Supplementary Figures

**Fig.S1.** Microfluidic device fabrication and design elements. **A-E** The manufacturing process of the microfluidic device involved elastomer casting on a two layer SU8 master and bonding of the elastomer to a glass slide. **F.** Fluids are introduced in the chip using pipette tips inserted in the elastomer. **G.** A sieve structure was used at the inlet for cells for removing debris from the cell suspension and to avoid channel clogging. **H.** A weir structure was used to trap silica particles in the separation column. **I-J** Nonspecific RNA binding inside the microfluidic has been avoided by treating the surface of the microchannels with fluorosilane. The efficacy of the treatment was evaluated by using a ribo-green RNA specific dye, following RNA solution flow through the device.

**Fig.S2.** Silica column characterization. **A.** Microscopy image of the silica particles inside the device. Scale bar is 500µm. **B.** Effect of silica type on the RNA isolation. The same amount of total RNA (10ng) was captured on microfluidic separation columns filled with three different types of silica (silica #1 – catalog number 40360, silica #2 – catalog number 0507, silica #3 – catalog number 227196, all from Sigma-Aldrich). Standard gel electrophoresis was used to compare the RNA amount eluted from each column and the original amount. **C.** Effect of silica preconditioning on RNA capture/elution. Pretreatment of the silica column with magnesium salt solutions improves the efficiency of RNA recovery from solution. Pretreatment the silica using diethylpyrocarbonate DEPC does not have a significant effect on the efficiency of separation, suggesting that the silica is not RNase contaminated. **D.** Effect of elution volume on the total RNA isolated from 50 cells. A volume of 20 µL of elution solution was used for better efficiency of RNA recovery from the silica column.

**Fig.S3.** Quality of the RNA isolated in the microfluidic device. The quality of the total RNA isolated and purified using the microfluidic chip, form a 2000 cells sample was measured using the “pico” electrophoresis chip (Agilent Bioanalyzer). The average amount of RNA in the sample in this example was calculated to 2.3pg/cell.
Fig.S1

Silicon Wafer
30 µm
PDMS casting
Micropatterned Mold
Inlet/Outlet Holes
Silica Particles
Without fluoro-silane treatment
With fluoro-silane treatment

Supplementary Material (ESI) for Integrative Biology
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Genome-wide transcriptome analysis of 150 cells samples
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