Electronic Supplementary Material (ESI) for Lab on a Chip.

Supplement

Table S1. Comparison of MSC size measured by coulter counter and imaging-based algorithm. Human MSCs at late passages were measured for cell size using both Moxi Z Mini coulter counter and an imaging-based algorithm implemented with MATLAB.

Replicates	**1**		**2**		**3**	
	Mean	**SE**	**Mean**	**SE**	**Mean**	**SE**
Imaging	18.56	0.23	19.84	0.28	19.67	0.25
Coulter counter	18.31	0.35	19.32	0.63	19.12	0.38

Table S2. Supplement information on MSC continuous culture expansion. Corresponding days of culture post initial seeding and Medium-size MSC recovery at each passage. All data are presented as Mean ± S.E.

Passage number	4	5	6	7	8	9	10
Days post seeding	0	6.8±1	15.8±1.55	22.3±1.44	30±2.18	43.3±0.58	63±1.80
Medium-sized MSC recovery	0	67.4±7.56 %	72.5±2.52 %	64.0±1.43 %	57.0±2.83 %	55.5±5.5 %	45.7±0.69 %

Figure S1: RT-PCR analysis of Col II/Col I ratio in cartilage pellets. (A) Col II/Col I ratio of cartilage pellets formed by different MSC size-dependent subgroups at early, middle and late passages. (B) Col II/Col I ratio in cartilage pellet formed by MSCs at different passages after normal (white bar) and selective (black bar) culture expansion. The percentage changes of ratio as compared to initial ratio (P3) at different passages after normal (line with round dots) and selective (line with triangle dots) culture expansion are plotted simultaneously. All error bars represent standard deviations. Statistical significance is determined by student's t-test, * indicates $p < 0.05$.

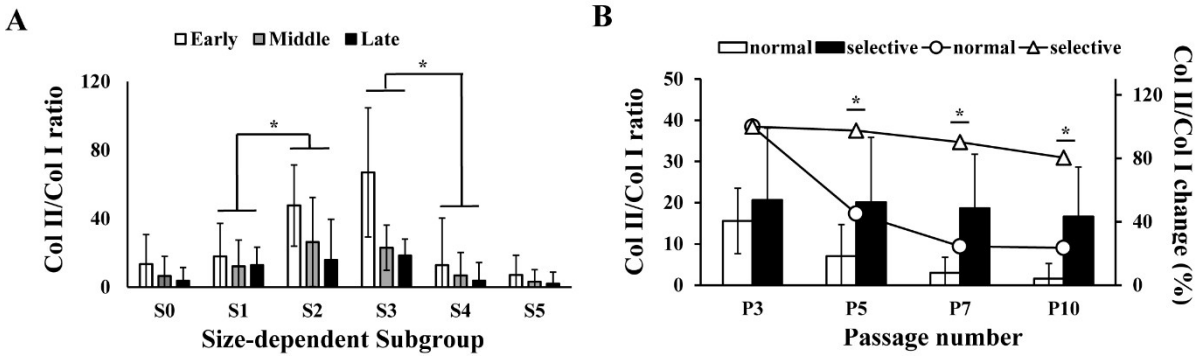

Figure S2: MSC cell cycle analysis. (A) An example of FACS plot for cell cycle analysis of MSC size-dependent subgroups. (B) Percentage of mitosis of total MSC (S0) at early, middle and late passages. All error bars represent standard deviations. Statistical significance is determined by student's t-test, * indicates $p < 0.05$.