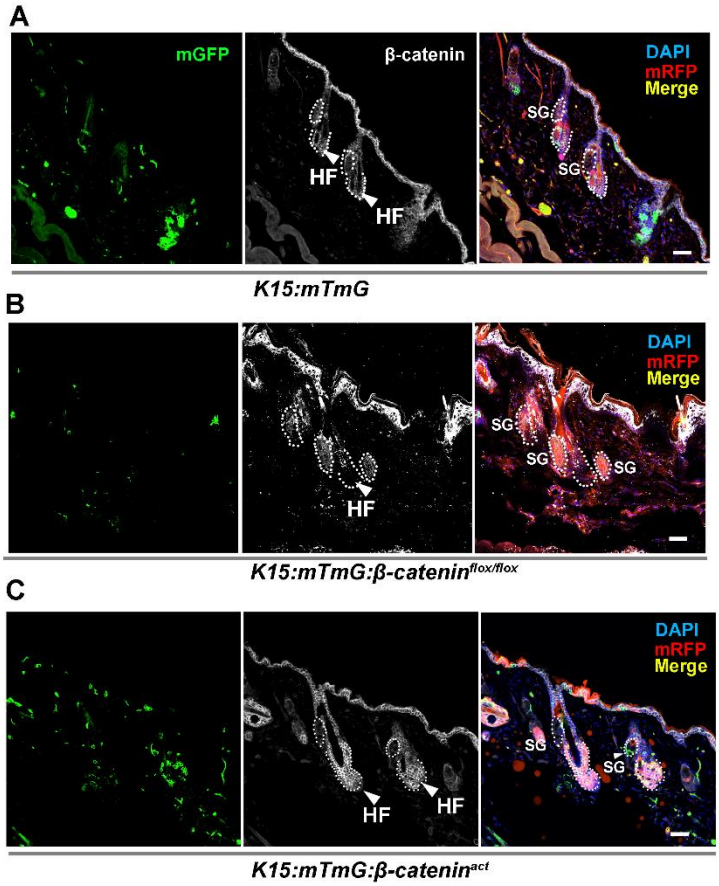

Figure S5. The influence of overexpression of β-catenin in K15⁺ HFSCs on their differentiation into sebocytes, related to Figure 6.

(A-C)The protein level change of β-catenin in K15+ HFSCs. (A) Immunostaining for β-catenin in *K15:mTmG* mice in 1st cycle telogen. (B) Immunostaining for β-catenin in *Lgr5:mTmG:β-catenin*$^{flox/flox}$ mice in 1st cycle telogen. (C) Immunostaining for β-catenin in *Lgr5:mTmG:β-catenin*^{act} mice in 1st cycle telogen SG, sebaceous gland; HF, hair follicle. Scale bar, 50 μm.

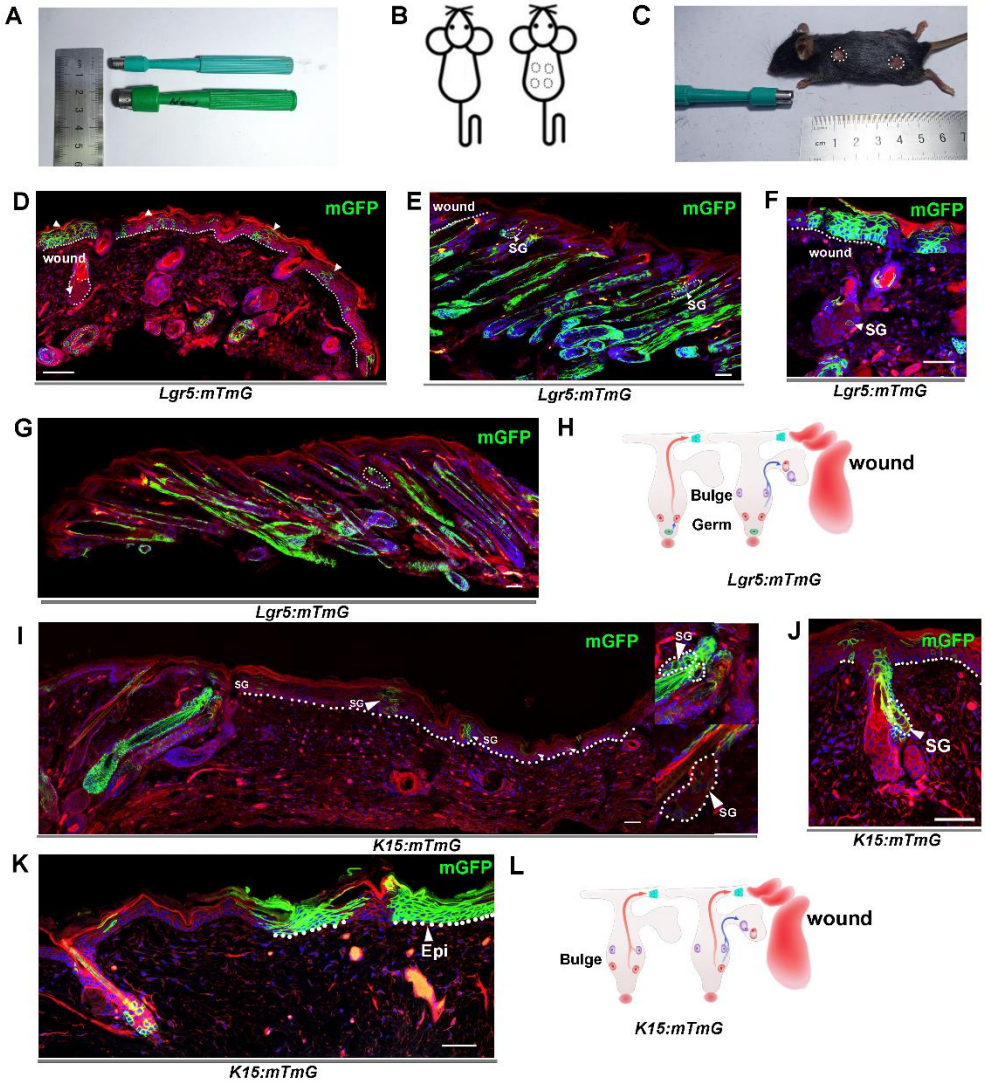

Figure S6. Wounding enhances SG renewal by recruiting progenies of Lgr5 and K15, related to Figure 4.

(A) 0.5 cm diameter hole punch and 1 cm diameter punch. (B) Pattern diagram of mice wound model. (C) Four symmetrical full-thickness skin defect wounds (0.5 cm in diameter) were made on the back of 8-week-old mice through folded skin with a sterile biopsy punch of 5 mm in diameter. (D-G) Tracing of Lgr5+ Stem cells in Lgr5:mTmG mice 20 days post wounding. Note that the border of 1cm area sebocytes in the HF adjacent to the wound and some interfollicular epidermal cells were labeled. (H) Pattern diagram of mice *Lgr5:mTmG* wound model. (I-K) Tracing of K15+ Stem cells in K15:mTmG mice 20 days post wounding.(L) Pattern diagram of mice *K15:mTmG* wound model.