

Title: Supplementary Data 1:

Description: Frequency of Histone-GFP retaining cells at 18 day time point (back skin 14 days) in histone-GFP dilution assay in R26M2rtTA/TetO-H2BGFP mice. CD45+ cells are leukocytes.

Title: Supplementary Data 2:

Description: Quantification of Histone-GFP dilution in esophagus and epidermis of R26M2rtTA/TetO-H2BGFP mice.

Title: Supplementary Data 3:

Description: Tests of unimodality of Histone-GFP distribution in Histone-GFP dilution in esophagus and epidermis of R26M2rtTA/TetO-H2BGFP mice.

Title: Supplementary Data 4:

Description: Parameter values used in simulations of model fits to experimental data and goodness of fit statistics.

Title: Supplementary Data 5:

Description: Lineage tracing data from *Lrig1-eGFP-cre^{ERT} R26^{flConfetti}* mice. Labelled clone sizes in murine esophageal epithelium at different times post-induction (number of basal-layer cells and total cells per labelled clone).

Title: Supplementary Movie 1.

Description: Orthogonal views of a rendered confocal Z stack of a typical esophageal epithelium wholemount from a *Rosa26^{M2rtTA} TetO-H2BGFP* mouse immediately after doxycycline induction (0 time point). Main panel is top down (x-y) view, small panels show side (x-z and y-z) views. Green: H2B-GFP; blue: DAPI. The video transits from deepest, basal plane to outermost suprabasal layers.

Title: Supplementary Movie 2.

Description: Orthogonal views of a rendered confocal Z stack of a typical ear epidermis wholemount from a *Rosa26^{M2rtTA} TetO-H2BGFP* mouse immediately after doxycycline induction (0 time point). Main panel is top down (x-y) view, small panels show side (x-z and y-z) views. Green: H2B-GFP; blue: DAPI. The video transits from deepest, basal plane to outermost suprabasal layers.

Title: Supplementary Movie 3.

Description: Orthogonal views of a rendered confocal Z stack of a typical tail epidermis wholemount from a *Rosa26^{M2rtTA} TetO-H2BGFP* mouse immediately after doxycycline induction (0 time point). Main panel is top down (x-y) view, small panels show side (x-z and y-z) views. Green: H2B-GFP; blue: DAPI; white: KRT14. The video transits from deepest, basal plane to outermost suprabasal layers. A scale plate (most apical, blister-shaped region) is located in the middle of the image, surrounded by deeper interscale regions and hair follicle openings (brightest H2BGFP intensity).

Title: Supplementary Movie 4.

Description: Orthogonal views of a rendered confocal Z stack of a typical dorsum epidermis wholemount from a *Rosa26^{M2rtTA} TetO-H2BGFP* mouse immediately after doxycycline induction (0 time point). Main panel is top down (x-y) view, small panels show side (x-z and y-z) views. Green: H2B-GFP. The video transits from deepest, basal plane to outermost suprabasal layers.