

[Supplementary Materials and Methods]

Table S1. Primer sequences used for quantitative polymerase chain reaction (qPCR)

Gene name	Primer sequences (5'→3')
Keratinocyte growth factor (<i>KGF</i>)	F: CCTTCTGCCTGTTGATTTATGG R: AGTTGCTGTGACGCTGTTTG
Fibroblast growth factor 10 (<i>FGF10</i>)	F: GCATTCTGCCTTCATCCCTTTC R: TAGCACACGGGCACTCATAC
Transforming growth factor- β 1 (<i>TGF-β1</i>)	F: GGTGGAATACGGCAACAAAATC R: TGCTGCTCCACTTTTAACTTGA
Keratin 31 (<i>K31</i>)	F: TGCCTAGAACCTAGGGAATG R: GAGCAGGACAGTCTGGAGTAG
Keratin 85 (<i>K85</i>)	F: CAGACTCTGCTCAGCCTCACAC R: CGGAAGCCACCTACAGCTATCC
Ceramide synthase 3 (<i>CerS3</i>)	F: CCAGGCTGAAGAAATTCCAG R: AACGCAATTCCAGCAACAGT
Tumor necrosis factor- α (<i>TNF-α</i>)	F: CAGGCGGTGCCTATGTCTC R: CGATCACCCCGAAGTTCAGTAG
Androgen receptor (<i>AR</i>)	F: CCAGCAGAAATGATTGCAC R: ATTACCAAGTTTCTTCAGCTTC
Dickkopf-1 (<i>DKK-1</i>)	F: GCGGGAATAAGTACCAGAC R: CGCAGTACTCATCAGTGCC

1.1. Immunofluorescence Staining

To investigate the hair follicle markers in skin organoids, immunofluorescence analysis was conducted. Whole-mount immunostaining was performed, involving fixation of samples in 4% (v/v) paraformaldehyde (PFA), permeabilization, incubation with primary antibodies, subsequent incubation with fluorescently labelled secondary antibodies, re-fixation in 4% (v/v) PFA and clearing. Analysis was carried out using a confocal microscope (Leica TCSSP5 II; Leica, Wetzlar, Germany). The expression of follicle markers was evaluated under non-treated conditions and conditions treated with WHS. The information regarding the antibodies used for analysis is listed in Table S2.

[Table S2] Antibodies list

Antibody	Vendor	Cat No.	Markers for:
DAPI	Thermo Fisher	H-1399	Nucleus
Cytokeratin 5 Monoclonal Antibody (2C2)	Thermo Fisher	MA5-17057	Basal layer of skin
NFATC1 Monoclonal Antibody (7A6)	Invitrogen	MA3-024	Hair follicle bulge

Goat Anti-Mouse IgG H&L (Alexa Fluor®488)	Abcam	Ab150113	Secondary antibodies
--	-------	----------	----------------------
