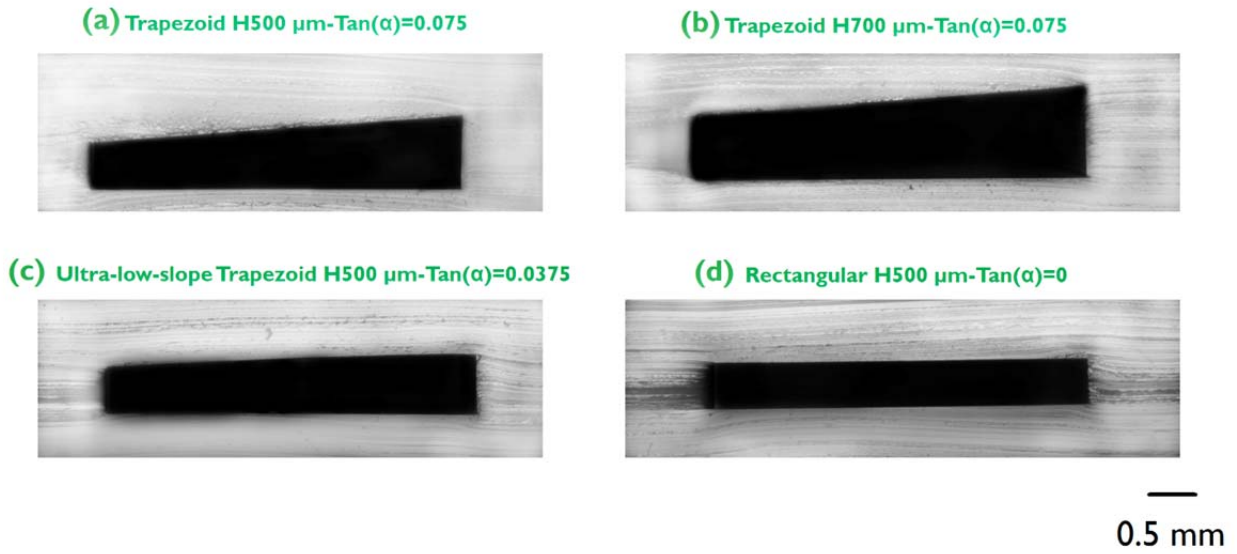


# Inertial-based filtration method for removal of microcarriers from mesenchymal stem cell suspensions

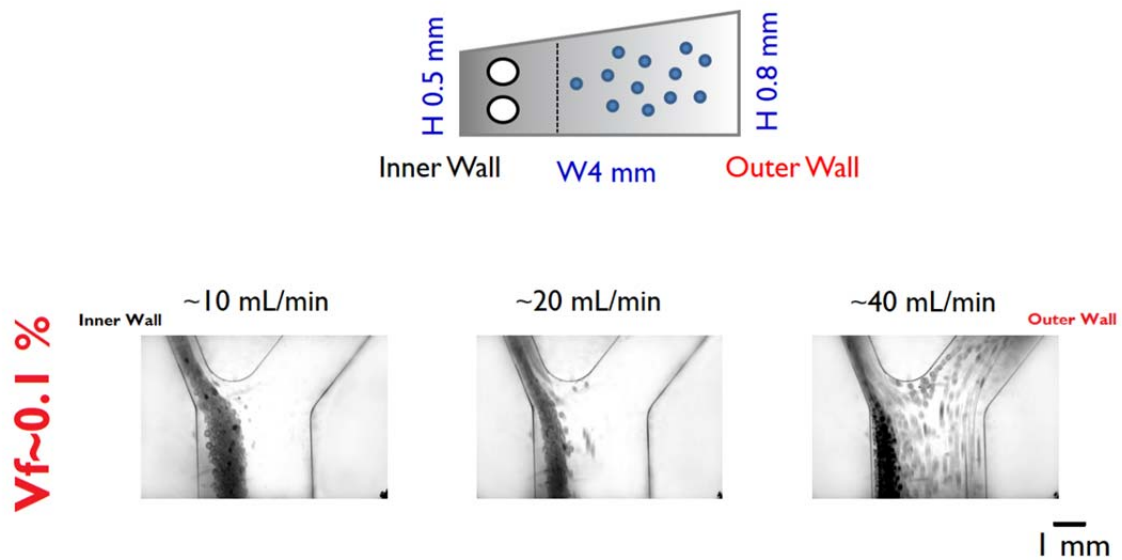
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**Fig. S1** Experimental set up for separation of microcarriers from hMSCs

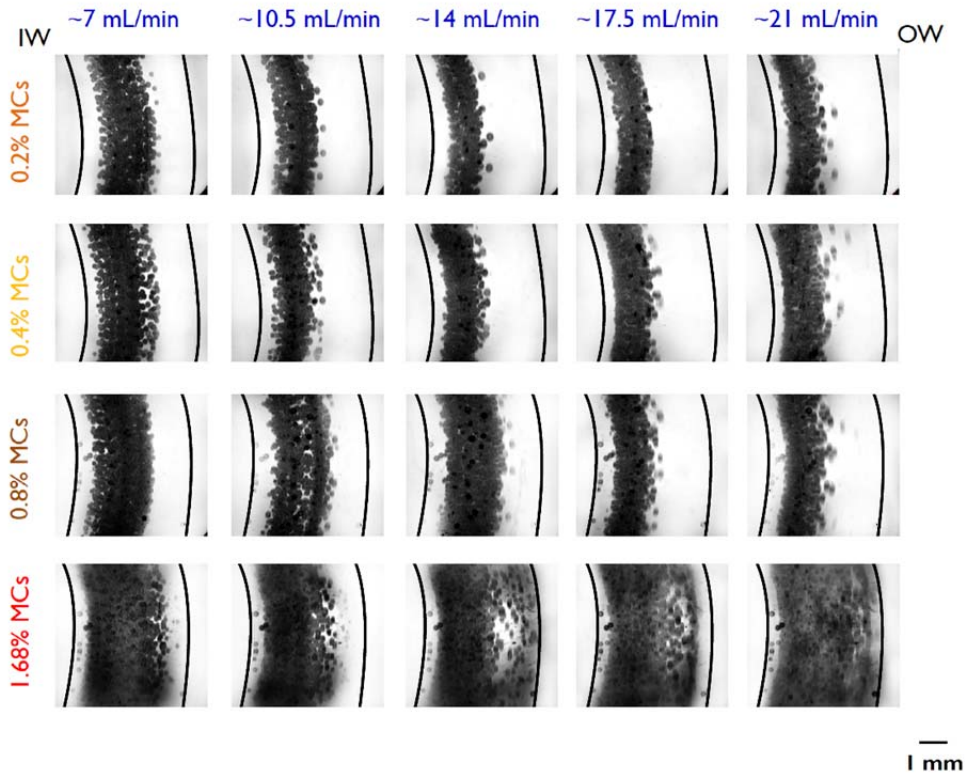


**Fig. S2** The cross-sections of fabricated trapezoid and rectangular spiral channels. All channel's widths are fixed at 4 mm.

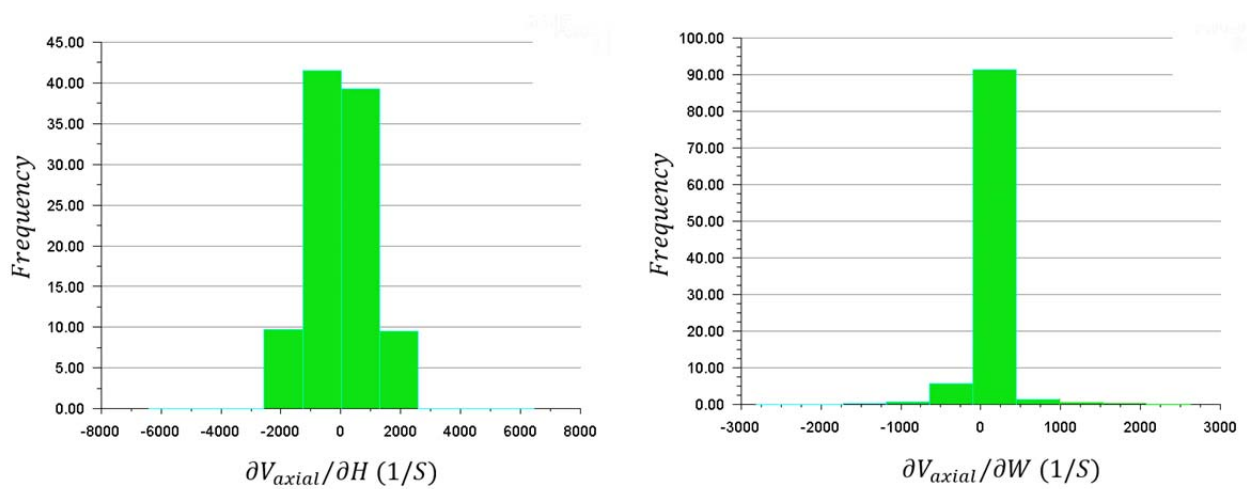


**Fig. S3** Microcarrier focusing dynamics at the bifurcation of trapezoid spiral channel with  $H=500\ \mu\text{m}$ ,  $\text{Tan}(\alpha)=0.075$  when the MC volume fraction is as low as  $\sim 0.1\%$ . It shows good-focusing and separation of MCs from the inner wall outlet at  $\sim 20\ \text{mL/min}$ .

**Trapezoid H500  $\mu\text{m}$ -Tan( $\alpha$ )=0.075-Increasing Dean Mode**



**Fig. S4** Microcarrier focusing dynamics in trapezoid spiral channel with  $H=500 \mu\text{m}$ ,  $\text{Tan}(\alpha)=0.075$  when Dean number increases across the spiral channel.



**Fig. S5** Histogram of two major shear rates across the ultra-low-slope trapezoid spiral channel,  $H=500 \mu\text{m}$ ,  $\text{Tan}(\alpha)=0.0375$ .

**Table S1.** MC count from the outer wall outlet sample (n=3) using the ultra-low-slope trapezoidal spiral

MC volume fraction %	0.2	0.4	0.8	1.6
$C_o$ (MCs/mL) Outer wall outlet	0	7.6±2.5	24.3±4	41.6±7.6
$C_s$ (MCs/mL) Reservoir	~750	~1500	~3000	~6000
E %	100	99.4	99.19	99.3

Note: To perform microcarrier (MC) count of the outer wall outlet collection, due to low concentration, 1-mL sample was dispersed into a petri dish and subsequently MCs were counted manually on the microscope stage using bright field.