Fig S1

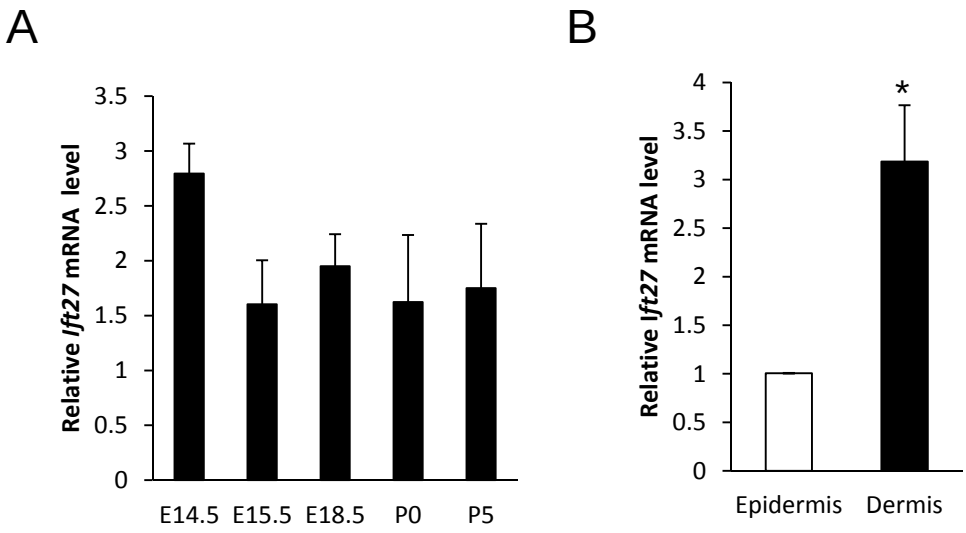

Fig. S1. *Ift27* mRNA expression in mouse skin. (**A**) *Ift27* mRNA level during skin development. n=4. (**B**) *Ift27* mRNA levels in epidermis and dermis of E18.5 embryos. n=3. *, *P*<0.05.

Fig S2

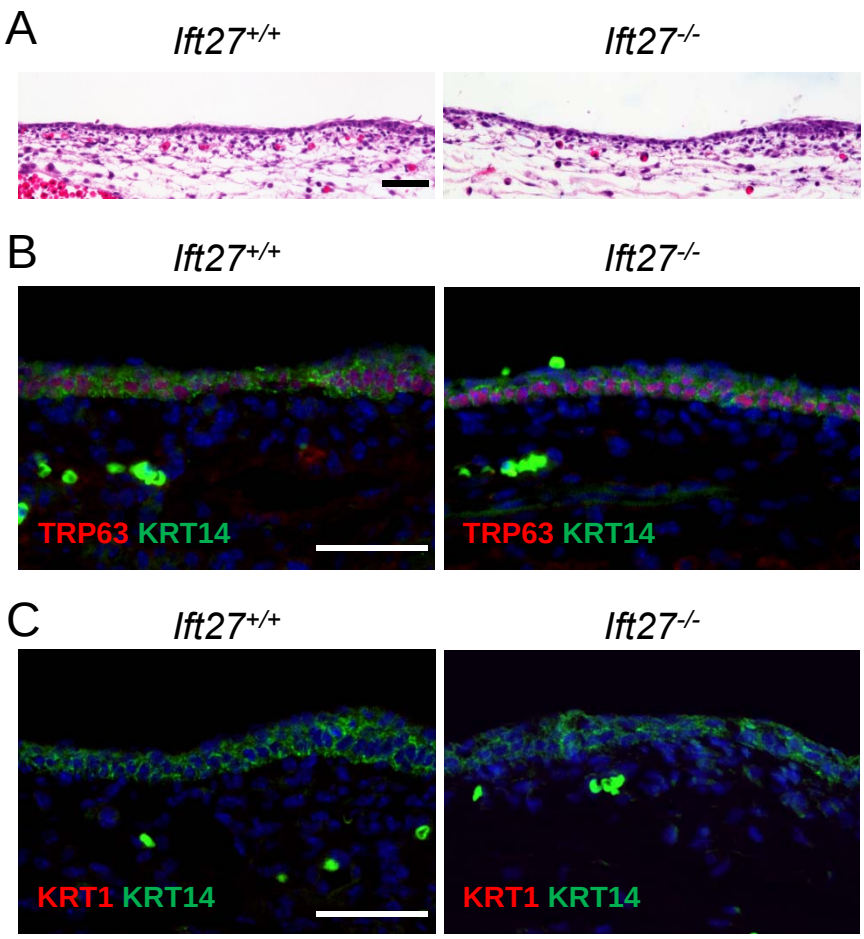

Fig. S2. Control (*Ift27*$^{+/+}$) and *Ift27* mutant (*Ift27*$^{-/-}$) skins at E14.5. (**A**) H&E staining. (**B**) TRP63 (red) and KRT14 (green). (**C**) KRT1 (red) and KRT14 (green). Note, KRT1 is absent. Scale bars: 50 µm.

Fig S3

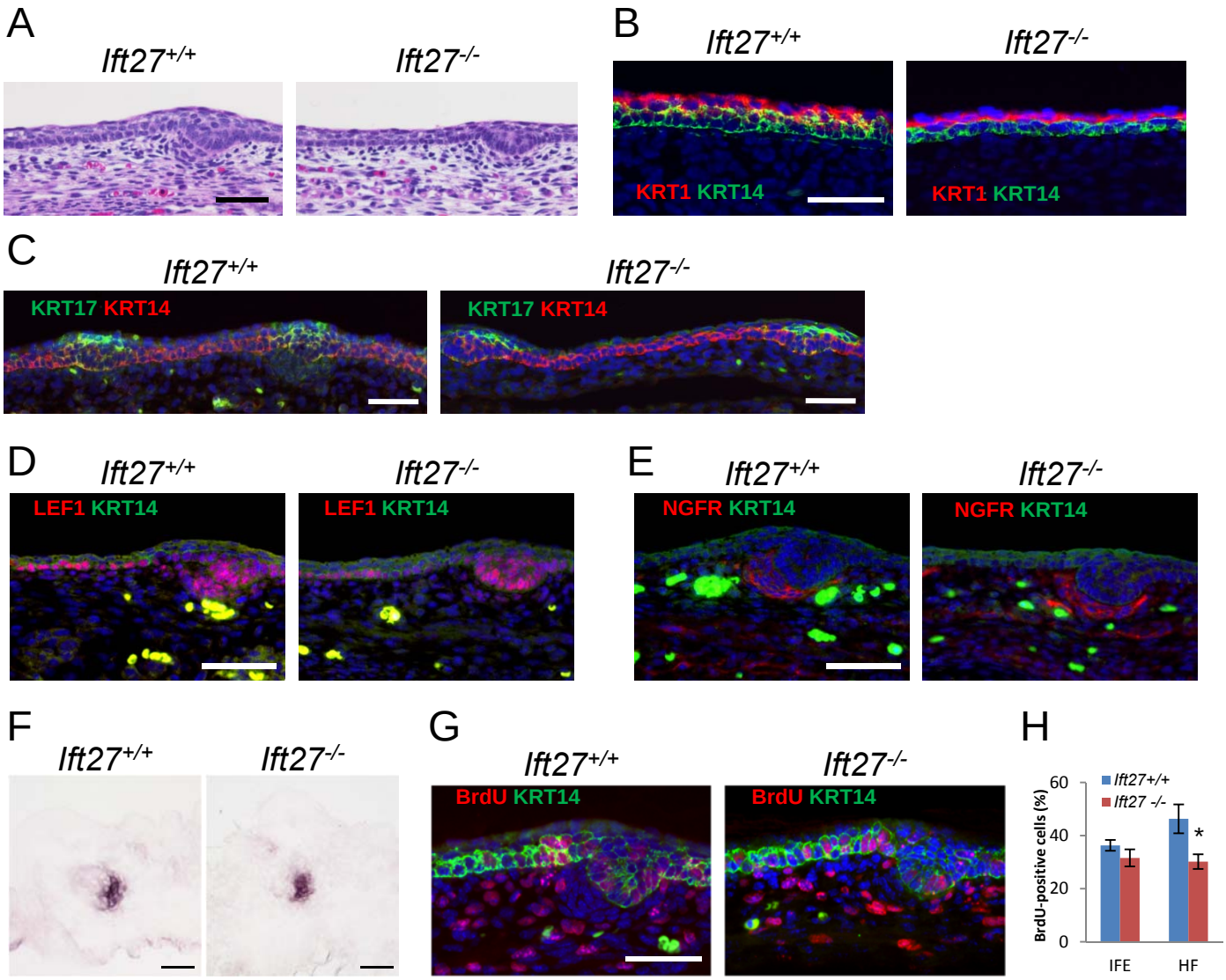

Fig. S3. Control (*Ift27*$^{+/+}$) and *Ift27* mutant (*Ift27*$^{-/-}$) skins at E15.5. (**A**) H&E staining. (**B**) KRT1 (red) and KRT14 (green). (**C**) KRT17 (green) and KRT14 (red). (**D**) LEF1 (red) and KRT14 (green). (**E**), NGFR (p75^{NTR}, red) and KRT14 (green). (**F**) Alkaline phosphatase (AP) staining in E16.5 skins. (**G**) BrdU (red) and KRT14 (green). (**H**) Quantification of BrdU-positive cells in interfollicular epidermis (IFE) and hair follicles (HF). *, *P*<0.05. Scale bars: 50 µm.

Fig S4

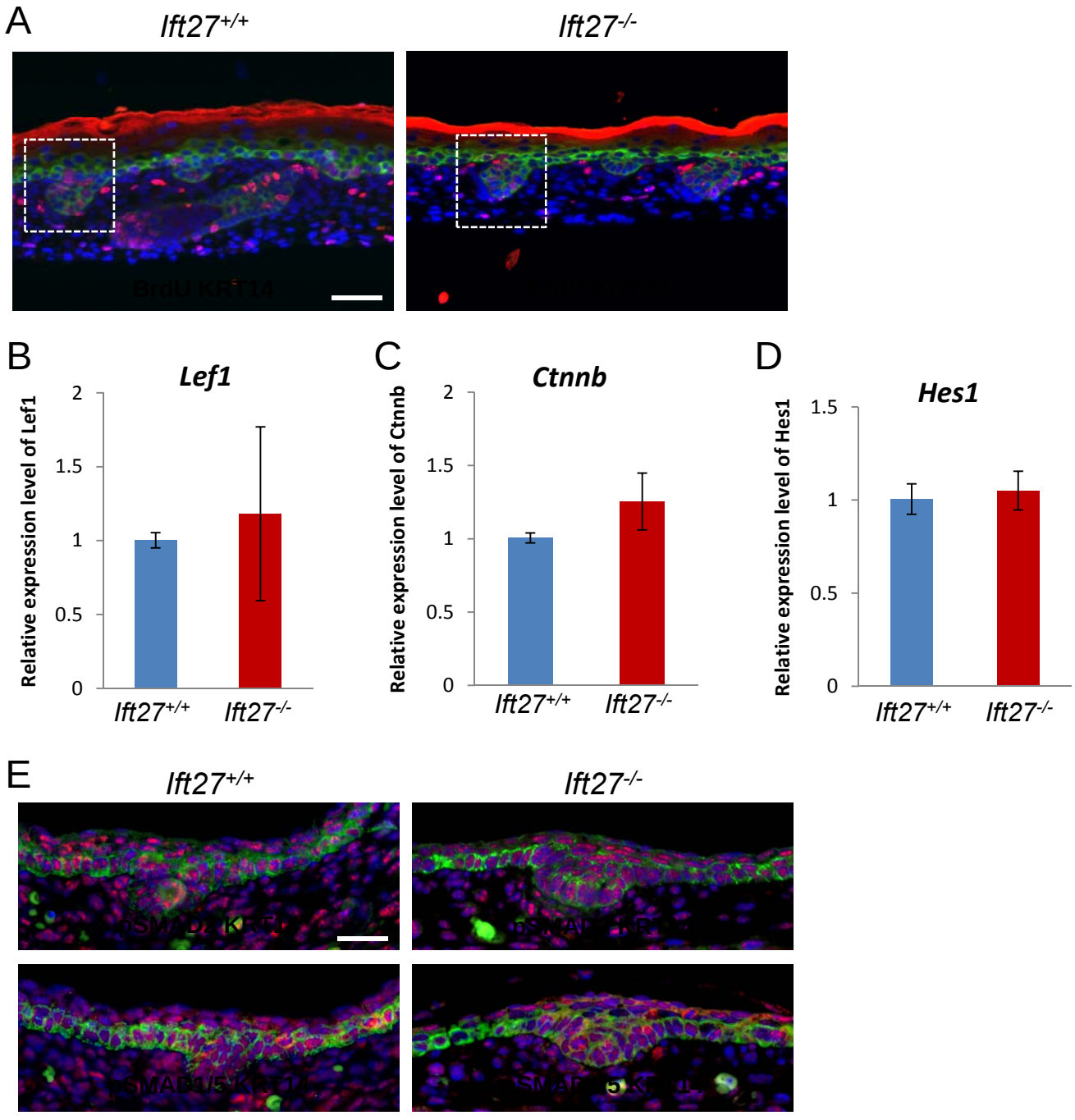

Fig. S4. Control (*Ift27*$^{+/+}$) and *Ift27* mutant (*Ift27*$^{-/-}$) skins at E18.5. (**A**) BrdU (red) and KRT14 (green). Note that BrdU-positive cells in stage 2 hair follicles (boxed) were quantified. (**B**–**D**) Relative expression levels of *Lef1*, *Ctnnb* and *Hes1* by quantitative RT-PCR. Note, the expression levels of these Wnt and Notch target genes are comparable in *Ift27*$^{+/+}$ and *Ift27*$^{-/-}$ skins. n=3. (**E**) Expression of phospho-SMAD2 (pSMAD2) and phospho-SMAD1/5 (pSMAD1/5) in control and mutant skin. Scale bar: 50 µm in A, 25 µm in E.

Fig S5

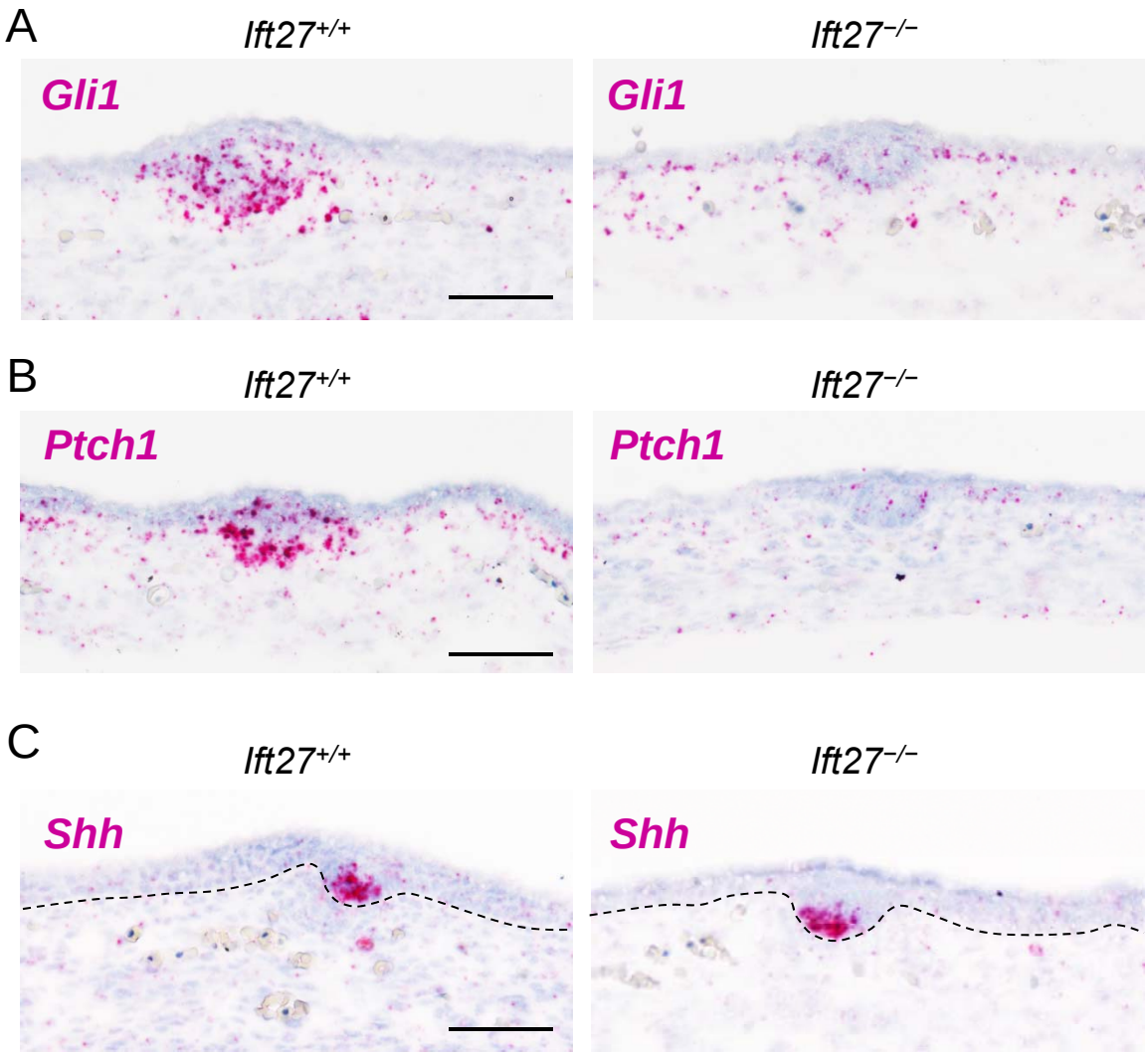

Fig. S5. Hedgehog signaling in skin of E15.5 control (*Ift27*$^{+/+}$) and *Ift27* mutant (*Ift27*$^{-/-}$). (**A**–**C**) *In situ* hybridization of *Gli1* (A), *Ptch1* (B), and *Shh* (C) in E15.5 skins of control and *Ift27* mutant, n=3. Dotted lines represent basement membrane. Note that the expression of *Shh* was comparable in hair follicles of control and *Ift27* mutant. Scale bars: 50 µm.

Fig S6

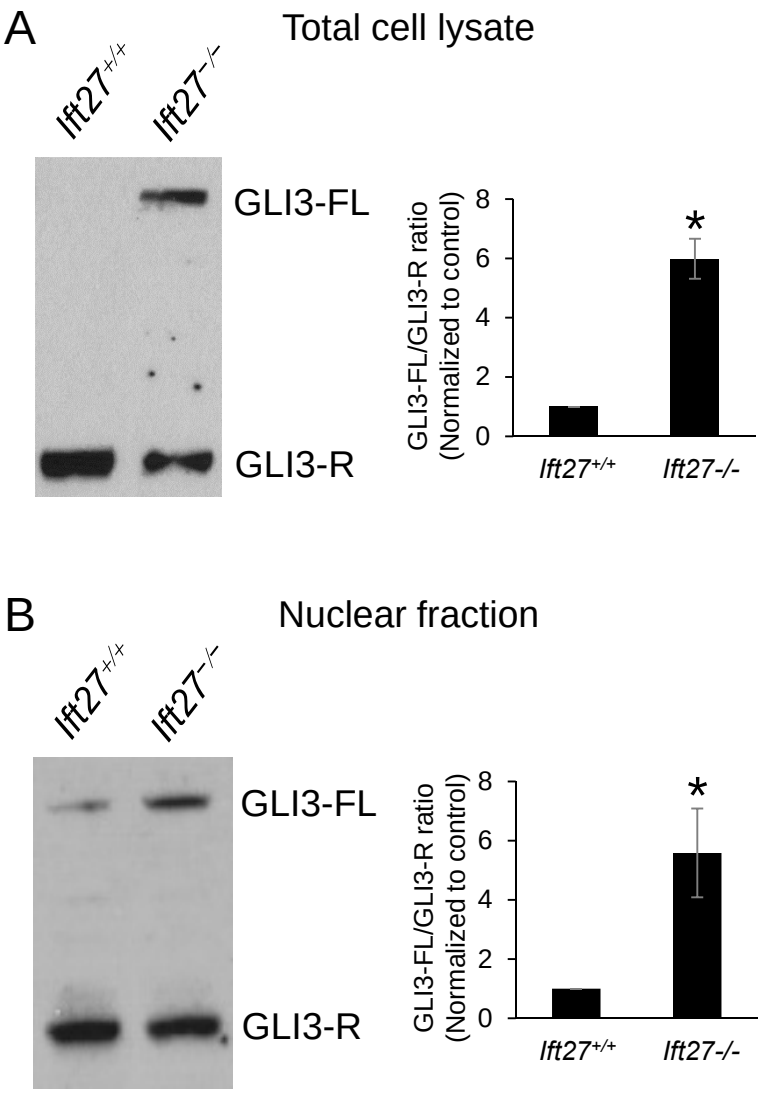

Fig. S6. Expression of full-length GLI3 (GLI3-FL) and repressor form of GLI3 (GLI3-R) in primary dermal fibroblast isolated from control (*Ift27*$^{+/+}$) and *Ift27* mutants (*Ift27*$^{-/-}$). (**A**) Representative western blotting and quantification of GLI3 in whole cell lysate. (**B**) Representative western blotting and quantification of GLI3 in the nuclear fraction of the cells. n=3. *, *P*<0.05.

Fig. S7

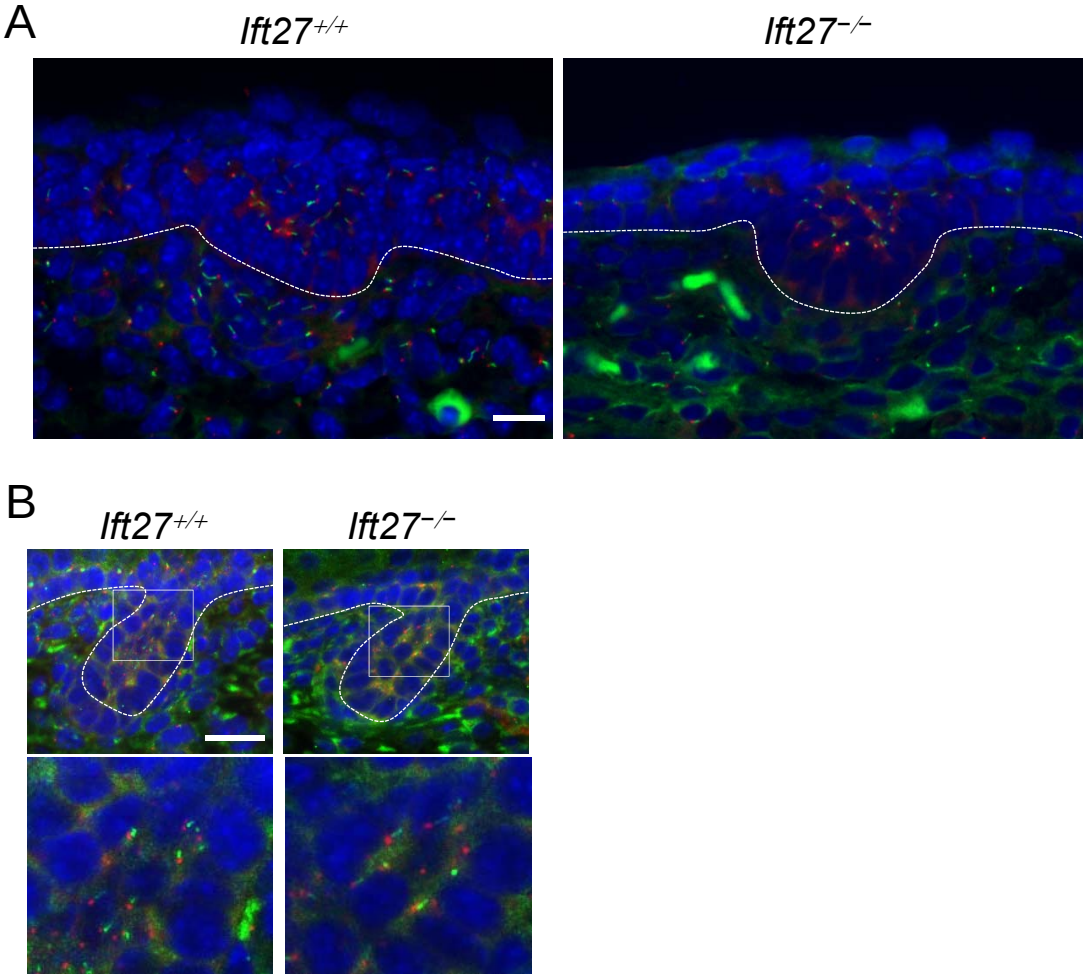

Fig. S7. Primary cilia in control (*Ift27*$^{+/+}$) and *Ift27* mutant (*Ift27*$^{-/-}$). (**A**) Cilia (ARL13B, green) and basal body (γ -tubulin, red) in hair follicles of E15.5 skins. (**B**) Cilia (ACIII, green) and basal body (γ-tubulin, red) in stage 2 hair follicles of E18.5 skins. Lower panels are enlarged boxed areas above. Scale bars: 25 µm.

Fig. S8

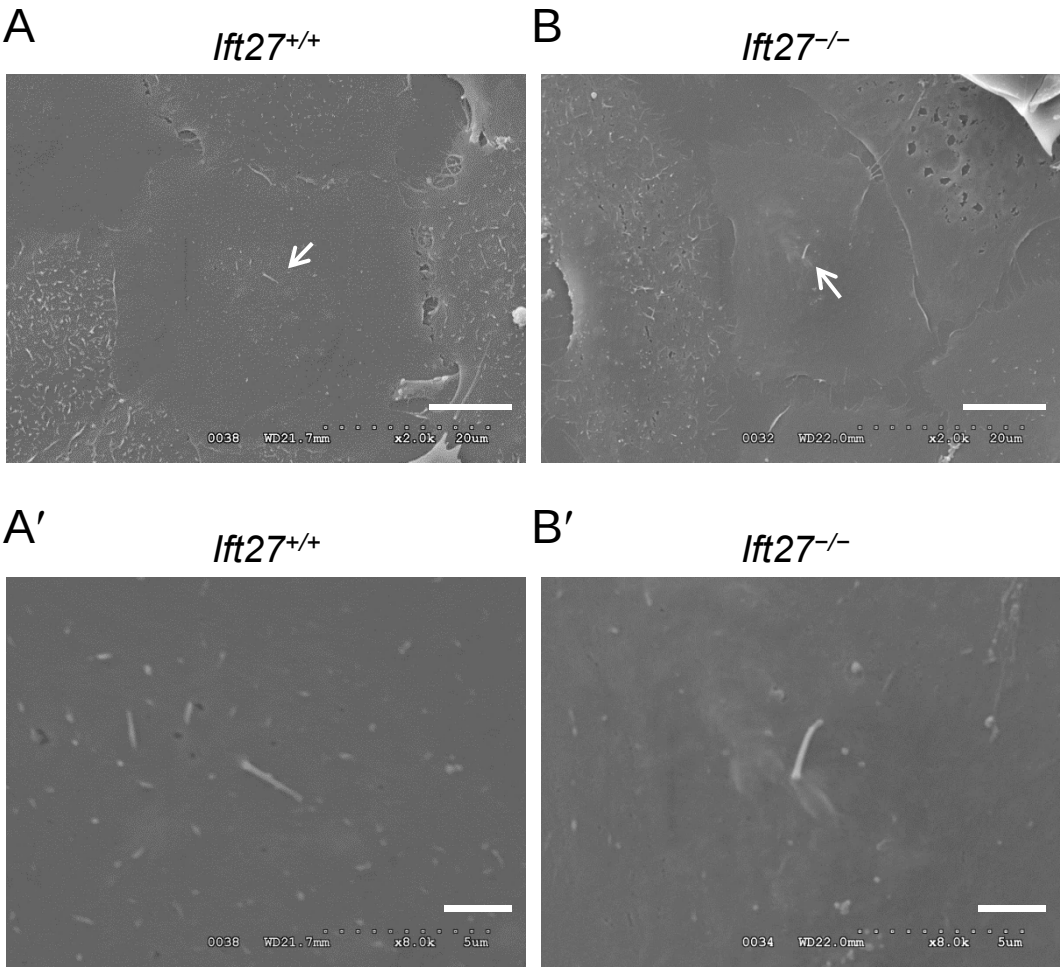

Fig. S8. Primary cilia in control (*Ift27*$^{+/+}$) and *Ift27* mutant (*Ift27*$^{-/-}$) the primary keratinocytes by scanning electron microscopy. (**A**) Cilium in a control cell. (**B**) Cilium in a mutant cell. A′ and B′ are enlarged areas of cilia shown in A and B. Scale bar: 10 µm in A and B; 2 µm in A′ and B′.

Fig S9

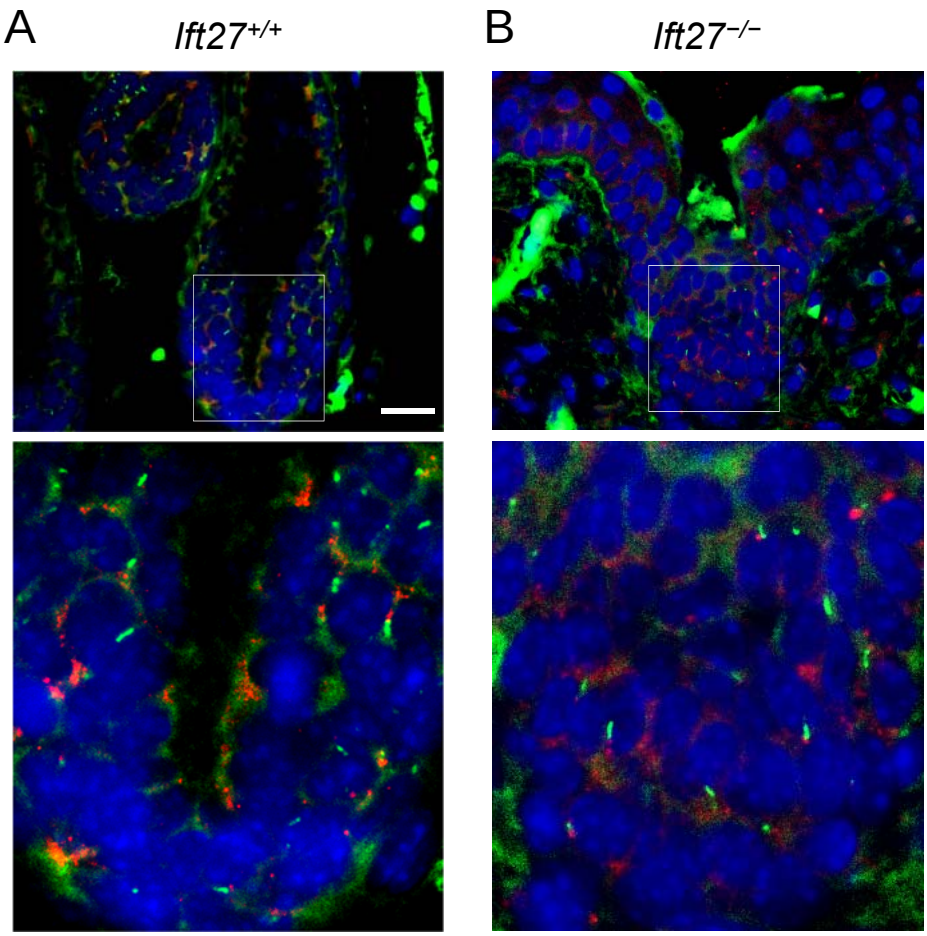

Fig. S9. Primary cilia in control (*Ift27*$^{+/+}$) and *Ift27* mutant (*Ift27*$^{-/-}$) skin transplants. (**A**) Cilia (ARL13B, green) and basal body (γ-tubulin, red) in hair follicles of *Ift27*$^{+/+}$ skin transplants. (**B**) Cilia (ARL13B, green) and basal body (γ -tubulin, red) in the hair follicle-like invagination of *Ift27*$^{-/-}$ skin transplants. Lower panels are enlarged boxed areas above. Scale bar: 20 μm.