

Supplementary Information

Detection of anti-p53 autoantibodies in saliva using microfluidic chips for the rapid screening of oral cancer

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Supplementary Fig. S1

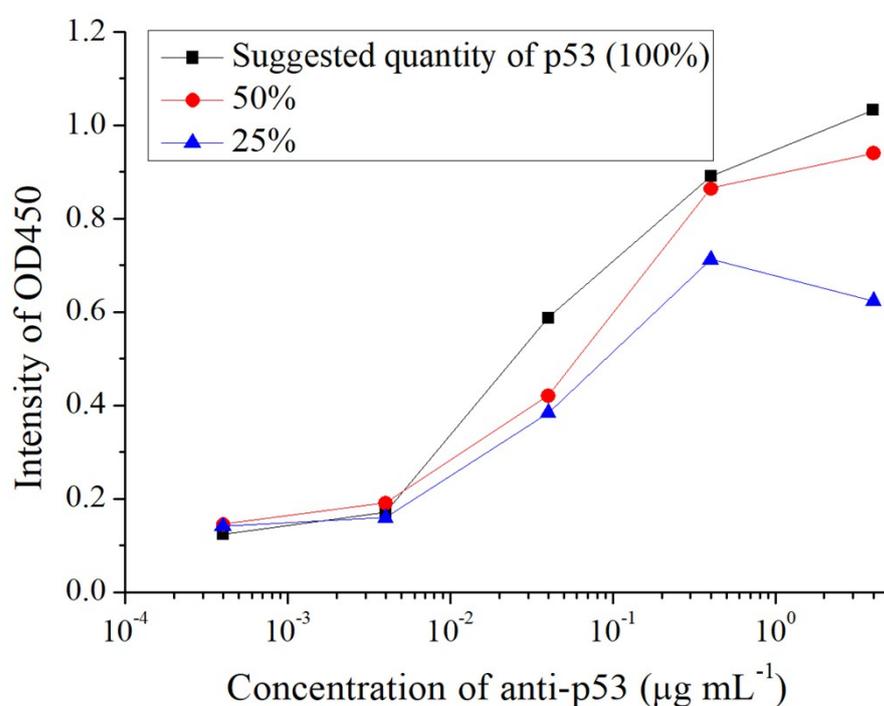


Fig. S1 The ratio of p53 and bead when coupling was $20 \mu\text{g protein/mg bead}$, according to the manufacturer's protocol. We verified the ratio if the quantity of p53 to beads was enough. The black square denotes the suggestion ratio of protein and bead, i.e., $20 \mu\text{g protein/mg bead}$, the red circle and blue triangle denote the half and 1/4 of the p53 protein used. We used the beads with different coating conditions to perform anti-p53 ELISA. It was observed that the detection signal increased in intensity with the concentration of anti-p53 with suggestion and half suggestion coating ratio. It can be inferred that the microbeads were fully coated by the antigen with maximum binding capacity.

Supplementary Fig. S2

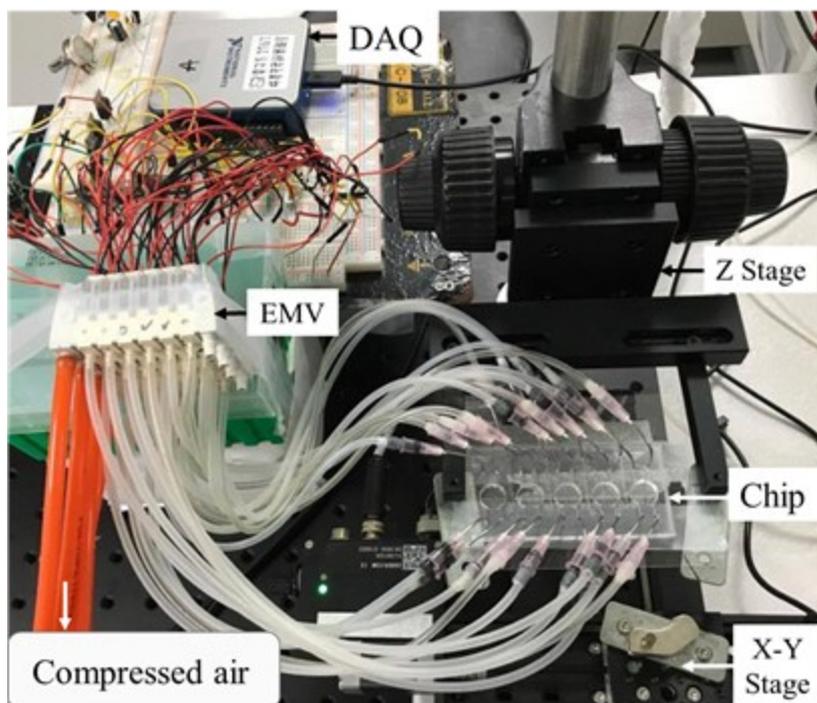


Fig. S2 Experimental setup. The chip was placed on the post on an adjustable Z-axis and the bottom of the chip contains a program-controlled X-Y stage. The stage contains a strong magnet to manipulate the magnetic beads. The output signal from the DAQ is used to control the solenoid valves so as to control the compressed air switch. The solenoid valve is connected to the micromixer and microvalves on the chip on one side while the other side is connected to the air compressor and pressure regulating valves.

Supplementary Fig. S3

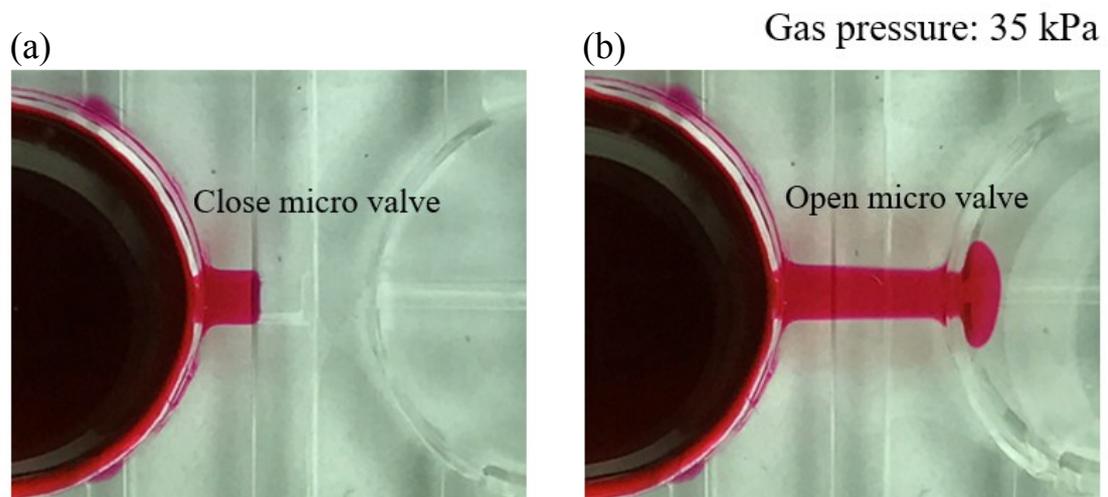


Fig. S3 Microvalve test results (a) 35 kPa of compressed air is driven into the air chamber below the valve so that the membrane on top of the valve rises and seals the channel. It can be observed that the red ink and water are completely isolated. (b) Conversely, if no air pressure is applied, the valve is open and fluids can flow through.

Supplementary Fig. S4

(a)

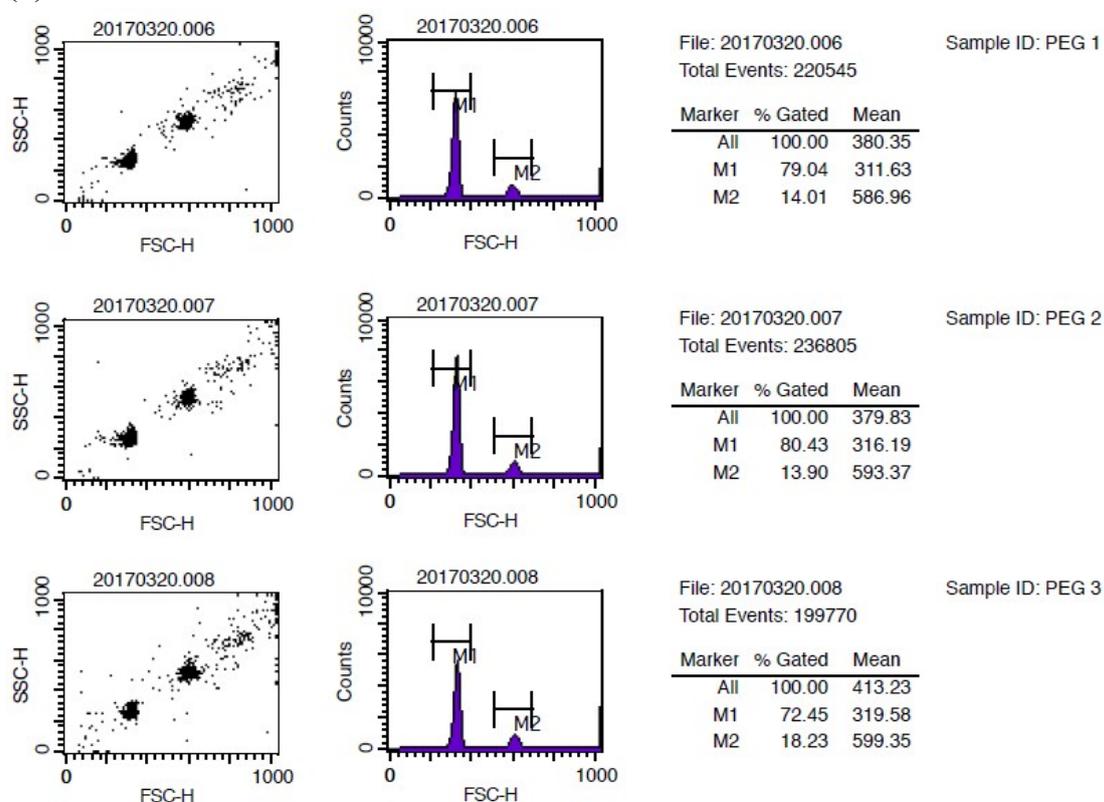


Fig. S4 (a) After immunoassay was carried out on the PEG-modified chip, the magnetic beads in the last reaction well were collected and counted using flow cytometry. M1 is the number of single magnetic beads while M2 is the number of aggregated magnetic beads. The figure shows the results from 3 chips that were repeated in triplicates.

(b)

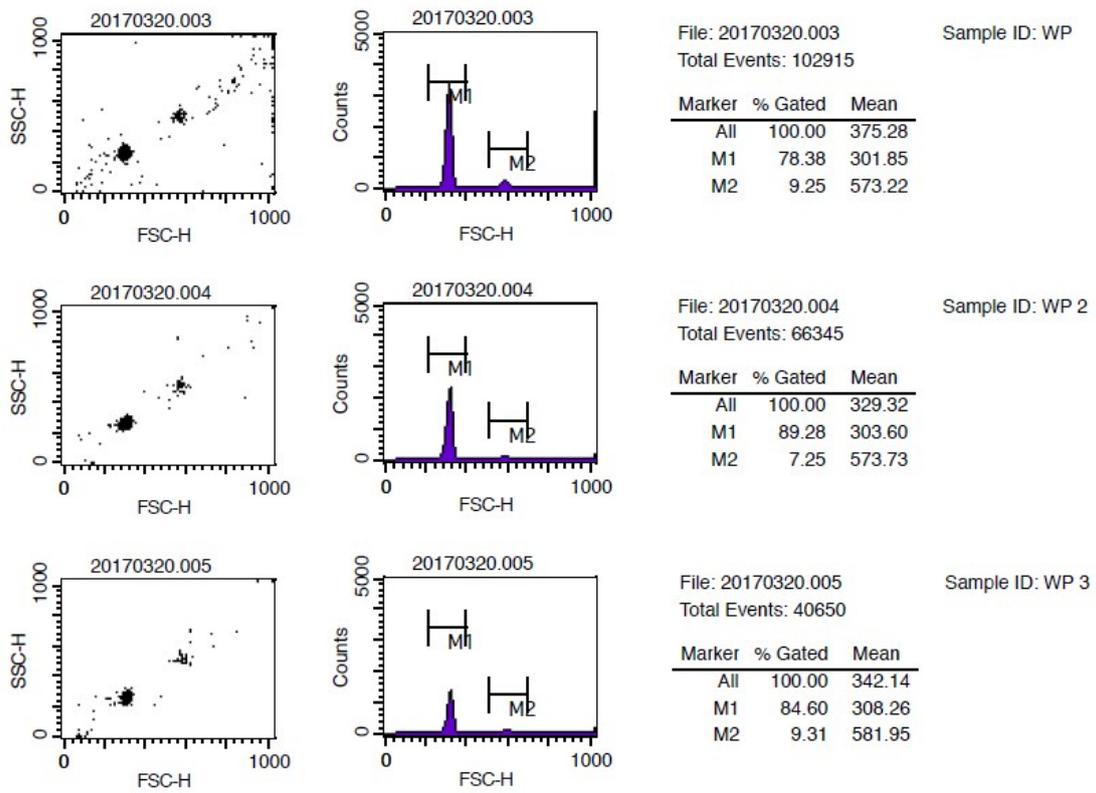


Fig. S4 (b) After immunoassay was carried out on the unmodified chip, the magnetic beads in the last reaction well were collected and counted using flow cytometry.

Supplementary Fig. S5

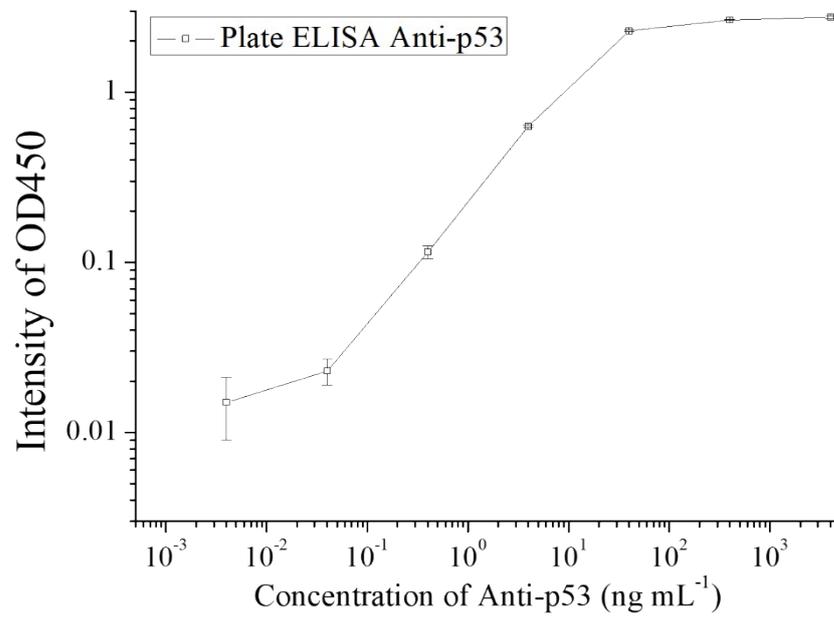


Fig. S5 Detection of anti-p53 using plate-based ELISA.