Antibodies	Source	Dilution	
Cytokeratin 12 (L-20)		Santa Cruz (Santa Cruz, CA)	1:500
Cytokeratin 3 (AE5)		Millipore (Billerica, MA)	1.100
Cytokeratin 8 (E432)		Millipore (Billerica, MA)	1:100
Cytokratin 14 (C-14)		Santa Cruz (Santa Cruz, CA)	1:200
Cytokeratin 15 (LHK15)		Santa Cruz (Santa Cruz, CA)	1:250
Pan-cytokeratins (PCK)		Millipore (Billerica, MA)	1:200
Recognizes cytokeratins 4, 5, 6, 8, 10, 13 18	&		
E-cadherin (36/-E-cadherin)		BD Biosciences	1:2000
Oct4 (Octamer-binding Protein 4)		Abcam (Cambridge, MA)	1:100
TRA-1-60		Abcam (Cambridge, MA)	1:100
SSEA4 (Stage Specific Embryonic Antige	en)	Abcam (Cambridge, MA)	1:100
(for immunofluorescence)			
SSEA4 (for separation and sorting)		R&D Systems Inc.,	1:100
		Minneapolis	
N-cadherin		Santa Cruz (Santa Cruz, CA)	1:50
Mouse monoclonal IgG		Millipore (Billerica, MA)	1:50
Vimentin (5G3F10)		Santa Cruz (Santa Cruz CA)	1.500
v inicitin (303110)		Santa Ciuz (Santa Ciuz, CA)	1.500
Alexa Fluor 488 anti–mouse IgG		Invitrogen (Carlsbad, CA)	1:1000
Alexa Fluor 488 anti–mouse IgG Alexa Fluor 647 anti–Rabbit IgG Table 2. Assay ID and Probe Sequences	s Used	Invitrogen (Carlsbad, CA) Invitrogen (Carlsbad, CA)	1:1000 1:1000
Alexa Fluor 488 anti-mouse IgG Alexa Fluor 647 anti-Rabbit IgG Table 2. Assay ID and Probe Sequences Gene Name	s Used	Invitrogen (Carlsbad, CA) Invitrogen (Carlsbad, CA) Invitrogen (Carlsbad, CA)	1:1000 1:1000
Alexa Fluor 488 anti–mouse IgG Alexa Fluor 647 anti–Rabbit IgG Table 2. Assay ID and Probe Sequences Gene Name	s Usec	Invitrogen (Carlsbad, CA) Invitrogen (Carlsbad, CA) Invitrogen (Carlsbad, CA) Invitrogen (Carlsbad, CA) Invitrogen (Carlsbad, CA)	1:1000 1:1000
Alexa Fluor 488 anti–mouse IgG Alexa Fluor 647 anti–Rabbit IgG Table 2. Assay ID and Probe Sequences Gene Name	s Usec As: Ex Hs	Invitrogen (Carlsbad, CA) Invitrogen (Carlsbad, CA)	1:1000 1:1000
Alexa Fluor 488 anti–mouse IgG Alexa Fluor 647 anti–Rabbit IgG Table 2. Assay ID and Probe Sequences Gene Name GAPDH p63	s Usec Ass Ex Hst	Invitrogen (Carlsbad, CA) Invitrogen (Carlsb	1:1000 1:1000
Alexa Fluor 488 anti-mouse IgG Alexa Fluor 647 anti-Rabbit IgG Table 2. Assay ID and Probe Sequences Gene Name GAPDH p63 K12	s Usec Ass Ex Hs Hs	Invitrogen (Carlsbad, CA) Invitrogen (Carlsb	1:1000 1:1000
Alexa Fluor 488 anti-mouse IgG Alexa Fluor 647 anti-Rabbit IgG Table 2. Assay ID and Probe Sequences Gene Name GAPDH p63 K12 ABCG2 (ATP-binding cassette sub-family G member 2)	S Usec Ass Ex Hs ^t Hs ^t Hs ^t	Invitrogen (Carlsbad, CA) Invitrogen (Carlsb	1:1000 1:1000
Alexa Fluor 488 anti-mouse IgG Alexa Fluor 647 anti-Rabbit IgG Table 2. Assay ID and Probe Sequences Gene Name GAPDH p63 K12 ABCG2 (ATP-binding cassette subfamily G member 2) K8	s Usec As: Ex Hs ¹ Hs ¹ Hs ¹ Hs ¹	Invitrogen (Carlsbad, CA) Invitrogen (Carlsb	1:1000 1:1000
Alexa Fluor 488 anti-mouse IgG Alexa Fluor 647 anti-Rabbit IgG Table 2. Assay ID and Probe Sequences Gene Name GAPDH p63 K12 ABCG2 (ATP-binding cassette sub-family G member 2) K8 DSC1 (Desmoclin-1)	s Used Ex Hs ^t Hs ^t Hs ^t Hs ^t Hs ^t Hs ^t	Invitrogen (Carlsbad, CA) Invitrogen (Carlsbad, CA) Invitrogen (Carlsbad, CA) d for Real-time PCR say ID (Taqman pression Assay) 99999905_m1 00978340_m1 00165015_m1 01053790_m1 01670053_m1 00245189_m1	1:1000 1:1000
Alexa Fluor 488 anti-mouse IgG Alexa Fluor 647 anti-Rabbit IgG Table 2. Assay ID and Probe Sequences Gene Name GAPDH p63 K12 ABCG2 (ATP-binding cassette sub-family G member 2) K8 DSC1 (Desmoclin-1) DSG1 (Desmoglein-1)	S Usec As: Ex Hs ¹ Hs ¹ Hs ¹ Hs ¹ Hs ¹ Hs ¹	Invitrogen (Carlsbad, CA)	1:1000 1:1000
Alexa Fluor 488 anti-mouse IgG Alexa Fluor 647 anti-Rabbit IgG Table 2. Assay ID and Probe Sequences Gene Name GAPDH p63 K12 ABCG2 (ATP-binding cassette sub-family G member 2) K8 DSC1 (Desmoclin-1) DSG1 (Desmoglein-1) Integrin, beta 1	s Used Ass Ex Hs ^s Hs ^s Hs ^s Hs ^s Hs ^s Hs ^s	Invitrogen (Carlsbad, CA)	1:1000 1:1000
Alexa Fluor 488 anti-mouse IgG Alexa Fluor 647 anti-Rabbit IgG Table 2. Assay ID and Probe Sequences Gene Name GAPDH p63 K12 ABCG2 (ATP-binding cassette sub-family G member 2) K8 DSC1 (Desmoclin-1) DSG1 (Desmoglein-1) Integrin, beta 1 Oct4 (Octamer-binding Protein 4)	s Usec As: Ex Hs ^t Hs ^t Hs ^t Hs ^t Hs ^t Hs ^t	Invitrogen (Carlsbad, CA)	1:1000 1:1000
Alexa Fluor 488 anti-mouse IgG Alexa Fluor 647 anti-Rabbit IgG Table 2. Assay ID and Probe Sequences Gene Name GAPDH p63 K12 ABCG2 (ATP-binding cassette sub-family G member 2) K8 DSC1 (Desmoclin-1) DSG1 (Desmoglein-1) Integrin, beta 1 Oct4 (Octamer-binding Protein 4) Nanog (Transcription Factors)	S Used As: Ex Hs ¹ Hs ¹ Hs ¹ Hs ¹ Hs ¹ Hs ¹ Hs ¹ Hs ²	Invitrogen (Carlsbad, CA)	1:1000 1:1000
Alexa Fluor 488 anti-mouse IgGAlexa Fluor 647 anti-Rabbit IgGTable 2. Assay ID and Probe SequencesGene NameGAPDHp63K12ABCG2 (ATP-binding cassette sub-family G member 2)K8DSC1 (Desmoclin-1)DSG1 (Desmoglein-1)Integrin, beta 1Oct4 (Octamer-binding Protein 4)Nanog (Transcription Factors)Sox2 (POU family binder Transcription	S Used Ass Ex Hs ¹ Hs ¹ Hs ¹ Hs ¹ Hs ¹ Hs ¹ Hs ¹ Hs ¹ Hs ² Hs ²	Invitrogen (Carlsbad, CA)	1:1000 1:1000
Alexa Fluor 488 anti-mouse IgGAlexa Fluor 647 anti-Rabbit IgGTable 2. Assay ID and Probe SequencesGene NameGAPDHp63K12ABCG2 (ATP-binding cassette sub-family G member 2)K8DSC1 (Desmoclin-1)DSG1 (Desmoglein-1)Integrin, beta 1Oct4 (Octamer-binding Protein 4)Nanog (Transcription Factors)Sox2 (POU family binder Transcription Factors)Rex1(Zinc-finger Transcription factor)	S Used As: Ex Hs ¹ Hs ¹ Hs ¹ Hs ¹ Hs ¹ Hs ¹ Hs ¹ Hs ¹ Hs ² Hs ¹ Hs ² Hs ³ Hs ³ Hs ³	Invitrogen (Carlsbad, CA) 99999905_m1 00978340_m1 0015015_m1 0010505955_m1 000415716_m1 00381890_m1	1:1000 1:1000

Gene Name	Assay ID (Taqman Expression Assay)
GAPDH	Hs99999905 m1
p63	Hs00978340 m1
K12	Hs00165015 m1
ABCG2 (ATP-binding cassette sub- family G member 2)	Hs01053790_m1
K8	Hs01670053 m1
DSC1 (Desmoclin-1)	Hs00245189 m1
DSG1 (Desmoglein-1)	Hs00170047_m1
Integrin, beta 1	Hs00559595_m1
Oct4 (Octamer-binding Protein 4)	Hs00999634_gH
Nanog (Transcription Factors)	Hs04260366_g1
Sox2 (POU family binder Transcription	Hs00415716_m1
Factors)	
Rex1(Zinc-finger Transcription factor)	Hs00381890_m1
Vim	Hs00185584_m1

Supplementary data (Ula V. Jurkunas et al,)

Table 3: Surface antigen profile of Unsorted LFs, LF SSEA4+, SSEA4-, and Unsorted BM MSCs by FACS Analysis.

Marker	Unsorted LFs	LF SSEA4+	LF SSEA4-	Unsorted BM MSCs	Predominant expression
CD106	59.24 ± 0.25%	$58.54 \pm 0.55\%$	$60.64 \pm 0.45\%$	$59.44 \pm 0.85\%$	Mesenchymal stem cells
CD166	88.24 ± 0.15%	$86.24 \pm 0.45\%$	88.74 ± 0.55%	$84.34 \pm 0.55\%$	Mesenchymal stem cells
CD71	69.07 ± 6.57%	64.34 ± 0.57%	69.83 ± 0.77%	49.73 ± 0.83%	Mesenchymal stem cells
CD90	95 ± 0.8 %	96 ± 0.2%	$96 \pm 0.5\%$	94.7 ± 3.00 %	Mesenchymal stem cells
CD29	85.6 ± 1.2 %	85.2 ± 1.2%	84.6±1.3%	84.0 ± 1.65 %	Mesenchymal stem cells
CD34	0.10 ± 0.05 %	$0.9\pm0.02~\%$	$0.15 \pm 0.04\%$	0.13 ± 0.02 %	Endothelial cells
CD45	Negative	Negative	Negative	0.8 ± 0.2 %	Hematopoietic cells
CD11b	0.51 %	$0.5\pm0.2\%$	$0.51 \pm 0.42\%$	0.35 ± 0.3 %	Microglial cells
CK3, CK12, CK10 and CK15	Negative	Negative	Negative	Negative	Epithelial cells

* Results represent percentage of expression of a marker (average values of $n=3, \pm$ standard deviation).



Supplementary Figure S1: LF SSEA4+ cell sphere formation assay. Spheres were labeled with BrdU 24 hours before fixation at days 2, 4, and 6 to detect dividing cells (10 x magnification).



 Supplementary data (Ula V. Jurkunas et al,)



Supplementary Figure S2: Comparison of stem cell marker expression between 3D Matrigel and thin-coated Matrigel culture systems. The data represent the mean \pm SEM from 6 experiments. Statistical analysis was performed using Two tailed Student's *t* test (**p*<0.05).



B



Supplementary Figure S3: Ectodermal induction of LFs and BM MSCs. (A): LFs and (B): BM MSCs; mRNA levels of p63 and CK8, determined at 1, 3, 5, and 7 days post induction. The marker levels increased to their highest levels between days 3 and 5 as compared to day 1 of induction. The data represent the mean \pm SEM from 3 experiments. Statistical analysis was performed using Two tailed Student's *t* test (**p* < 0.05).



Supplementary Figure S4: Differentiation of LF SSEA4+ and BM MSC SSEA4+ cells into corneal epithelial cells. LF SSEA4+ cells show a higher significant differentiation potential into corneal epithelial cells than do BM MSC SSEA4+ cells. The data represent the mean \pm SEM from 6 experiments. Statistical analysis was performed using Two tailed Student's t test. (***p <0.001).

