Supporting Information for:

A versatile, fully automated, microfluidic cell culture system

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Supporting Video Captions

Supporting Video 1. Comparison of motility between stimulated and non-stimulated hMSCs. Time lapse microscopic imaging (one image every hour, 20x objective) of human Mesenchymal Stem Cells in the continuous stimulation experiment (corresponding to the data shown in Fig. 3a). The top chamber was fed growth medium for 9.5 days and the bottom one was fed growth medium for 12 hours and then osteogenic medium for 9 days. The time displayed at the top left is measured from the beginning of the feeding schedule.

Supporting Video 2. Demonstration of individual addressability of the chambers in the microfluidic chip. Video microscopic imaging of food dyes of two colors being alternatively fed to consecutive chambers using the microfluidic multiplexer and pressure-driven flow (accelerated to 8 times the real speed). This demonstrates how different media, surface treatment reagents, staining reagents, or cells can be delivered to different chambers without cross-contamination.

Supporting Video 3. Demonstration of peristaltic pump functionality. Video microscopic imaging showing the precise delivery of different doses of fluid (food dye) to consecutive chambers using the peristaltic pump (accelerated to 4 times the real speed). Chambers were fed increasing amounts of dye by actuating the pump 20, 40, 60, and 80 cycles respectively.

Supporting Video 4. Invasion of a microfluidic chamber by hMSCs seeded at low density. Time lapse microscopic imaging (one image every 20 min, 20x objective) of human Mesenchymal Stem Cells seeded at low density and fed only growth medium.