Fig. 1a:

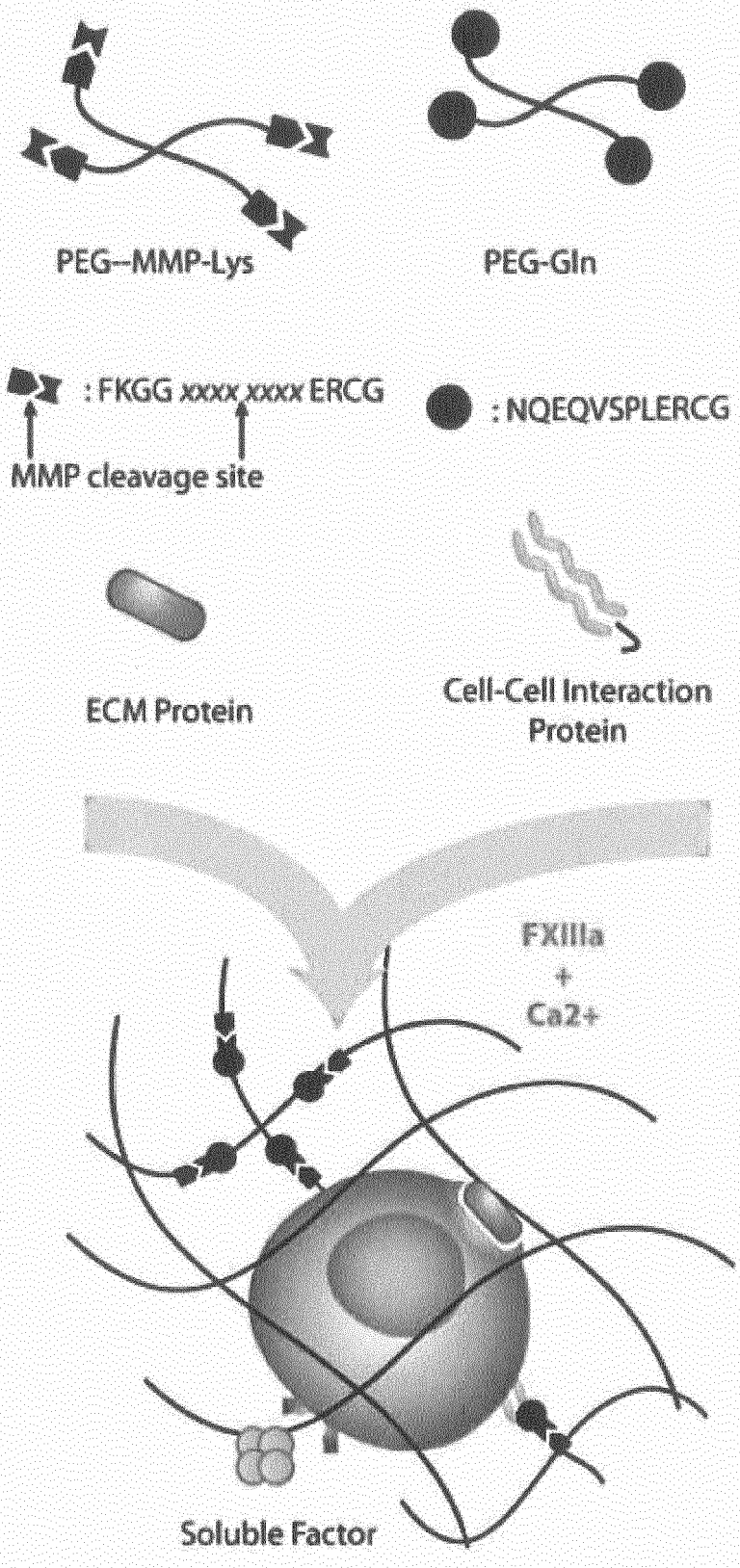

PEG--MMP-Lys
PEG-Gln
: FKGG xxxx xxxx ERCG
MMP cleavage site
: NQEQVSPLERCG
ECM Protein
Cell-Cell Interaction Protein
FXIIIa
+
Ca2+
Soluble Factor

Fig. 1b:

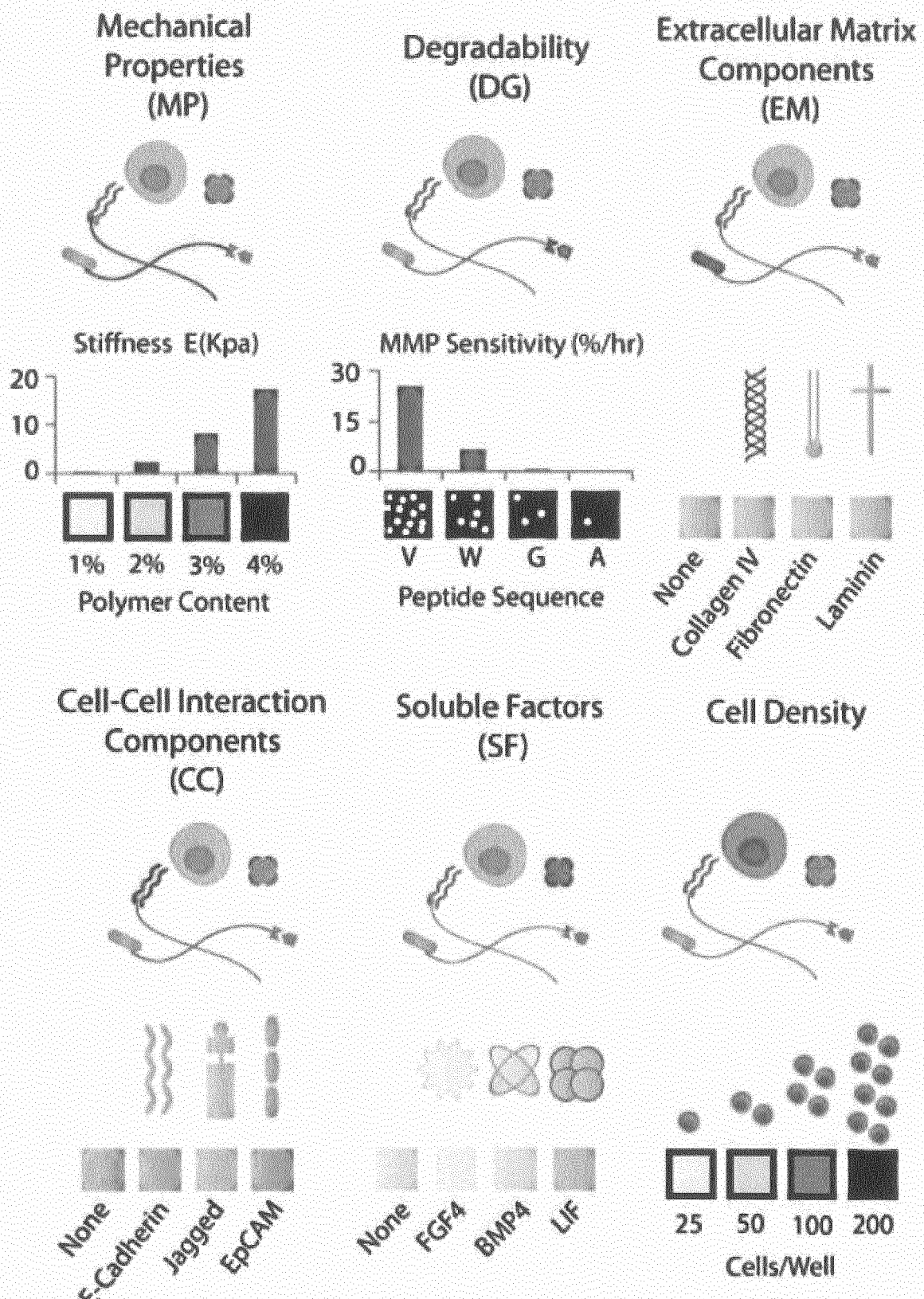
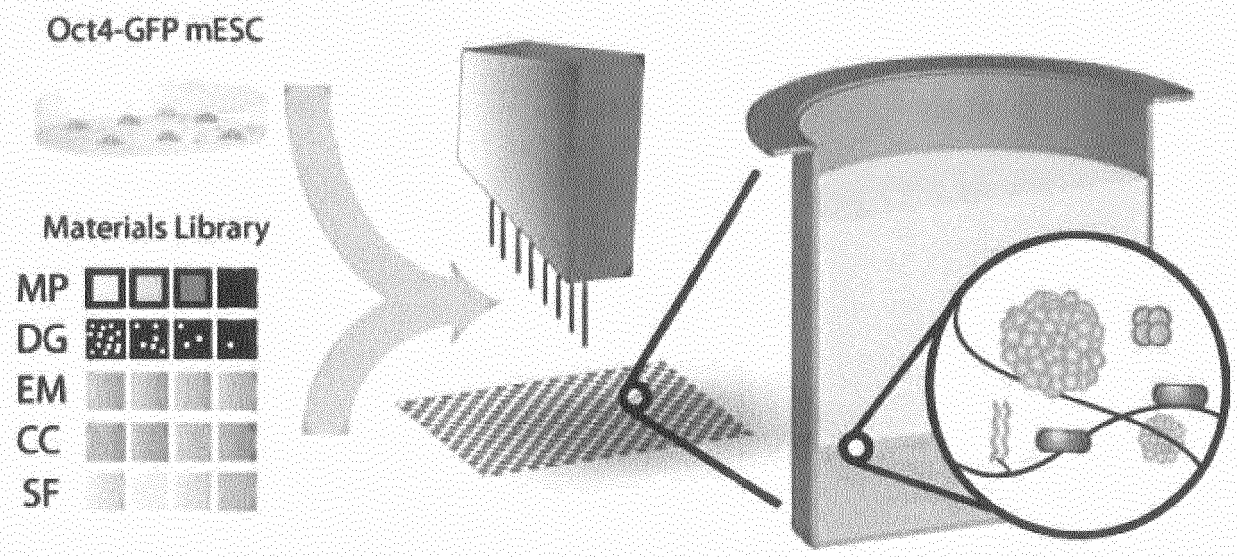

Mechanical Properties (MP)
Degradability (DG)
Extracellular Matrix Components (EM)
Stiffness E(Kpa)
20
10
0
1%
2%
3%
4%
Polymer Content
MMP Sensitivity (%/hr)
30
15
0
V
W
G
A
Peptide Sequence
None
Collagen IV
Fibronectin
Laminin
Cell-Cell Interaction Components (CC)
Soluble Factors (SF)
Cell Density
None
E-Cadherin
Jagged
EpCAM
None
FGF4
BMP4
LIF
25
50
100
200
Cells/Well

Fig. 1c & 1d:

c


Oct4-GFP mESC
Materials Library
MP
DG
EM
CC
SF

d

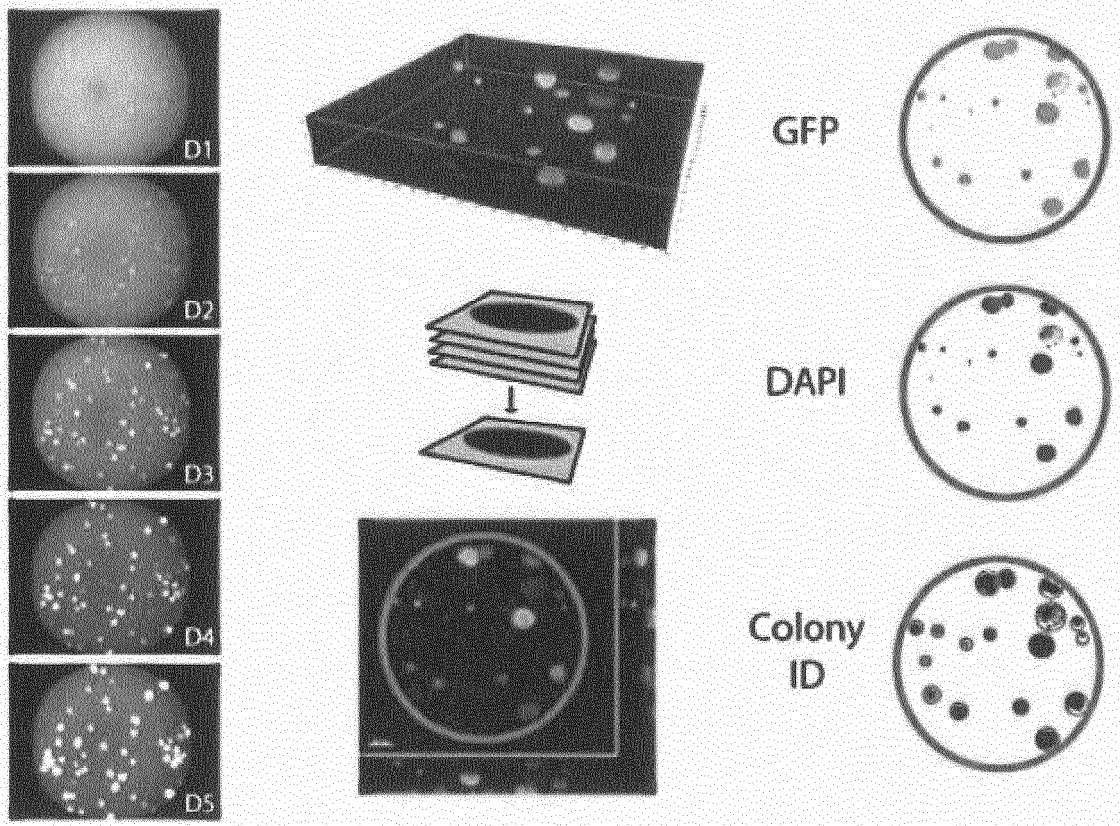
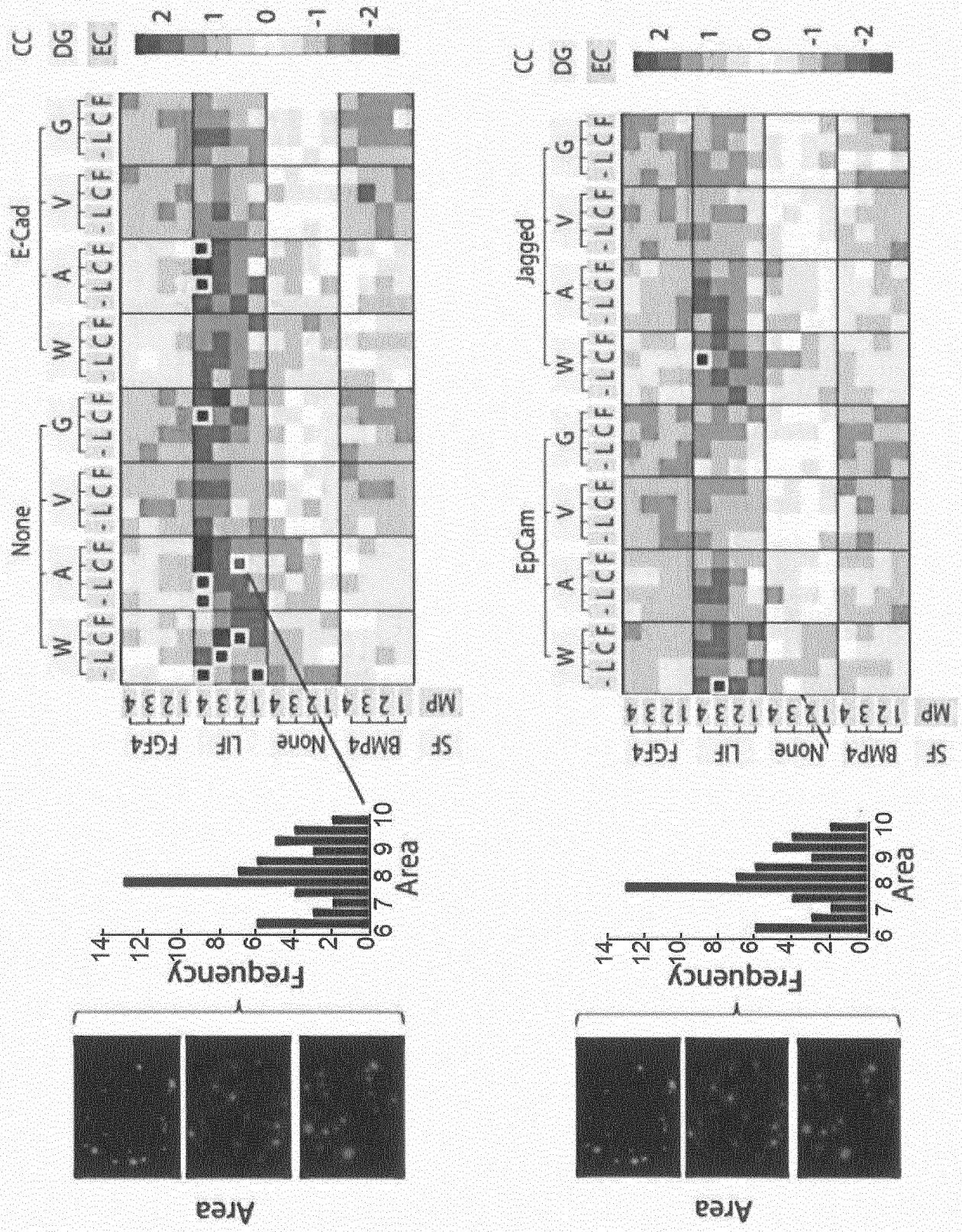

D1
D2
D3
D4
D5
GFP
DAPI
Colony ID

Fig. 2a:


CC
DG
EC
2
1
0
-1
-2
E-Cad
None
W
A
V
G
-LCF
MP
SF
BMP4
None
LIF
FGF4
Frequency
Area
Jagged
EpCam

Continuation Fig. 2a:

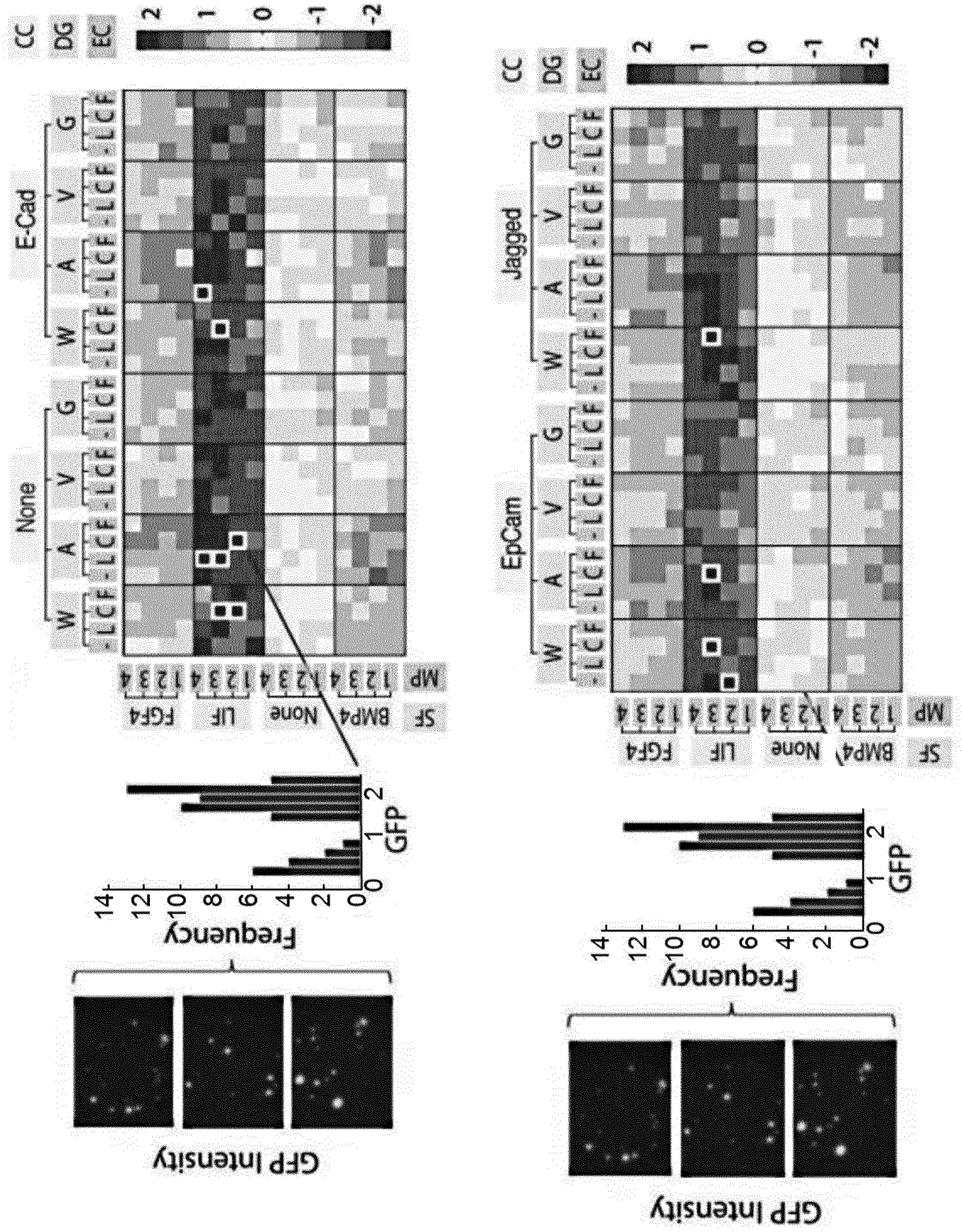


Fig. 2b:

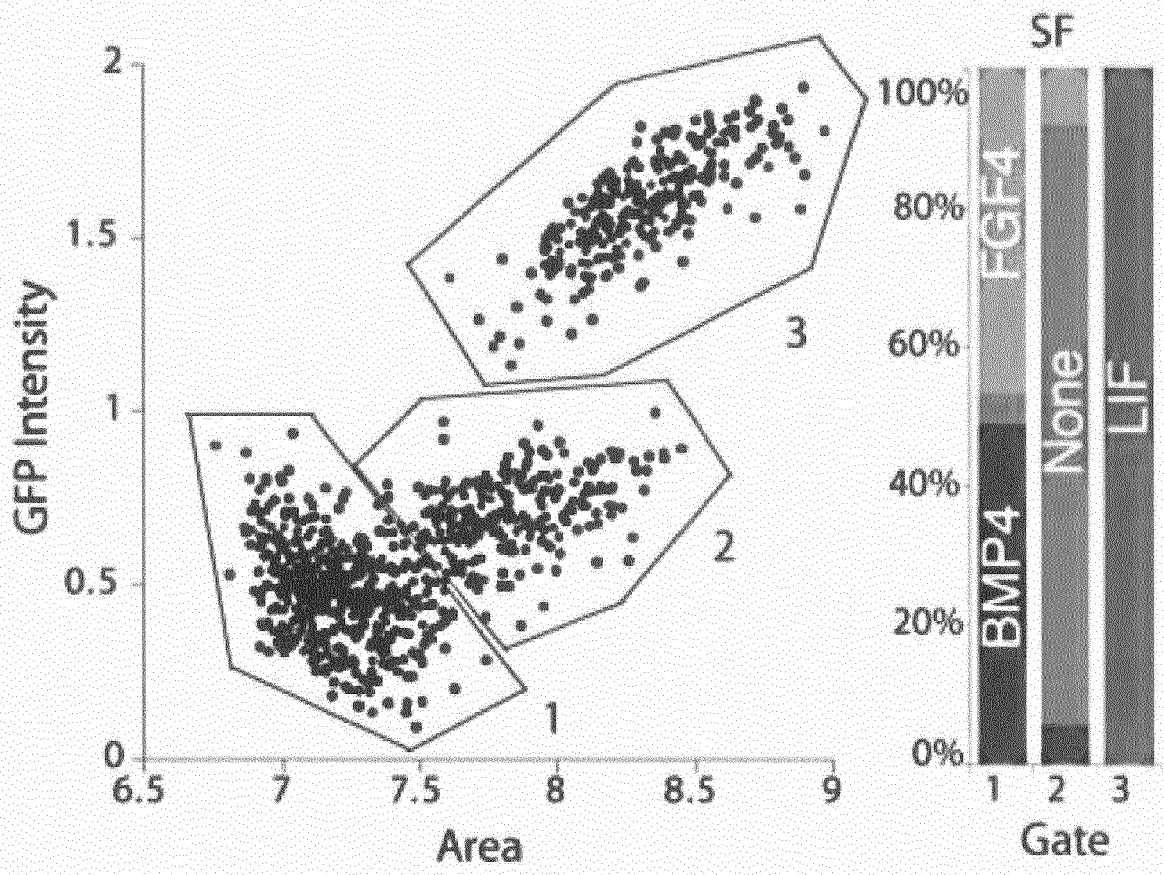

GFP Intensity
Area
SF
Gate
BMP4
None
LIF
FGF4
1
2
3

Fig. 2c:

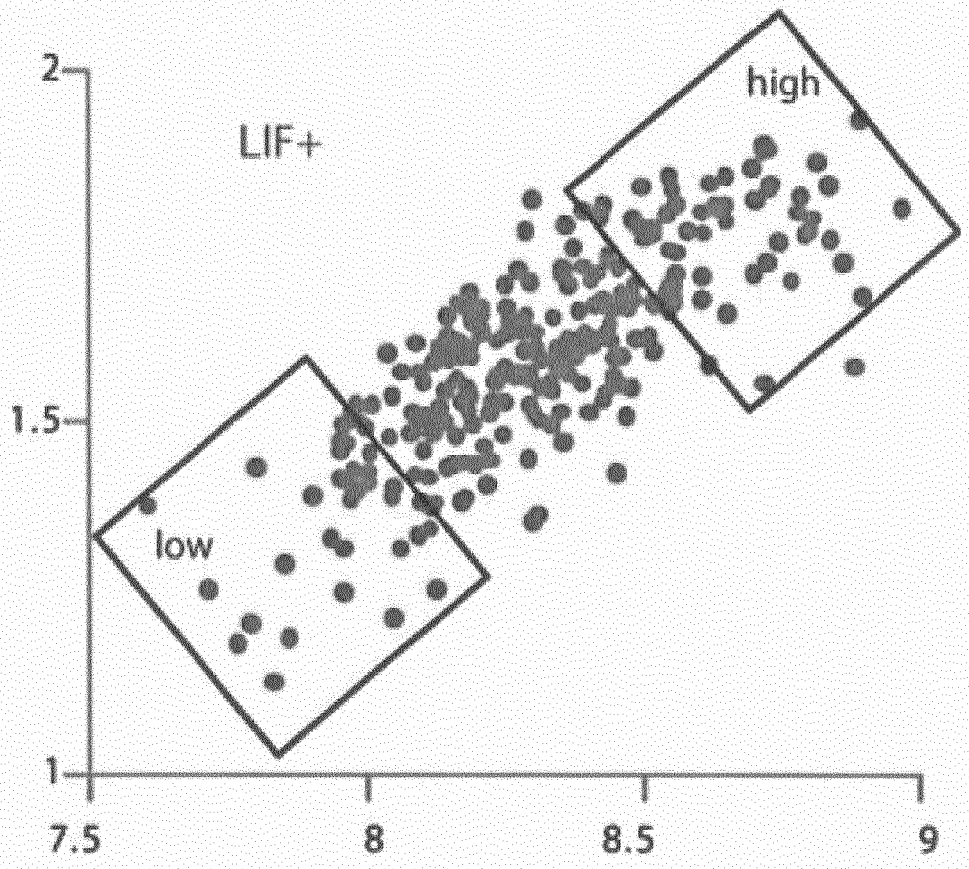

LIF+
high
low

Fig. 2d:

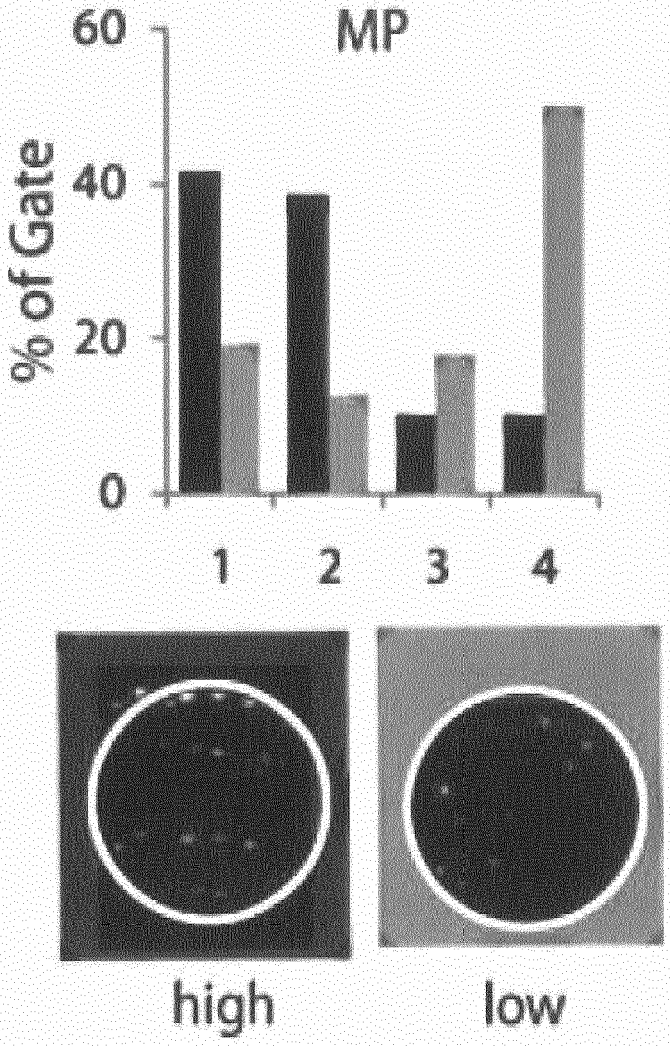

MP
% of Gate
60
40
20
0
1
2
3
4
high
low

Fig. 3a:

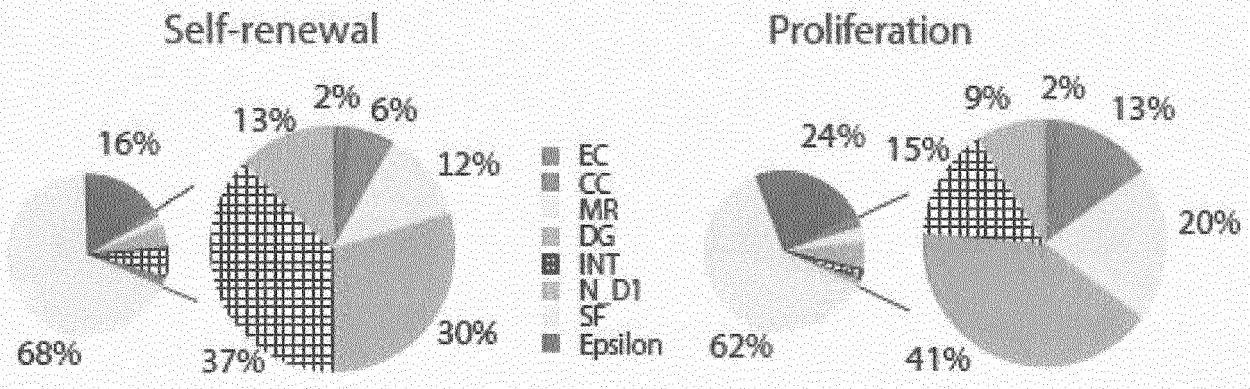

Self-renewal
Proliferation
16%
13%
2%
6%
12%
30%
37%
68%
EC
CC
MR
DG
INT
N_D1
SF
Epsilon
24%
9%
2%
13%
15%
20%
62%
41%

Fig. 3b

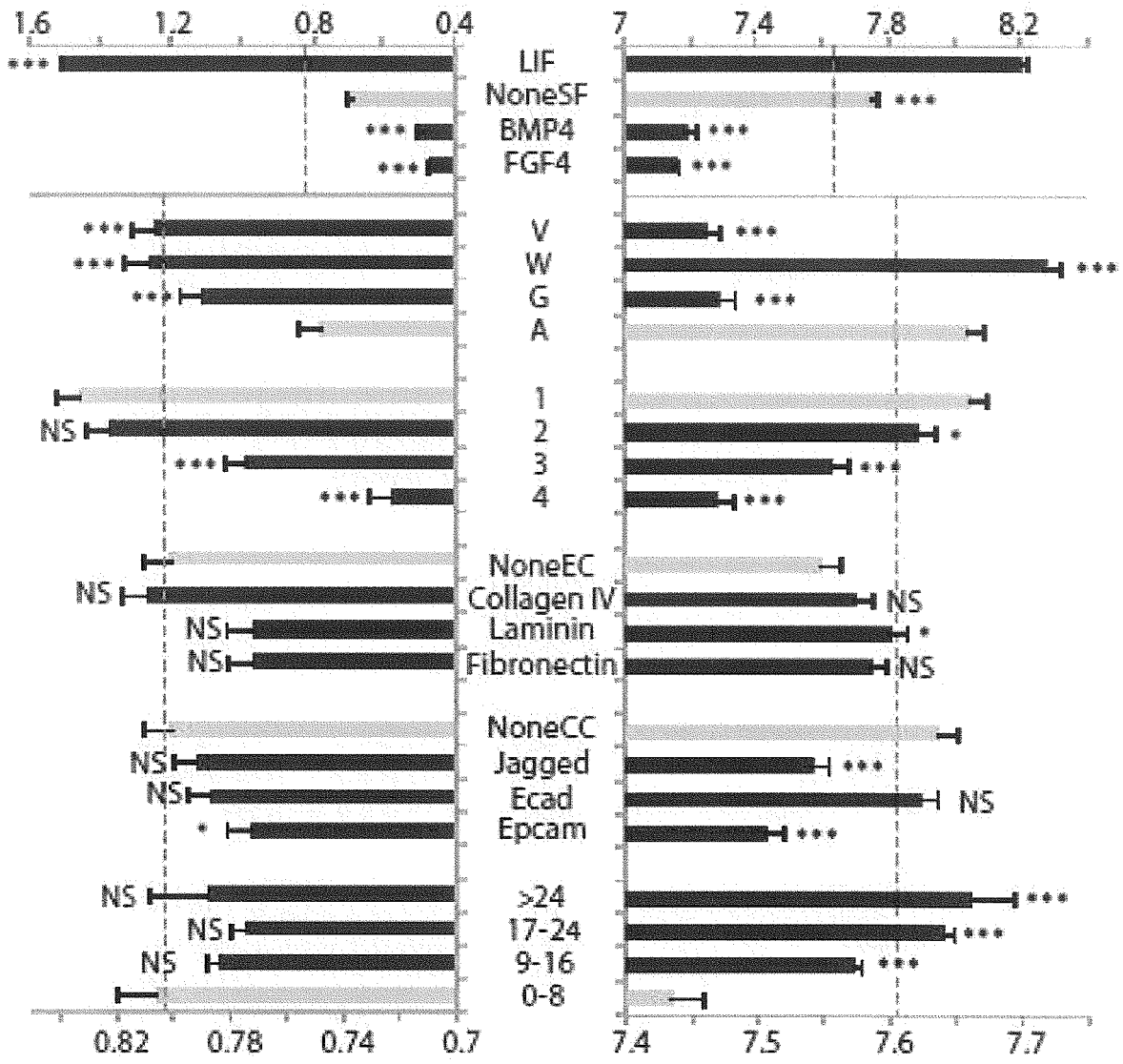

1.6
1.2
0.8
0.4
7
7.4
7.8
8.2
LIF
NoneSF
BMP4
FGF4
V
W
G
A
1
2
3
4
NoneEC
Collagen IV
Laminin
Fibronectin
NoneCC
Jagged
Ecad
Epcam
>24
17-24
9-16
0-8
NS
0.82
0.78
0.74
0.7
7.4
7.5
7.6
7.7

Fig. 3c, d, e, f, g:

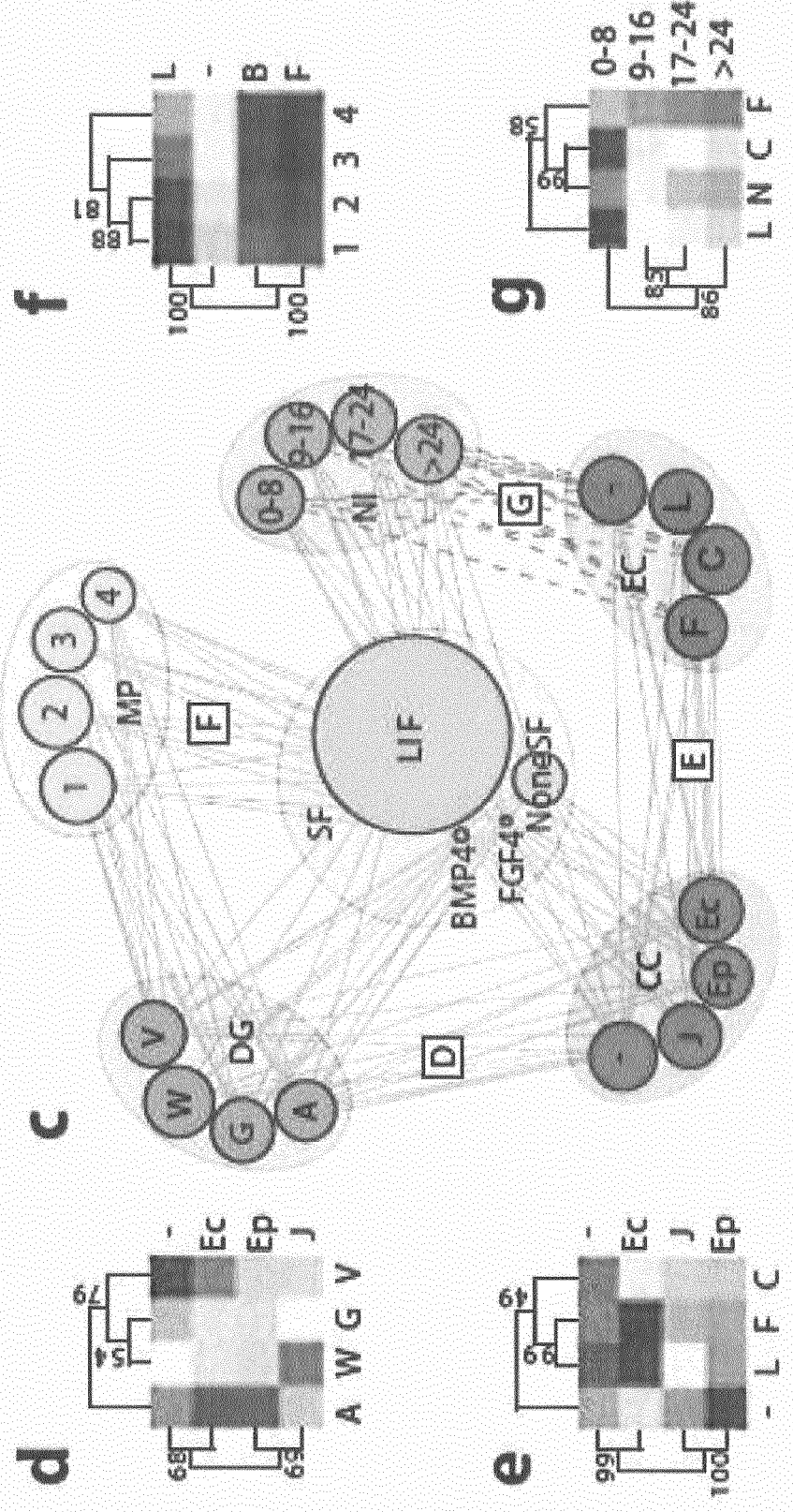

c
LIF
SF
BMP4
FGF-4
None
SF
MP
1
2
3
4
F
DG
V
W
G
A
D
NI
0-8
9-16
17-24
>24
G
EC
-
L
C
F
E
CC
Ec
Ep
J
E
d
A W G V
- Ec Ep J
e
- L F C
- Ec J Ep
f
1 2 3 4
L - B F
g
L N C F
0-8
9-16
17-24
>24

Fig. 4a:

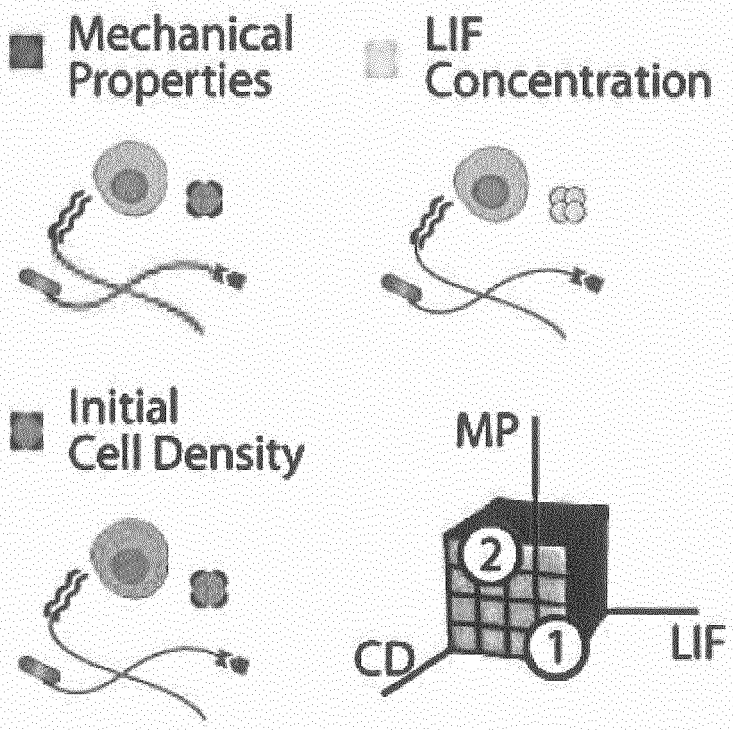

Mechanical Properties
LIF Concentration
Initial Cell Density
MP
2
CD
1
LIF

Fig. 4b:

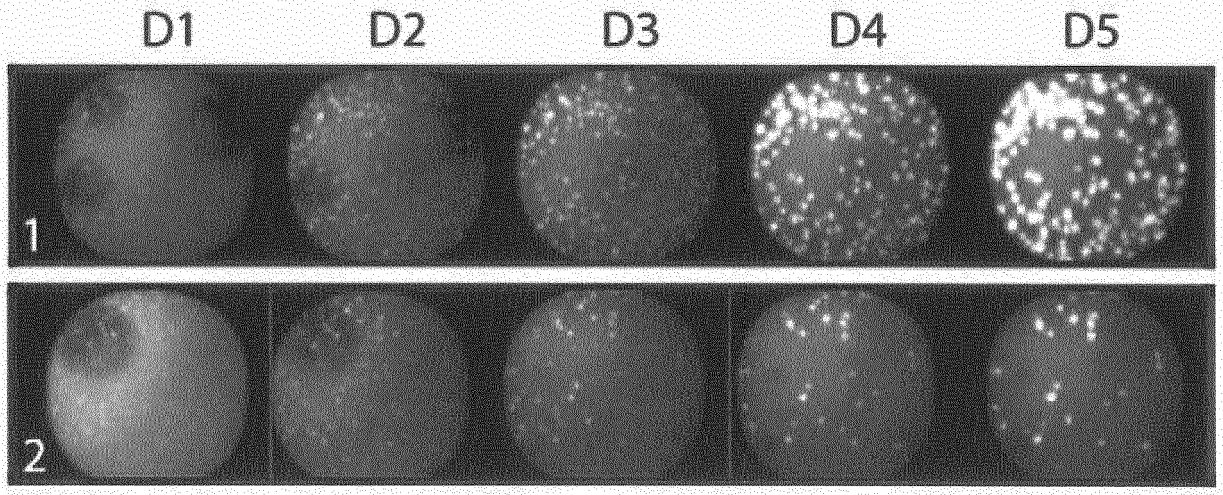

D1
D2
D3
D4
D5
1
2

Fig. 4c:

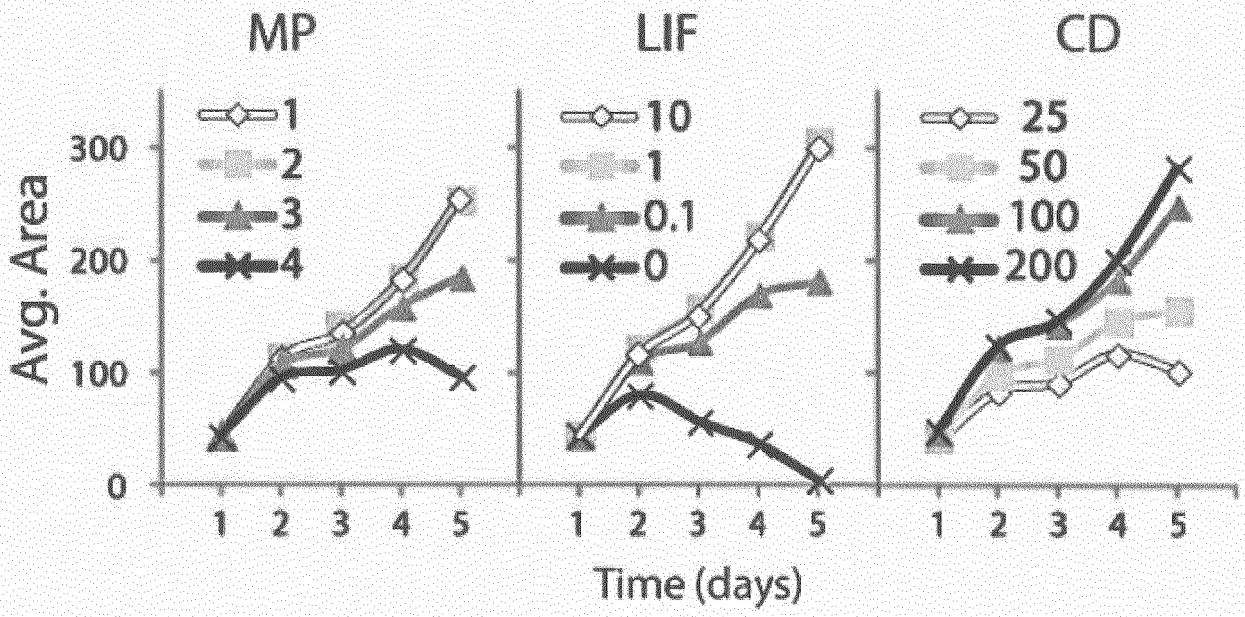

MP
LIF
CD
Avg. Area
300
200
100
0
1
2
3
4
10
1
0.1
0
25
50
100
200
1 2 3 4 5
Time (days)

Fig. 4d:

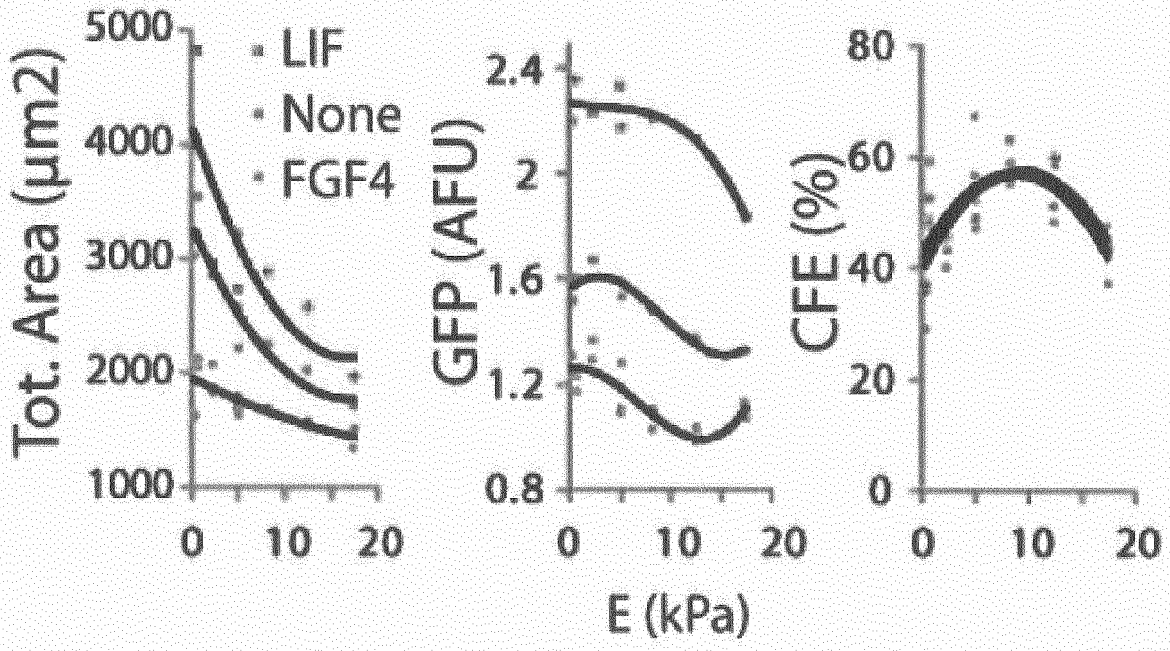

Tot. Area (µm2)
5000
4000
3000
2000
1000
LIF
None
FGF4
GFP (AFU)
2.4
2
1.6
1.2
0.8
CFE (%)
80
60
40
20
0
0 10 20
E (kPa)

Fig. 4e:

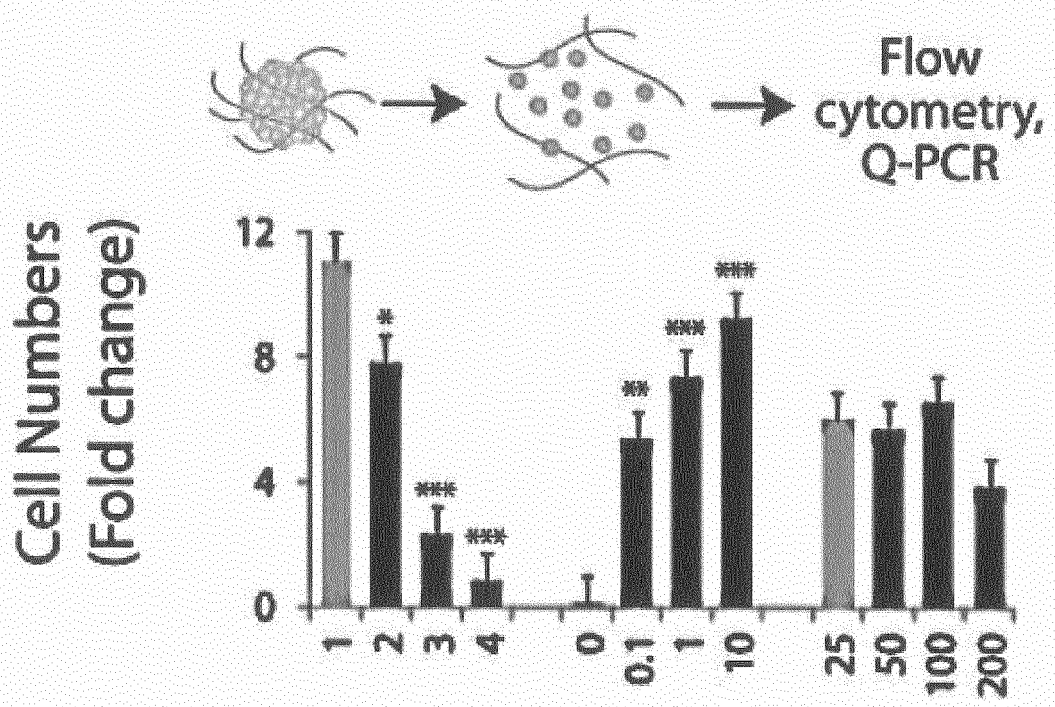

Flow cytometry, Q-PCR
Cell Numbers (Fold change)
12
8
4
0
*
***
***
**
***
***
1 2 3 4 0 0.1 1 10 25 50 100 200

Fig. 4f:

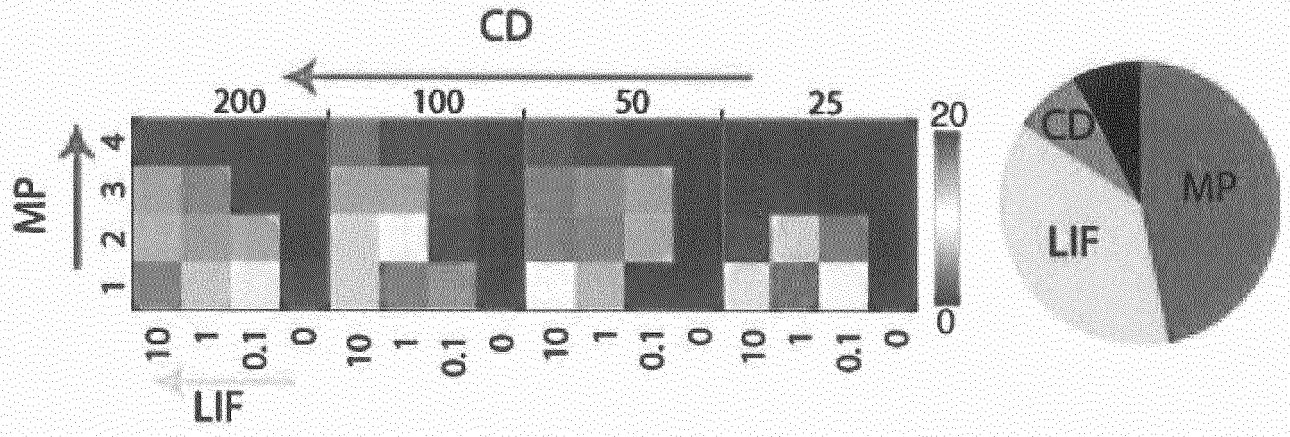

CD
200
100
50
25
MP
1 2 3 4
20
0
10 1 0.1 0 10 1 0.1 0 10 1 0.1 0 10 1 0.1 0
LIF
CD
MP
LIF

Fig. 4g:

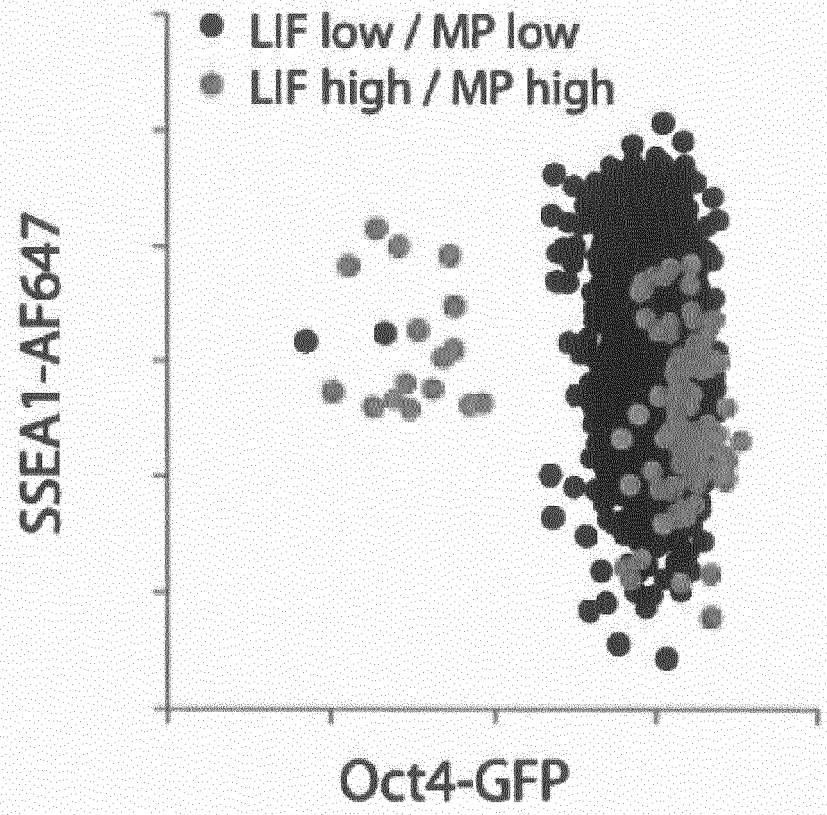

LIF low / MP low
LIF high / MP high
SSEA1-AF647
Oct4-GFP

Fig. 4h:

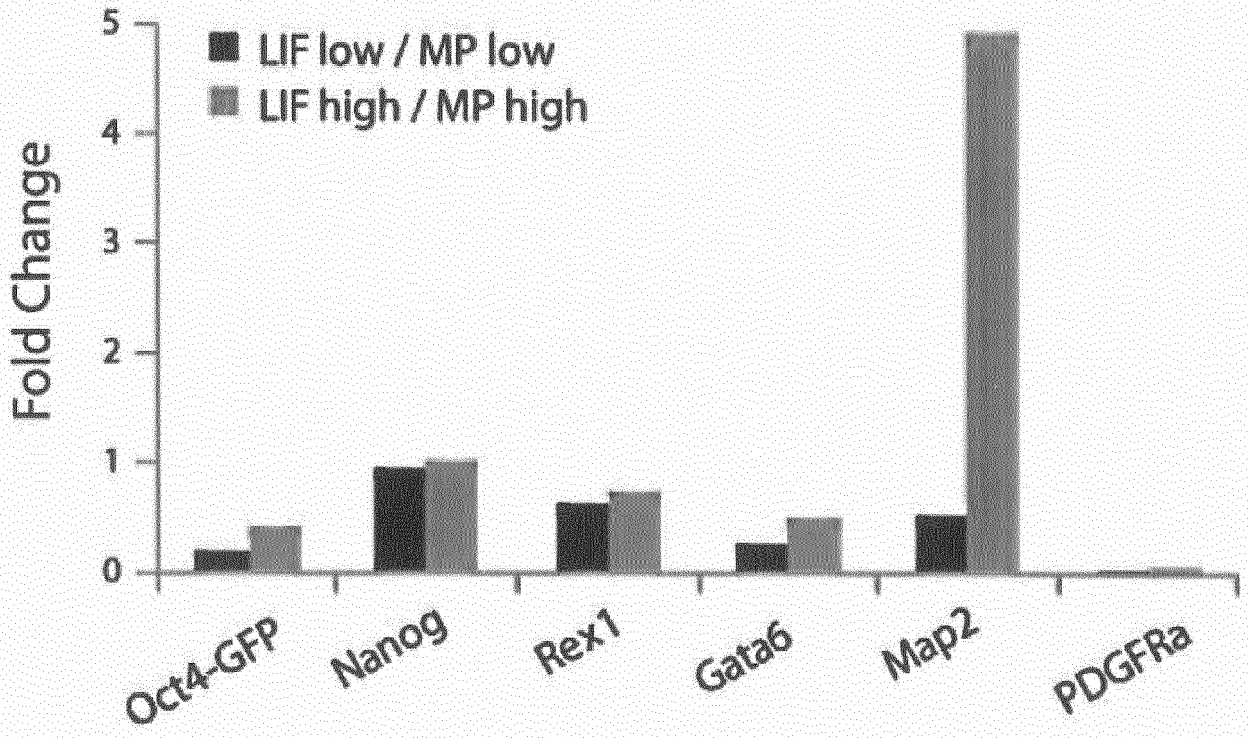

LIF low / MP low
LIF high / MP high
Fold Change
0
1
2
3
4
5
Oct4-GFP
Nanog
Rex1
Gata6
Map2
PDGFRa

Fig. 5a:

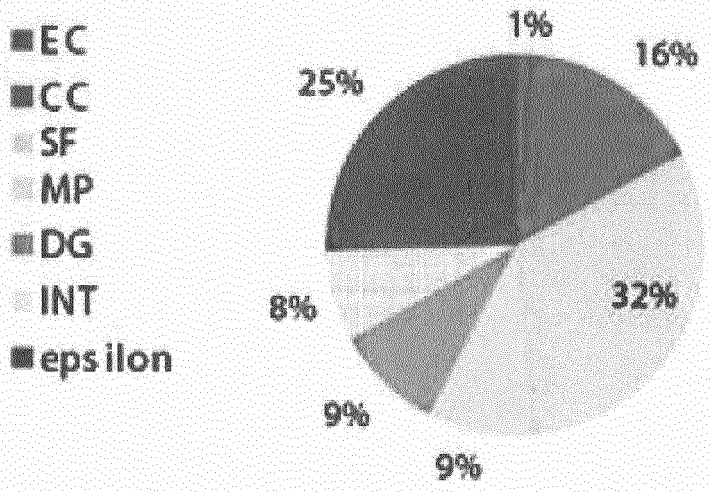

EC
CC
SF
MP
DG
INT
epsilon
1%
16%
25%
32%
8%
9%
9%

Fig. 5b

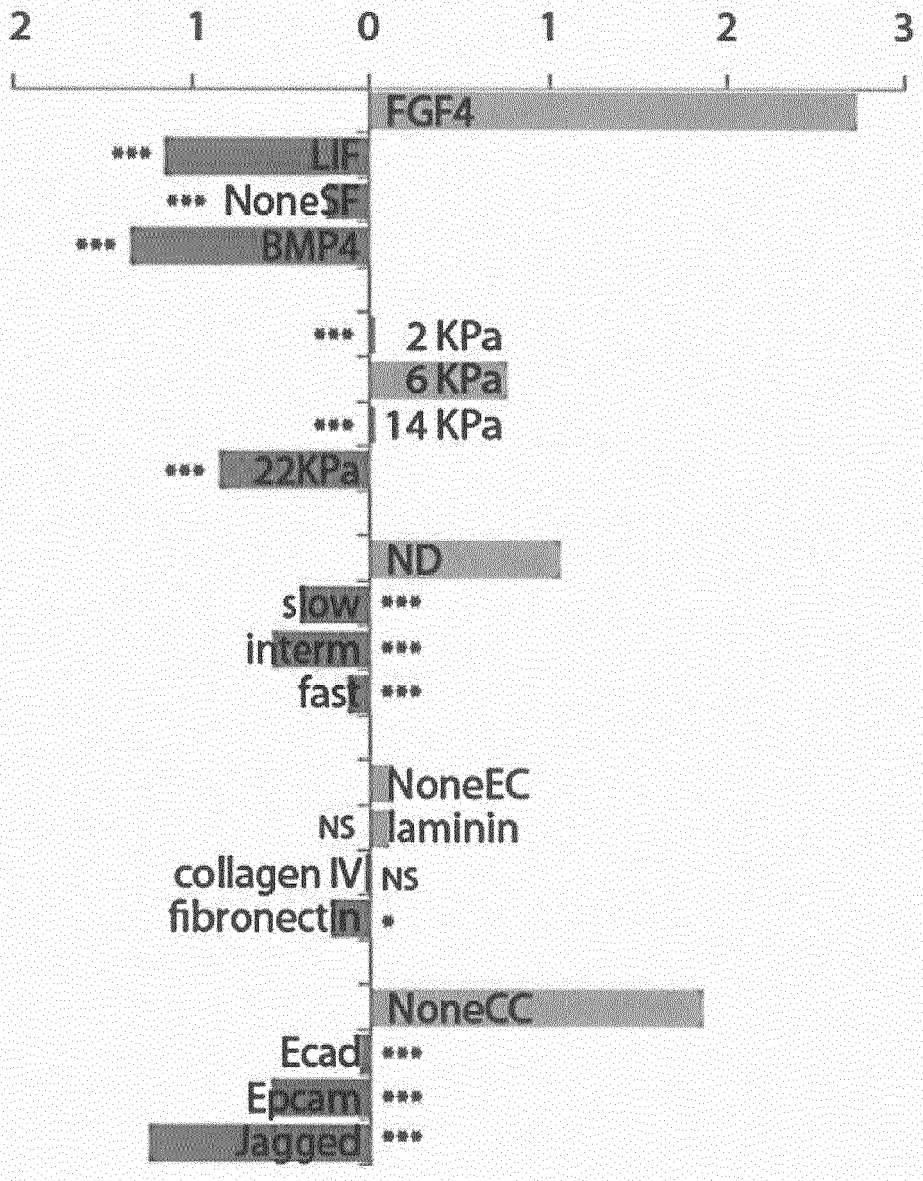

2
1
0
1
2
3
FGF4
***
LIF
***
NoneSF
***
BMP4
***
2 KPa
6 KPa
***
14 KPa
***
22KPa
ND
slow
***
interm
***
fast
***
NoneEC
NS
laminin
collagen IV
NS
fibronectin
*
NoneCC
Ecad
***
Epcam
***
Jagged
***

Fig. 5c, d, e, f, g, h:

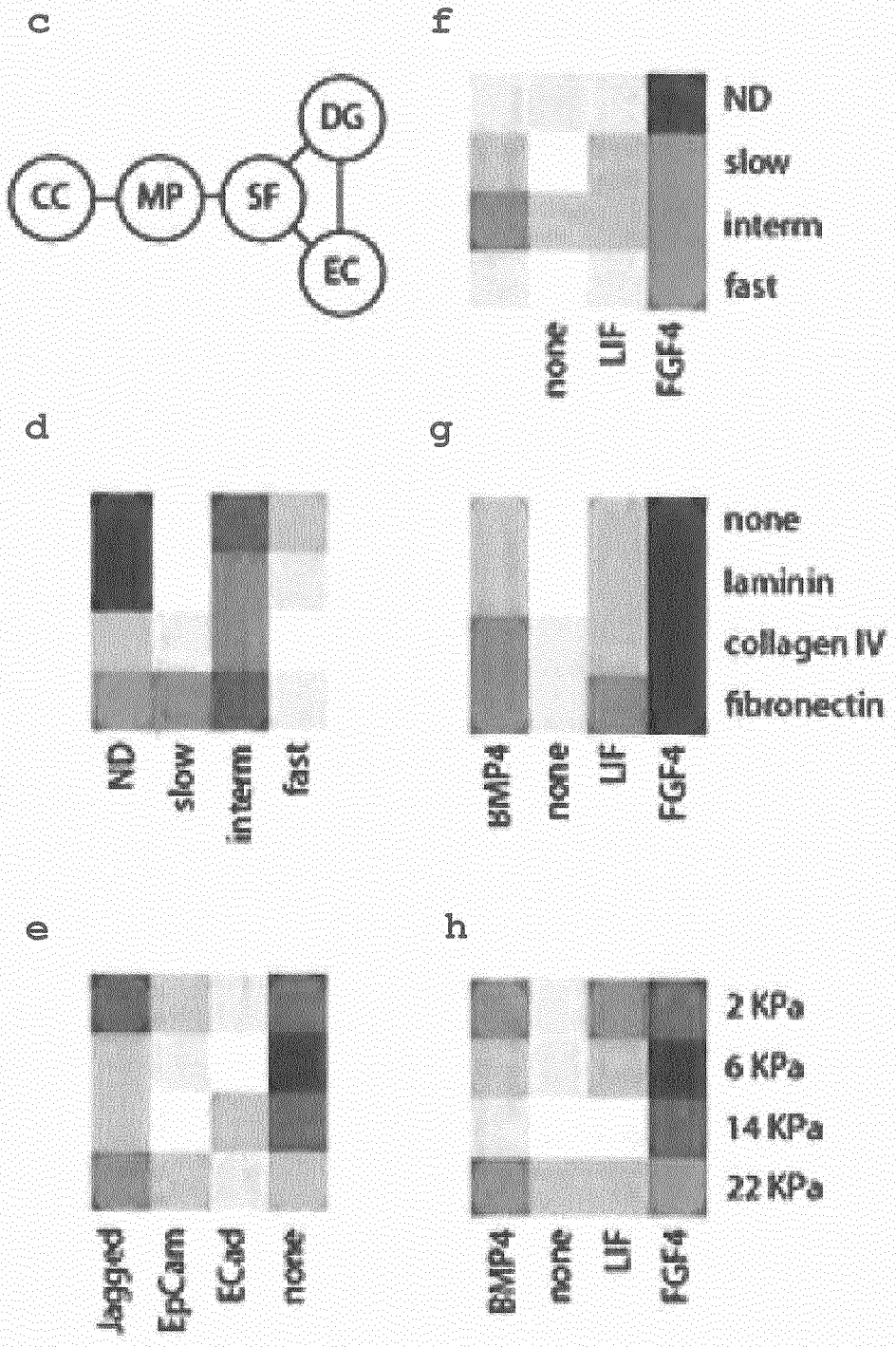

c
DG
CC
MP
SF
EC
f
ND
slow
interm
fast
none
LIF
FGF4
d
ND
slow
interm
fast
g
none
laminin
collagen IV
fibronectin
BMP4
none
LIF
FGF4
e
Jagged
EpCam
ECad
none
h
2 KPa
6 KPa
14 KPa
22 KPa
BMP4
none
LIF
FGF4

Fig. 6 a, b, c:

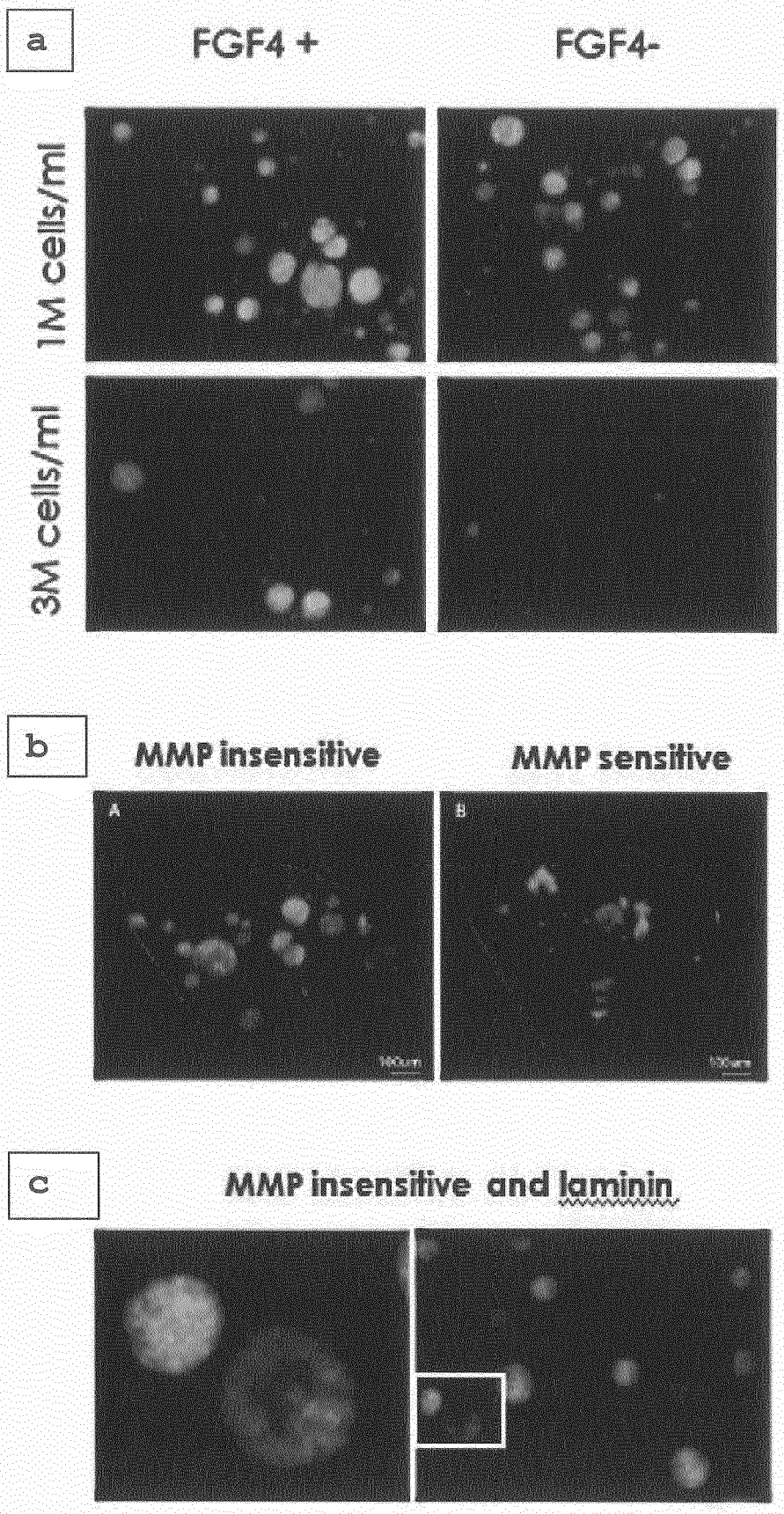

a
FGF4 +
FGF4-
1M cells/ml
3M cells/ml
b
MMP insensitive
MMP sensitive
A
B
c
MMP insensitive and laminin

Fig. 6d

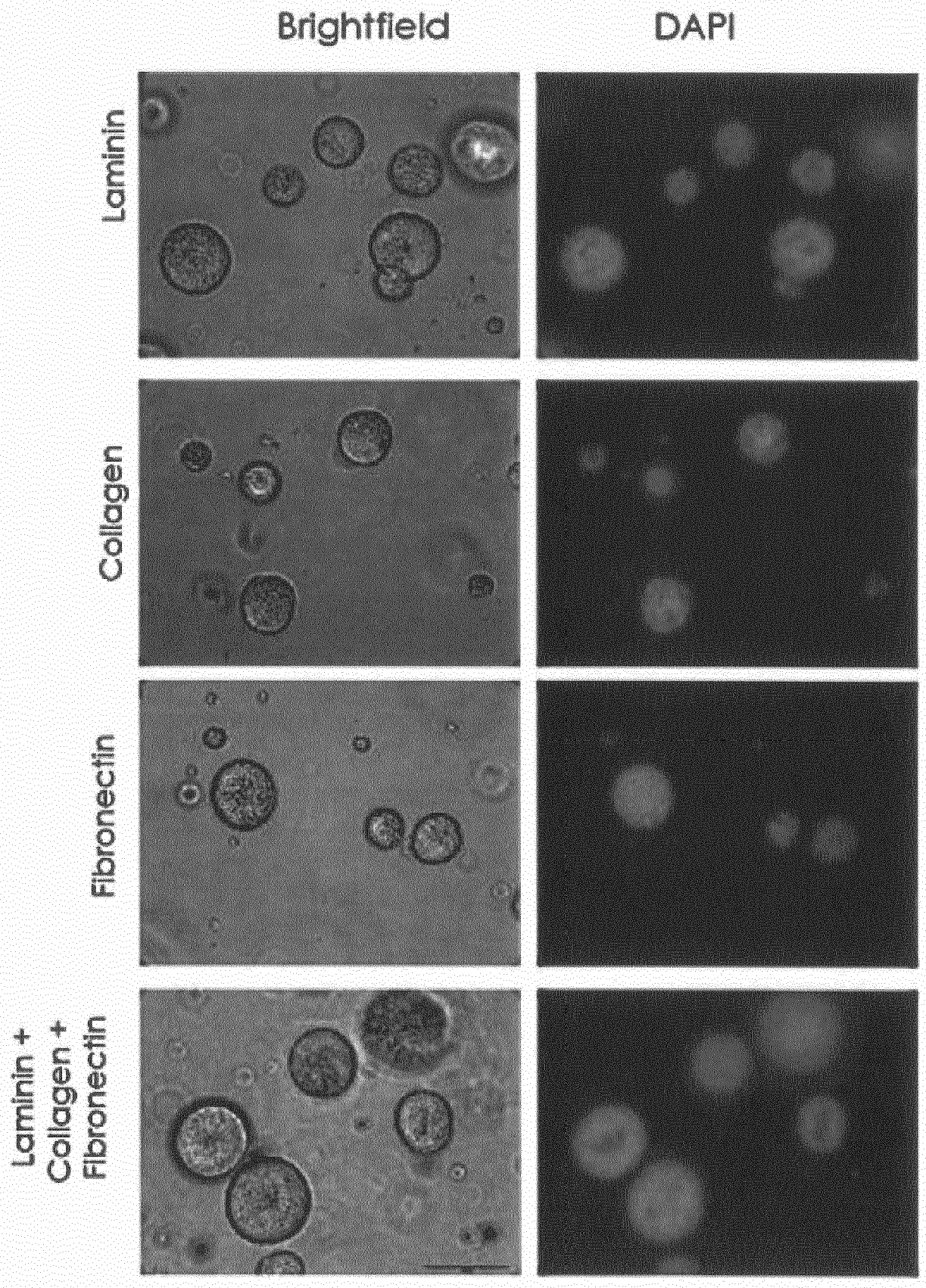
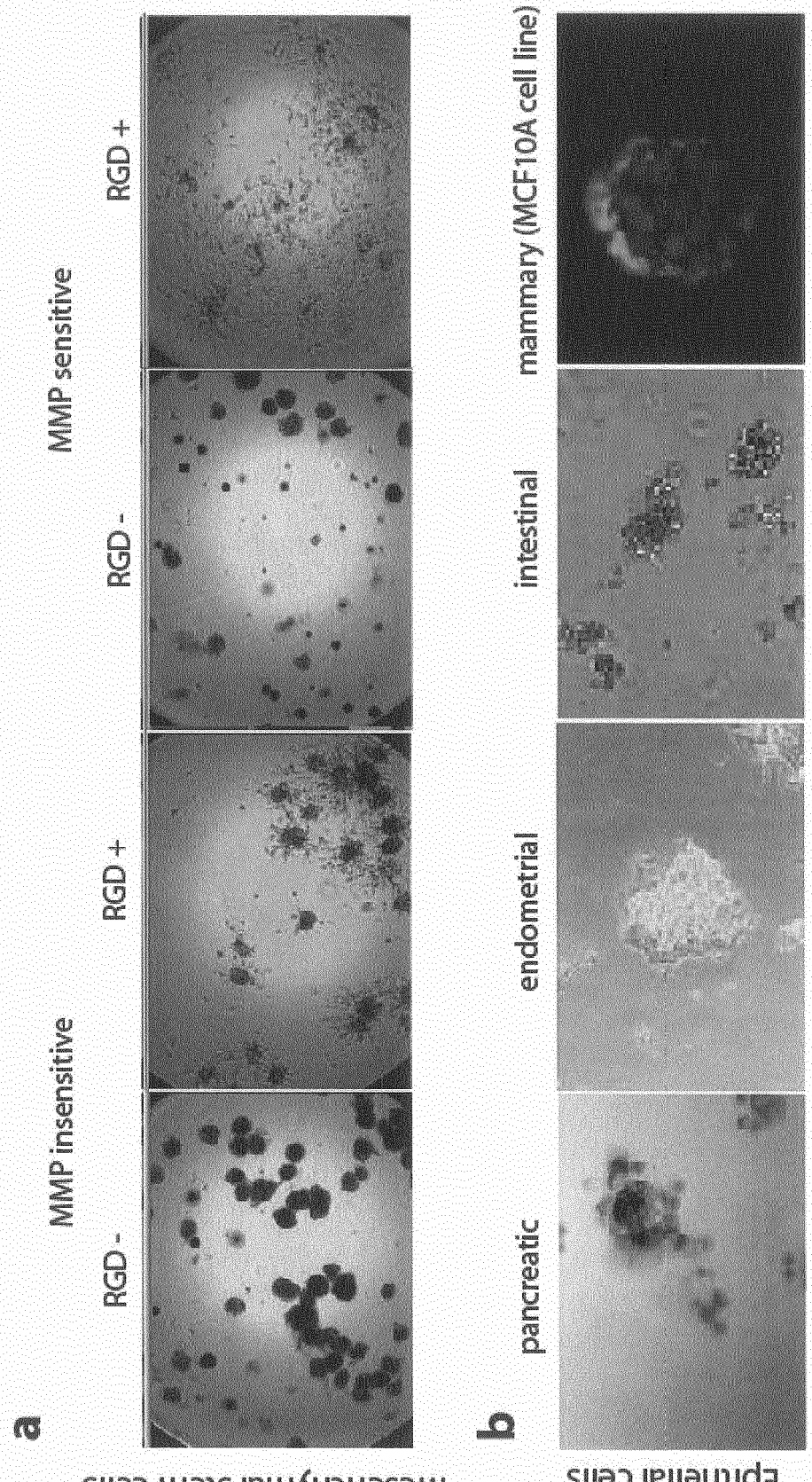

Brightfield
DAPI
Laminin
Collagen
Fibronectin
Laminin +
Collagen +
Fibronectin

Fig. 7:


a
MMP insensitive
MMP sensitive
RGD -
RGD +
RGD -
RGD +
Mesenchymal stem cells
b
pancreatic
endometrial
intestinal
mammary (MCF10A cell line)
Epithelial cells