

Explanatory Notes About Data

Title: Data from computer simulation of neutral drift among limbal epithelial stem cells of mosaic mice

Relevant Publication:

West JD, Mort RL, Hill RE, Morley SD and Collinson JM. (2018). Computer simulation of neutral drift among limbal epithelial stem cells of mosaic mice. *Stem Cell Research* 30, 1-11. <https://doi.org/10.1016/j.scr.2018.05.003>

Purpose of Simulation (Most of this text is taken from the above publication.)

It was previously shown that limbal epithelial stem cells (LESCs) around the periphery of the cornea maintain radial sectors of the corneal epithelium but that radial stripe numbers declined with age in mosaic mice. Originally, these results were interpreted as progressive, age-related loss or irreversible inactivation of some clones of LESCs. We used computer simulations to show that these results could also be explained by stochastic replacement of LESCs by neighbouring LESCs, leading to neutral drift of LESC populations. This was shown to reduce the number of coherent clones of LESCs and hence would coarsen the mosaic pattern in the corneal epithelium without reducing the absolute number of LESCs. Simulations also showed that corrected stripe numbers declined more slowly when LESCs were grouped, non-randomly and that mosaicism was rarely lost unless simulated LESC numbers were unrealistically low.

Nature of Data.

 The data comprise:

- The source code for the simulation program
- Data from 154 sets of simulations (20 simulations per set) grouped into parts 1-9
 - PNG images and raw data (CSV files) of individual simulations
 - Excel workbooks with summaries of numerical data

Location of Source Code for the Simulation Program.

Zip file: 'clonesim-master.zip'

The web app 'CloneSim' was written in JavaScript with Angular JS, by Graham West, and was designed to run on the web browser, Google Chrome. The source code is in the zip file: 'clonesim-master.zip'. At the time of depositing the data in Edinburgh University's DataShare repository, the source code was available online at: <https://github.com/grahamwest/clonesim> and an active version of the simulation was accessible at: <http://grahamwest.github.io/clonesim/dist/index.html#!/view/1>

Explanation of Simulation and Output. (Most of this text is taken from the above publication.)

For each simulation, a 1-dimensional circular array (closed linear array) was established to represent a mixture of two populations of LESCs (referred to as 'blue' and 'white' or 'positive' and 'negative' stem cells) at G0. The following parameters were varied at set-up: (1) the number of LESCs in the array at generation 0 (G0); (2) the number of subsequent LESC generations (division iterations) to be simulated; (3) the initial proportion of positive (blue) LESCs; (4) the number of LESCs per coherent clone (the value is set at 1, to simulate random distributions, or higher, to simulate coherent clonal groups); (5) the probability of an LESC being replaced by a stem celling LESC and (6) the probability of an LESC being lost (and not replaced).

The composition of the array was then changed over successive LESC generations by simulating a defined percentage of stochastic LESC loss (without replacement) and/or stochastic LESC replacement (whereby an LESC was replaced by one that was equivalent to an adjacent LESC). The software displayed the distribution of LESCs (on the vertical axis) as blue and white rectangles for each simulated LESC generation (shown on the horizontal axis). Images of the displays were downloaded as PNG files. Numerical data, showing the LESC population as a binary code (1 for blue or 0 for white), for each LESC position in the array at each generation, plus 12 summary parameters (listed in the Table below) were downloaded as CSV files.

Table showing simulation output (Table is from manuscript's supplementary information.)

Output	Description	Calculation
i	Number of positive (blue) stem cells in the array	
ii	Number of negative (white) stem cells in the array	
iii	Total number of blue plus white stem cells	i + ii
iv	Number of blue stripes (equivalent to the number of patches of blue stem cells in a 1-dimensional circular array)* A 'patch' of blue stem cells is defined as an uninterrupted sequence of contiguous blue cells around the circumference	
v	Number of white stripes (equivalent to the number of patches of white stem cells)	
vi	Uncorrected stripe number	iv + v
vii	Proportion of blue stem cells (p)	i/iii
viii	Mean number of blue stem cells per blue stripe width (equivalent to the mean number of blue stem cells per blue patch length in the array)	i/iv
ix	Correction factor 1/(1-p)	1/(1-vii)
x	Corrected mean number of blue stem cells per blue stripe width (equivalent to the corrected mean number of blue stem cells per blue patch length)	viii/ix
xi	Corrected blue stripe number	i/x
xii	Corrected stripe number produced by both blue and white stem cells. [The calculation shown is because, for closed circular arrays, the numbers of blue and white patches are equal and the corrected mean patch lengths are equal for blue and white patches.]	iii/x

* For consistency with terminology used for studies of mosaic mice, we refer to 'stripe numbers' in the manuscript text rather than 'patch numbers'

Data from 154 sets of simulations (20 simulations per set) grouped into parts 1-9

Examples of nomenclature used to describe simulation parameters:

'1_R120-50B-10rep_01' = set number 1, random array of 120 cells; 50% blue; 10% stem cell replacement; array number 01 (in set 1)

'154_Gp3-360_80B_1_loss_500gen_20' = set number 154, groups of 3 in array of 360 cells; 80% blue; 1% stem cell loss; simulation run for 500 stem cell generations; array number 20 (in set 154)

Note: In some places, 'percent' is abbreviated to 'pc'. For brevity, in the above examples, no symbol for % is used.

PNG images and raw data (CSV files) from 154 sets of 20 simulations are archived. The output data for each set of 20 simulations are also summarised in a spreadsheet of an Excel workbook. The example shown below shows the left and right end of the top part of the spreadsheet for the simulations in set 1 (Random array of 120 cells; 50% blue; 10% stem cell replacement). The left side of the spreadsheet shows the names of the 12 outputs plus the corresponding data for generations 0–4 for the first two simulations in set 1. The generation numbers are shown at the top of the spreadsheet. The right side of the spreadsheet shows the data for the last few generations simulated (in this case 46–50), the abbreviated description of the simulation parameters (in this case R120-50B-10rep) and the simulation array number in the set. The set number is given on the tab of the spreadsheet ('1_R-120-50B-10rep simulations') but is not shown below.

Generation	0	1	2	3	4
Number Positive Cells	60	59	61	60	60
Number Negative Cells	60	61	59	60	60
Total Positive + Negative Cell Number	120	120	120	120	120
Number Positive Stripes	33	29	28	25	22
Number Negative Stripes	33	29	28	25	22
Uncorrected Stripe Count (positive + negative stripes)	66	58	56	50	44
Proportion positive cells = p	0.5	0.49	0.51	0.5	0.5
Mean # positive cells per stripe width	1.81818182	2.03448276	2.17857143	2.4	2.72727273
Correction factor 1/(1-p)	2	1.96721311	2.03898831	2	2
Corrected mean # positive cells per stripe width	0.90909091	1.0341954	1.07113095	1.2	1.36363636
Corrected positive stripe number	66	57.0491803	56.9491525	50	44
Corrected total (pos + neg) stripe number	132	116.032231	112.03112	100	88

Left side of spreadsheet

AV	AW	AX	AY	AZ	BA	BB	BC
46	47	48	49	50	Array		
						Number (1-20)	
72	71	73	75	74	R120-50B-10rep_01	1	
48	49	47	45	46	R120-50B-10rep_01	1	
120	120	120	120	120	R120-50B-10rep_01	1	
9	9	9	9	9	R120-50B-10rep_01	1	
9	9	9	9	9	R120-50B-10rep_01	1	
18	18	18	18	18	R120-50B-10rep_01	1	
0.6	0.59	0.61	0.63	0.62	R120-50B-10rep_01	1	
8	7.88888889	8.11111111	8.33333333	8.22222222	R120-50B-10rep_01	1	
2.5	2.44897959	2.55319149	2.66666667	2.60869565	R120-50B-10rep_01	1	
3.2	3.2212963	3.17685185	3.125	3.15185185	R120-50B-10rep_01	1	
22.5	22.0408163	22.9787234	24	23.4782609	R120-50B-10rep_01	1	
37.5	37.2520839	37.773244	38.4	38.0728555	R120-50B-10rep_01	1	
72	70	70	71	71	R120-50B-10rep_02	2	
48	50	50	49	49	R120-50B-10rep_02	2	
120	120	120	120	120	R120-50B-10rep_02	2	
9	9	9	9	9	R120-50B-10rep_02	2	
9	9	9	9	9	R120-50B-10rep_02	2	
18	18	18	18	18	R120-50B-10rep_02	2	
0.6	0.58	0.58	0.59	0.59	R120-50B-10rep_02	2	
8	7.77777778	7.77777778	7.88888889	7.88888889	R120-50B-10rep_02	2	
2.5	2.4	2.4	2.44897959	2.44897959	R120-50B-10rep_02	2	
3.2	3.24074074	3.24074074	3.2212963	3.2212963	R120-50B-10rep_02	2	
22.5	21.6	21.6	22.0408163	22.0408163	R120-50B-10rep_02	2	
37.5	37.0285714	37.0285714	37.2520839	37.2520839	R120-50B-10rep_02	2	

Right side of spreadsheet

Part 1. Arrays sets 1-12. (Sets of 20 arrays run for 50 stem cell generations)

Comparison of the effects of 10% or 50% stem cell replacement and 5% or 10% stem cell loss for random arrays and arrays with groups of 3 stem cells, starting with 50% or 80% blue stem cells.

50% blue stem cells at G0

1. Random array of 120 cells; 50% blue; 10% stem cell replacement
2. Random array of 120 cells; 50% blue; 5% stem cell loss
3. Groups of 3 in array of 360 cells; 50% blue; 10% stem cell replacement
4. Groups of 3 in array of 360 cells; 50% blue; 5% stem cell loss
5. Groups of 3 in array of 360 cells; 50% blue; 50% stem cell replacement
6. Groups of 3 in array of 360 cells; 50% blue; 10% stem cell loss

80% blue stem cells at G0

7. Random array of 120 cells; 80% blue; 10% stem cell replacement
8. Random array of 120 cells; 80% blue; 5% stem cell loss
9. Groups of 3 in array of 360 cells; 80% blue; 10% stem cell replacement
10. Groups of 3 in array of 360 cells; 80% blue; 5% stem cell loss
11. Groups of 3 in array of 360 cells; 80% blue; 50% stem cell replacement
12. Groups of 3 in array of 360 cells; 80% blue; 10% stem cell loss

Use of data from arrays sets 1-12 in main manuscript:

Fig. 4 shows effects of stem cell loss or replacement on corrected stripe number.

Use of data from arrays sets 1-12 in supplementary material (to examine changes in more depth):

Note: In the supplementary material, the results for Part 9 are included before the results for Part 1.

Fig. S5 shows effects of stem cell loss or replacement on uncorrected stripe number and % blue stem cells for arrays starting with 50% blue stem cells.

Fig. S6 shows effects of stem cell loss or replacement on uncorrected stripe number and % blue stem cells for arrays starting with 80% blue stem cells.

Fig. S7 shows effects of 5% or 10% stem cell loss on stem cell numbers and survival of both blue and white stem cell populations.

Fig. S8 shows changes in uncorrected stripe number that occur after each stem cell division for stem cell loss and replacement.

Fig. S9 shows changes in corrected stripe number that occur after each stem cell division for stem cell loss and replacement.

Part 2. Arrays sets 13-36. (Sets of 20 arrays run for 500 stem cell generations)

Comparison of the effects of stem cell clumping (arrays with groups of 2, 3 or 4 stem cells vs. random arrays) on changes in corrected stripe numbers with 10%, 25% or 40% stem cell replacement, starting with 50% blue stem cells (array sets 13-24) or with 80% blue stem cells (array sets 25-36).

50% blue stem cells at G0

13. Random array of 120 cells; 50% blue; 10% stem cell replacement
14. Groups of 2 in array of 240 cells; 50% blue; 10% stem cell replacement
15. Groups of 3 in array of 360 cells; 50% blue; 10% stem cell replacement
16. Groups of 4 in array of 480 cells; 50% blue; 10% stem cell replacement

17. Random array of 120 cells; 50% blue; 25% stem cell replacement
18. Groups of 2 in array of 240 cells; 50% blue; 25% stem cell replacement
19. Groups of 3 in array of 360 cells; 50% blue; 25% stem cell replacement
20. Groups of 4 in array of 480 cells; 50% blue; 25% stem cell replacement

21. Random array of 120 cells; 50% blue; 40% stem cell replacement
22. Groups of 2 in array of 240 cells; 50% blue; 40% stem cell replacement
23. Groups of 3 in array of 360 cells; 50% blue; 40% stem cell replacement
24. Groups of 4 in array of 480 cells; 50% blue; 40% stem cell replacement

80% blue stem cells at G0

25. Random array of 120 cells; 80% blue; 10% stem cell replacement
26. Groups of 2 in array of 240 cells; 80% blue; 10% stem cell replacement
27. Groups of 3 in array of 360 cells; 80% blue; 10% stem cell replacement
28. Groups of 4 in array of 480 cells; 80% blue; 10% stem cell replacement

29. Random array of 120 cells; 80% blue; 25% stem cell replacement
30. Groups of 2 in array of 240 cells; 80% blue; 25% stem cell replacement
31. Groups of 3 in array of 360 cells; 80% blue; 25% stem cell replacement
32. Groups of 4 in array of 480 cells; 80% blue; 25% stem cell replacement

33. Random array of 120 cells; 80% blue; 40% stem cell replacement
34. Groups of 2 in array of 240 cells; 80% blue; 40% stem cell replacement
35. Groups of 3 in array of 360 cells; 80% blue; 40% stem cell replacement
36. Groups of 4 in array of 480 cells; 80% blue; 40% stem cell replacement

Use of data from arrays sets 13-36 in main manuscript:

Fig. 5 shows effect of stem cell clumping on corrected stripe number for stem cell replacement over 50 and 500 stem cell generations in arrays with 50% blue stem cells at G0.

Use of data from arrays sets 13-36 in supplementary material (to examine more details):

Fig. S10 shows effect of stem cell clumping on corrected stripe number for stem cell replacement over 50 and 500 stem cell generations in arrays with 80% blue stem cells at G0.

Table. S2 shows the effect of stem cell clumping and different probabilities of stem cell replacement on the frequency of survival of both stem cell populations

Table. S3 shows the effect of stem cell clumping and different probabilities of stem cell replacement on the stem cell generation when one stem cell population was lost.

Part 3. Arrays sets 37-63. (Sets of 20 arrays run for 500 stem cell generations)

Other variables: Comparison of effects of (1) 10% stem cell replacement vs. (2) 5% stem cell loss vs. (3) 5% replacement plus 2.5% loss for clumped arrays with groups of 3 stem cells, over a wide range of initial percentages of blue stem cells.

37 Groups of 3 in arrays of 360 cells; 10% blue; 10% stem cell replacement

38 Groups of 3 in arrays of 360 cells; 10% blue; 5% stem cell replacement and 2.5% stem cell loss

39 Groups of 3 in arrays of 360 cells; 10% blue; 5% stem cell loss

40 Groups of 3 in arrays of 360 cells; 20% blue; 10% stem cell replacement

41 Groups of 3 in arrays of 360 cells; 20% blue; 5% stem cell replacement and 2.5% stem cell loss

42 Groups of 3 in arrays of 360 cells; 20% blue; 5% stem cell loss

43 Groups of 3 in arrays of 360 cells; 30% blue; 10% stem cell replacement

44 Groups of 3 in arrays of 360 cells; 30% blue; 5% stem cell replacement and 2.5% stem cell loss

45 Groups of 3 in arrays of 360 cells; 30% blue; 5% stem cell loss

46 Groups of 3 in arrays of 360 cells; 40% blue; 10% stem cell replacement

47 Groups of 3 in arrays of 360 cells; 40% blue; 5% stem cell replacement and 2.5% stem cell loss

48 Groups of 3 in arrays of 360 cells; 40% blue; 5% stem cell loss

49 Groups of 3 in arrays of 360 cells; 50% blue; 10% stem cell replacement

50 Groups of 3 in arrays of 360 cells; 50% blue; 5% stem cell replacement and 2.5% stem cell loss

51 Groups of 3 in arrays of 360 cells; 50% blue; 5% stem cell loss

52 Groups of 3 in arrays of 360 cells; 60% blue; 10% stem cell replacement

53 Groups of 3 in arrays of 360 cells; 60% blue; 5% stem cell replacement and 2.5% stem cell loss

54 Groups of 3 in arrays of 360 cells; 60% blue; 5% stem cell loss

55 Groups of 3 in arrays of 360 cells; 70% blue; 10% stem cell replacement

56 Groups of 3 in arrays of 360 cells; 70% blue; 5% stem cell replacement and 2.5% stem cell loss

57 Groups of 3 in arrays of 360 cells; 70% blue; 5% stem cell loss

58 Groups of 3 in arrays of 360 cells; 80% blue; 10% stem cell replacement

59 Groups of 3 in arrays of 360 cells; 80% blue; 5% stem cell replacement and 2.5% stem cell loss

60 Groups of 3 in arrays of 360 cells; 80% blue; 5% stem cell loss

61 Groups of 3 in arrays of 360 cells; 90% blue; 10% stem cell replacement

62 Groups of 3 in arrays of 360 cells; 90% blue; 5% stem cell replacement and 2.5% stem cell loss

63 Groups of 3 in arrays of 360 cells; 90% blue; 5% stem cell loss

Use of data from arrays sets 37-63 in supplementary material (to examine other variables):

Fig. S11 shows effect of a wide range of percentages (10-90%) of blue stem cells at G0 and different combinations of stem cell loss and replacement on the corrected stripe number.

Fig. S12 shows effect of a wide range of percentages (10-90%) of blue stem cells at G0 and different combinations of stem cell loss and replacement on the corrected stripe number at G50 and on the corrected stripe number half-life.

Part 4. Arrays sets 64-75. (Sets of 20 arrays run for 500 stem cell generations)

Other variables: Comparison of the effects of a wide range of probabilities of stem cell loss (0.1-20%) in random arrays of 120 cells (array sets 64-69) and clumped arrays of 360 cells with groups of 3 stem cells (array sets 70-75).

Random arrays

- 64. Random arrays of 120 cells; 50% blue; 0.1% stem cell loss
- 65. Random arrays of 120 cells; 50% blue; 0.5% stem cell loss
- 66. Random arrays of 120 cells; 50% blue; 1% stem cell loss
- 67. Random arrays of 120 cells; 50% blue; 5% stem cell loss
- 68. Random arrays of 120 cells; 50% blue; 10% stem cell loss
- 69. Random arrays of 120 cells; 50% blue; 20% stem cell loss

Clumped arrays (with groups of 3 stem cells)

- 70. Groups of 3 in array of 360 cells; 50% blue; 0.1% stem cell loss
- 71. Groups of 3 in array of 360 cells; 50% blue; 0.5% stem cell loss
- 72. Groups of 3 in array of 360 cells; 50% blue; 1% stem cell loss
- 73. Groups of 3 in array of 360 cells; 50% blue; 5% stem cell loss
- 74. Groups of 3 in array of 360 cells; 50% blue; 10% stem cell loss
- 75. Groups of 3 in array of 360 cells; 50% blue; 20% stem cell loss

Use of data from arrays sets 64-75 in supplementary material (to examine other variables):

Fig. S13 shows the effect of a wide range of stem cell loss probabilities (0.1-20%) on the decline in stem cell number and corrected stripe number.

Table. S4 shows the effect of different probabilities (0.1-20%) of stem cell loss probabilities on the decline in stem cell numbers for random arrays and clumped arrays with groups of 3 stem cells.

Table. S5 shows the effect of different probabilities (0.1-20%) of stem cell loss probabilities on the decline in corrected stripe numbers for random arrays and clumped arrays with groups of 3 stem cells.

Part 5. Arrays sets 76-95. (Sets of 20 arrays run for 500 stem cell generations)

Other variables: Comparison of the effects of a wide range of probabilities of stem cell replacement (1-100%) in random arrays of 120 cells (array sets 76-85) and clumped arrays of 360 cells with groups of 3 stem cells (array sets 86-95).

Random arrays

- 76. Random arrays of 120 cells; 50% blue; 1% stem cell replacement
- 77. Random arrays of 120 cells; 50% blue; 5% stem cell replacement
- 78. Random arrays of 120 cells; 50% blue; 10% stem cell replacement
- 79. Random arrays of 120 cells; 50% blue; 30% stem cell replacement
- 80. Random arrays of 120 cells; 50% blue; 50% stem cell replacement
- 81. Random arrays of 120 cells; 50% blue; 70% stem cell replacement
- 82. Random arrays of 120 cells; 50% blue; 90% stem cell replacement
- 83. Random arrays of 120 cells; 50% blue; 95% stem cell replacement
- 84. Random arrays of 120 cells; 50% blue; 99% stem cell replacement
- 85. Random arrays of 120 cells; 50% blue; 100% stem cell replacement

Clumped arrays (with groups of 3 stem cells)

- 86. Groups of 3 in array of 360 cells; 50% blue; 1% stem cell replacement
- 87. Groups of 3 in array of 360 cells; 50% blue; 5% stem cell replacement
- 88. Groups of 3 in array of 360 cells; 50% blue; 10% stem cell replacement
- 89. Groups of 3 in array of 360 cells; 50% blue; 30% stem cell replacement
- 90. Groups of 3 in array of 360 cells; 50% blue; 50% stem cell replacement
- 91. Groups of 3 in array of 360 cells; 50% blue; 70% stem cell replacement
- 92. Groups of 3 in array of 360 cells; 50% blue; 90% stem cell replacement
- 93. Groups of 3 in array of 360 cells; 50% blue; 95% stem cell replacement
- 94. Groups of 3 in array of 360 cells; 50% blue; 99% stem cell replacement
- 95. Groups of 3 in array of 360 cells; 50% blue; 100% stem cell replacement

Use of data from arrays sets 76-95 in supplementary material (to examine other variables):

Fig. S14 shows the effect of a wide range of stem cell replacement probabilities (1-100%) on the decline in corrected stripe number.

Table. S6 shows the effect of different probabilities (1-100%) of stem cell replacement probabilities on the decline in corrected stripe numbers for random arrays.

Table. S7 shows the effect of different probabilities (1-100%) of stem cell replacement probabilities on the decline in corrected stripe numbers for clumped arrays with groups of 3 stem cells.

Part 6. Arrays sets 96-122. (Sets of 20 arrays run for 500 stem cell generations)

Other variables: Effects of different array sizes (120, 240 and 360 stem cells) on decline in corrected stripe numbers caused by 5% stem cell loss (array sets 96-104), 10% stem cell replacement (array sets 105-113) and 90% stem cell replacement (array sets 114-122).

5% stem cell loss

- 96. R-120 arrays; 50% blue; 5% stem cell loss
- 97. R-240 arrays; 50% blue; 5% stem cell loss
- 98. R-360 arrays; 50% blue; 5% stem cell loss

- 99. Gp2-120 arrays; 50% blue; 5% stem cell loss
- 100. Gp2-240 arrays; 50% blue; 5% stem cell loss
- 101. Gp2-360 arrays; 50% blue; 5% stem cell loss

- 102. Gp3-120 arrays; 50% blue; 5% stem cell loss
- 103. Gp3-240 arrays; 50% blue; 5% stem cell loss
- 104. Gp3-360 arrays; 50% blue; 5% stem cell loss

10% stem cell replacement

- 105. R-120 arrays; 50% blue; 10% cell replacement
- 106. R-240 arrays; 50% blue; 10% cell replacement
- 107. R-360 arrays; 50% blue; 10% cell replacement

- 108. Gp2-120 arrays; 50% blue; 10% cell replacement
- 109. Gp2-240 arrays; 50% blue; 10% cell replacement
- 110. Gp2-360 arrays; 50% blue; 10% cell replacement

- 111. Gp3-120 arrays; 50% blue; 10% cell replacement
- 112. Gp3-240 arrays; 50% blue; 10% cell replacement
- 113. Gp3-360 arrays; 50% blue; 10% cell replacement

90% stem cell replacement

- 114. R-120 arrays; 50% blue; 90% cell replacement
- 115. R-240 arrays; 50% blue; 90% cell replacement
- 116. R-360 arrays; 50% blue; 90% cell replacement

- 117. Gp2-120 arrays; 50% blue; 90% cell replacement
- 118. Gp2-240 arrays; 50% blue; 90% cell replacement
- 119. Gp2-360 arrays; 50% blue; 90% cell replacement

- 120. Gp3-120 arrays; 50% blue; 90% cell replacement
- 121. Gp3-240 arrays; 50% blue; 90% cell replacement
- 122. Gp3-360 arrays; 50% blue; 90% cell replacement

Use of data from arrays sets 96-122 in supplementary material (to examine other variables):

Fig. S16 shows effect of different array sizes (120, 240 and 360 stem cells) on decline in corrected stripe numbers caused by 5% stem cell loss in random arrays and clumped arrays with groups of 2 or 3 stems.

Fig. S17 shows effect of different array sizes (120, 240 and 360 stem cells) on decline in corrected stripe numbers caused by 10% stem cell replacement in random arrays and clumped arrays with groups of 2 or 3 stems.

Fig. S18 shows effect of different array sizes (120, 240 and 360 stem cells) on decline in corrected stripe numbers caused by 90% stem cell replacement in random arrays and clumped arrays with groups of 2 or 3 stems.

Part 7. Arrays sets 123-138. (Sets of 20 arrays run for 1000 stem cell generations)

Effects of different array sizes (30 – 360 stem cells) on survival of mosaicism in simulations with 50% probability of stem cell replacement in random arrays and clumped arrays with groups of 3 stem cells.

Random arrays

- 123. R-360 arrays; 50% blue; 50% cell replacement 1000 generations
- 124. R-120 arrays; 50% blue; 50% cell replacement 1000 generations
- 125. R-60 arrays; 50% blue; 50% cell replacement 1000 generations
- 126. R-30 arrays; 50% blue; 50% cell replacement 1000 generations

- 127. R-360 arrays; 80% blue; 50% cell replacement 1000 generations
- 128. R-120 arrays; 80% blue; 50% cell replacement 1000 generations
- 129. R-60 arrays; 80% blue; 50% cell replacement 1000 generations
- 130. R-30 arrays; 80% blue; 50% cell replacement 1000 generations

Clumped arrays (with groups of 3 stem cells)

- 131. Gp3-360 arrays; 50% blue; 50% cell replacement 1000 generations
- 132. Gp3-120 arrays; 50% blue; 50% cell replacement 1000 generations
- 133. Gp3-60 arrays; 50% blue; 50% cell replacement 1000 generations
- 134. Gp3-30 arrays; 50% blue; 50% cell replacement 1000 generations

- 135. Gp3-360 arrays; 80% blue; 50% cell replacement 1000 generations
- 136. Gp3-120 arrays; 80% blue; 50% cell replacement 1000 generations
- 137. Gp3-60 arrays; 80% blue; 50% cell replacement 1000 generations
- 138. Gp3-30 arrays; 80% blue; 50% cell replacement 1000 generations

Note: The results for Part 7 are shown in Fig. 6 of the manuscript after the results for Part 8 (see below).

Use of data from arrays sets 123-138 in main manuscript:

Fig. 6C-F shows effects of different array sizes (30 – 360 stem cells) on survival of mosaicism in random arrays and clumped arrays (with groups of 3 stem cells), with either 50% or 80% blue stem cells at G0 and a 50% probability of stem cell replacement per generation for 1000 stem cell generations.

Use of data from arrays sets 123-138 in supplementary material (to examine more details):

Fig. S19 compares arrays with 50% or 80% blue stem cells at G0 for survival of mosaicism in arrays of different sizes and types with a 50% probability of stem cell replacement per generation for 1000 stem cell generations.

Fig. S20 compares random or clumped arrays (with groups of 3 stem cells) for survival of mosaicism in arrays of different sizes and with either 50% or 80% blue stem cells at G0 and a 50% probability of stem cell replacement per generation for 1000 stem cell generations.

Part 8. Arrays sets 139-142. (Sets of 20 arrays run for 1000 stem cell generations)

Effects of different array sizes (6 or 120 stem cells) on survival of mosaicism in simulations with 10% or 50% probability of stem cell replacement in random arrays.

It has been reported that each intestinal crypt each has only 5-7 active stem cells (Kozar et al., Continuous clonal labelling reveals small numbers of functional stem cells in intestinal crypts and adenomas. Cell Stem Cell 13, 626-633, 2013). Survival of mosaicism was, therefore, compared in random arrays of 6 or 120 stem cells, to represent simulations of intestinal villi stem cells and limbal epithelial stem cells respectively.

- 139. R-6 arrays; 50% blue; 10% cell replacement 1000 generations
- 140. R-120 arrays; 50% blue; 10% cell replacement 1000 generations
- 141. R-6 arrays; 50% blue; 50% cell replacement 1000 generations
- 142. R-120 arrays; 50% blue; 50% cell replacement 1000 generation

Note: The results for Part 8 are shown in Fig. 6 of the manuscript before the results for Part 7 (see above).

Use of data from arrays sets 139-142 in main manuscript:

Fig. 6A, B shows effects of two different array sizes (6 or 120) on survival of mosaicism in random arrays with 50% blue stem cells at G0 and a 10% or 50% probability of stem cell replacement.

Part 9. Arrays sets 143-154. (Sets of 20 arrays run for 500 stem cell generations)

Comparison of the effects of 1% or 5% stem cell replacement and 0.5% or 1% stem cell loss for random arrays and arrays with groups of 3 stem cells, starting with 50% or 80% blue stem cells.

50% blue cells

- 143. Random array of 120 cells; 50% blue; 1% stem cell replacement
- 144. Random array of 120 cells; 50% blue; 0.5% stem cell loss
- 145. Groups of 3 in array of 360 cells; 50% blue; 1% stem cell replacement
- 146. Groups of 3 in array of 360 cells; 50% blue; 0.5% stem cell loss
- 147. Groups of 3 in array of 360 cells; 50% blue; 5% stem cell replacement
- 148. Groups of 3 in array of 360 cells; 50% blue; 1% stem cell loss

80% blue cells

- 149. Random array of 120 cells; 80% blue; 1% stem cell replacement
- 150. Random array of 120 cells; 80% blue; 0.5% stem cell loss
- 151. Groups of 3 in array of 360 cells; 80% blue; 1% stem cell replacement
- 152. Groups of 3 in array of 360 cells; 80% blue; 0.5% stem cell loss
- 153. Groups of 3 in array of 360 cells; 80% blue; 5% stem cell replacement
- 154. Groups of 3 in array of 360 cells; 80% blue; 1% stem cell loss

Note: The results for Part 9 are included in the supplementary material, before the results for Part 1.

Use of data from arrays sets 143-154 in supplementary material:

Fig. S4 shows effect of lower levels of stem cell replacement or loss, than in Part 1 (Fig. 4), on corrected stripe number.