SUPPLEMENTARY INFORMATION FOR:

Real time detection and monitoring drug resistance of single myeloid leukemia cell by diffused total internal reflection

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Supplementary Figure S1.

The AZA concentration distribution in the microchannel can be simulated by the finite element method. The whole channel of simulation is the same as the experiment ones. The flow stream 1, Q_1 with c_1 = 0 mM marked in blue, is input in the inlet 1 and the flow stream 2, Q_2 with c_2 = 20 mM marked in red, is injected into the inlet 2. The Diffusion coefficient of liquids is set to 1×10^{-9} m^2/s. By changing *Pe* from 60 to 600, the results of diffused AZA concentration distribution are demonstrated and it reveals that the range of *Pe* from 200 to 500 can be formed effective concentration distribution in the channel and it is also no damage to cells. Besides, the drug concentration distribution of each row is the same while each column is different in main channel. The difference value of equal concentration curves is expressed as Δ*c*. And also the AZA concentration around every single cell is approximate uniform.

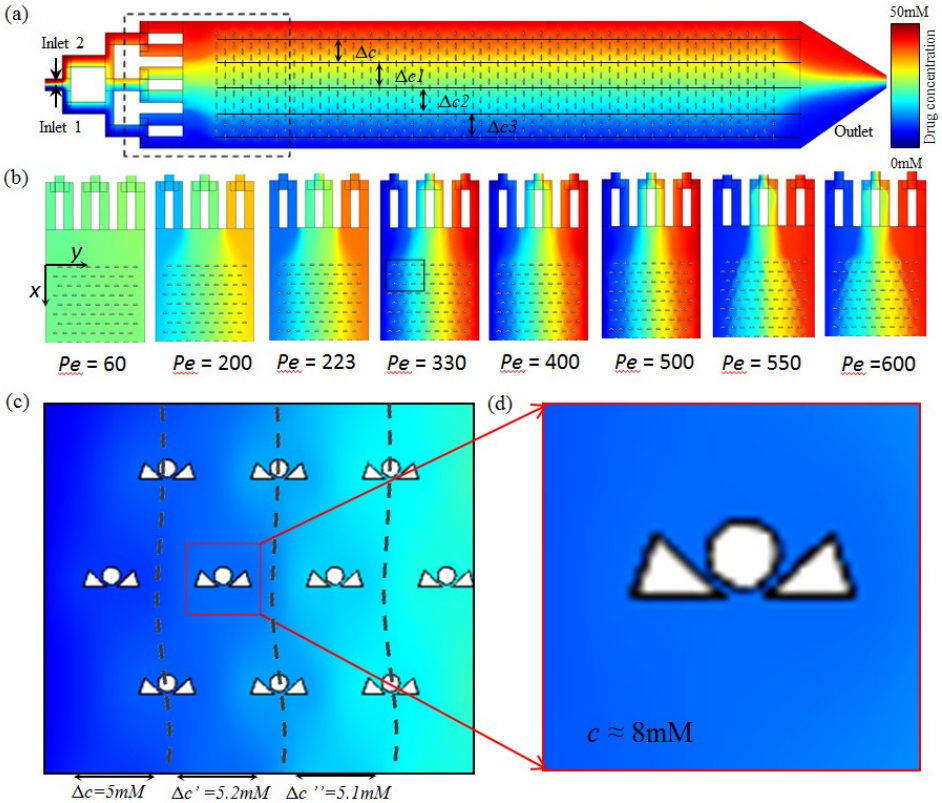

Fig. S1 (a) the simulation results of drug diffusion in the whole microchannel and the curves of equal concentration in the microchannel. (b) the results of gradient profiles in different *Pe* number in dashed-square area of (a).(c) and (d) the simulation diagram of concentration distribution around every single cell.

Supplementary Figure S2.

The comparison of the concentration distribution results of diffused total internal reflection experiments and simulation is to confirm the reliability of diffusion coefficient. In the experiments, the refractive index of the glass is 1.52. Based on the Eqn.(2) and the experimental relationship between the concentration and the refractive index of the drug solution, the liquid refractive index and concentration of drug in each detected point can be measured by using total internal reflection fluorescence microscope and adjusting the incident angle. Especially, when the flow rates are Q = 0.3 μL/ min, the concentration distribution of y –axial channel at x= 0 μm and x-axial channel at y= 100, 300, 500, 700, 900 μm are measured and simulated, respectively. The dotted lines indicate the results of experiments, while the real ones represent the simulation results. Compared to the results of them, the concentration distribution is the same. It demonstrates that the diffusion coefficient value of the drug molecule can be reasonable evaluated and the value is about $D_0 = 1\times10^{-9}$ m^2/s.

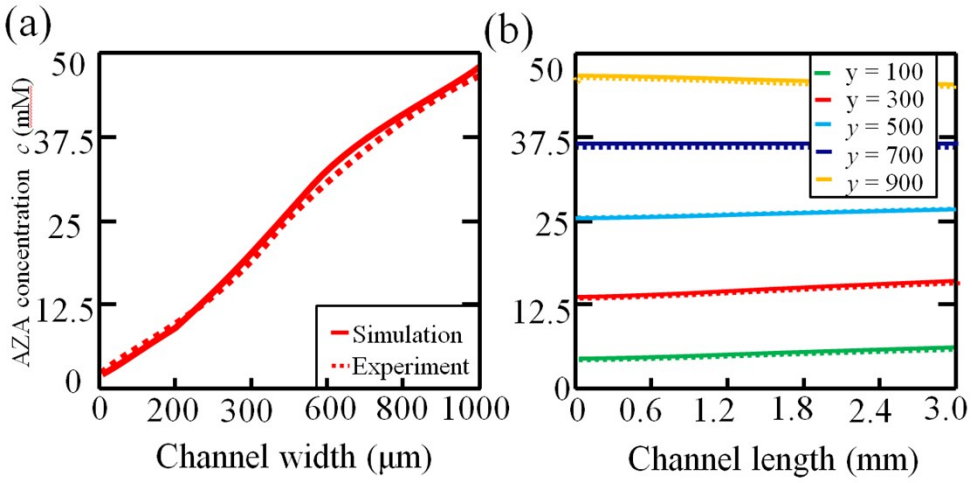

Fig. S2 Comparison of the simulation and experiments results of drug concentration distribution at Pe = 330. (a) the simulation and experiment results of drug concentration of y –axial channel at x= 0 μm. (b) the results of drug concentration of x-axial channel at y= 100, 300, 500, 700, 900 μm.