**SUPPORTING INFORMATION**

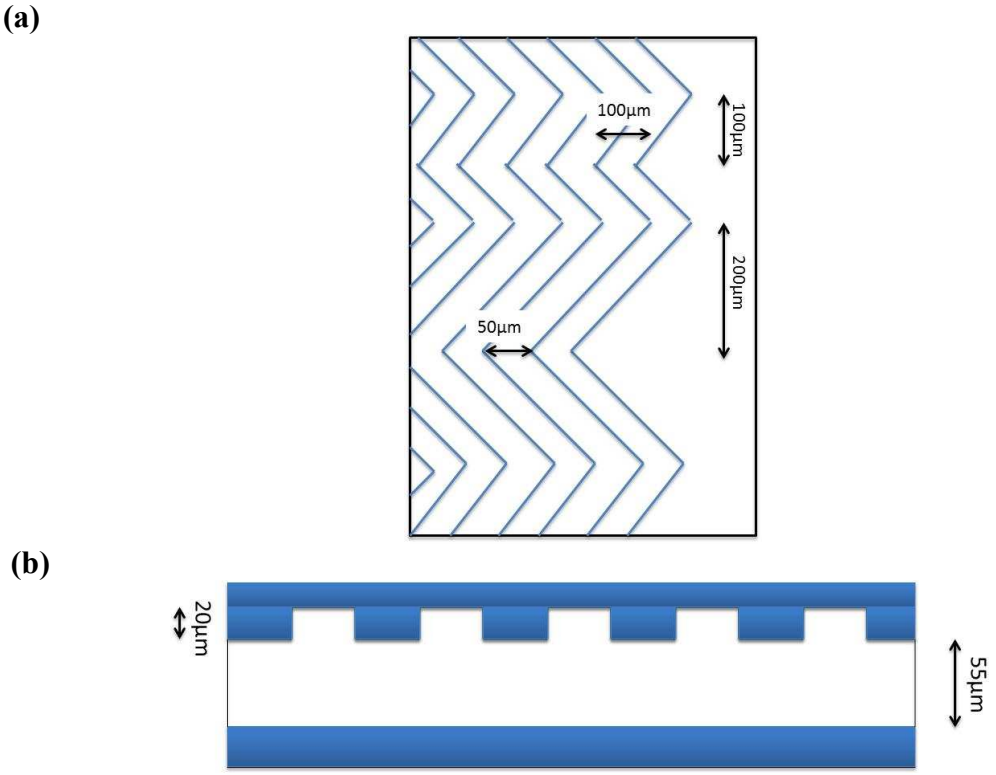


**Figure S.1**. Schematic diagram of the herringbone geometry in dimensions in a top view (a) and side view (b).

**Experiments with Ovine EPCs:**

A pure suspension of EPCs was input into the first capture stage at a concentration of 100,000 cells/mL at a flow rate of 5 µL/min for 20 min. Cells were then released into the following stages as shown in Fig. 1. Due to the homogeneous nature of the input stream the cells all express the same surface markers. However some information regarding capture efficiency can be gleaned from the data. The capture efficiency (defined as number of cells captured versus cells input) in each stage is approximately 56%. This indicates that the efficiency of the CD34 capture stage is similar to that of the Flk1 stage for these homogeneous suspensions.

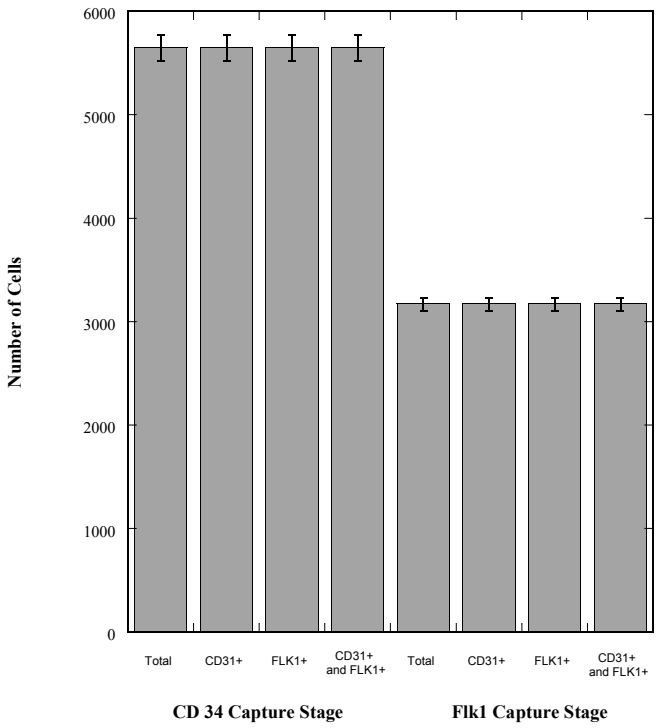


**Figure S.2.** Flow cytometry data for pure EPC suspension entering the multistage device. 10,000 cells were input into the device.

**Table S1.** Composition of Suspensions Recovered from Each Capture Stage.

| Capture Stage | CD31+ (%) | CD31+/Flk1+/CD45- (%) | CD45+ (%) |
|---|---|---|---|
| | | Total Compositions | |
| **CD34**† | 61 ± 3 | 37 ± 2 | 21 ± 1 |
| **Flk1** | 65 ± 5 | 41 ± 4 | 3 ± 0 |
| | | Excluding RBCs | |
| **CD34**† | 100 | 61 ± 4 | 35 ± 1 |
| **Flk1** | 100 | 63 ± 6 | 5 ± 0 |
| | | Excluding RBCs and CD31+/Flk1- Leukocytes | |
| **CD34**† | | 64 ± 4 | 36 ± 1 |
| **Flk1** | | 92 ± 11 | 8 ± 1 |

Note: all uncertainties are standard deviations based on three replicates.

† this data was collected as a separate series of experiments and these cells were not directly input into the Flk1 capture stage.

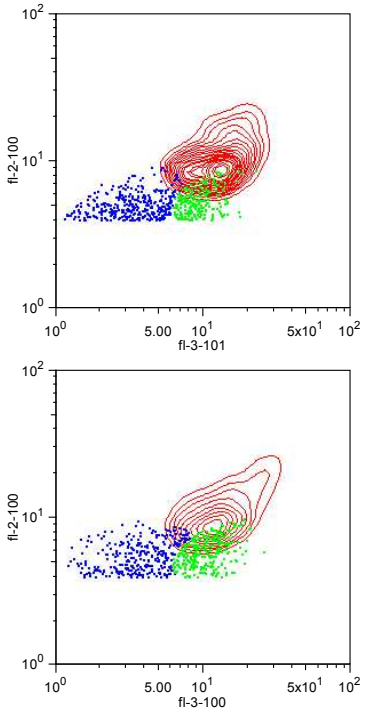


**Figure S.3.** Flow cytometry contour plots representing cells released from (a) the first stage and (b) the second stage. The y-axis represents CD45 expression and the x-axis CD31 expression. Blue represent red blood cells, red represent CD31+ and CD45+ positive cells (hematopoietic stem cells), green represent CD31+ and CD45- cells (EPCs).