Electronic Supplementary Information (ESI) for

Microfluidic Retention of Progressively Motile Zebrafish Sperms

By

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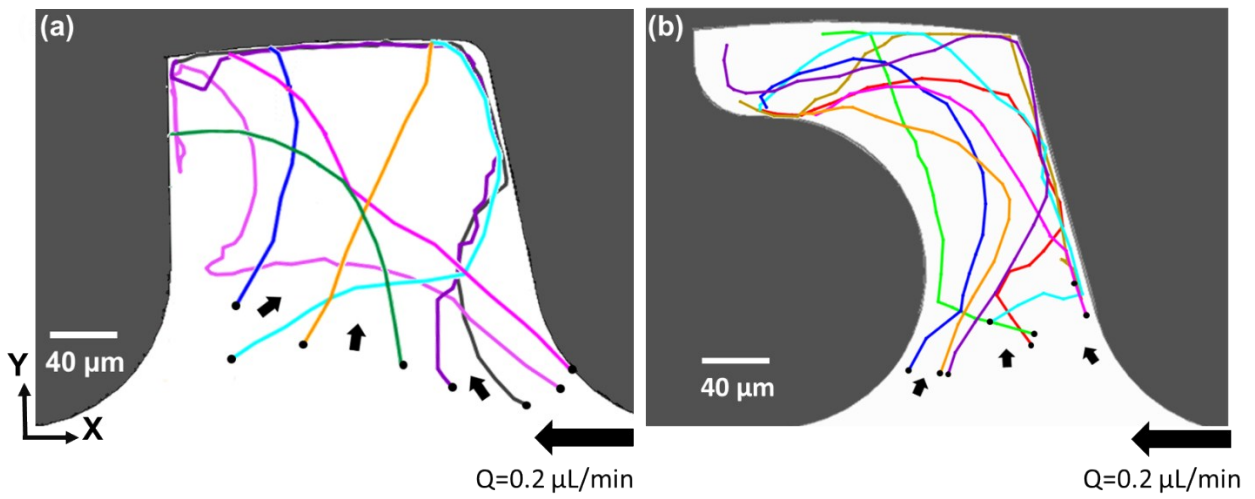*E-mail:chiayuac@mail.ncku.edu.tw; Tel: +886-6-2757575-62169.*

Fig. E1. Extracted trajectories of zebrafish sperms at flow rates of 0.2 μL/min in (a) Device I (b) Device II. All the trajectories were extrapolated from the recorded videos and trajectories with the tracking starting points labelled as solid circles.
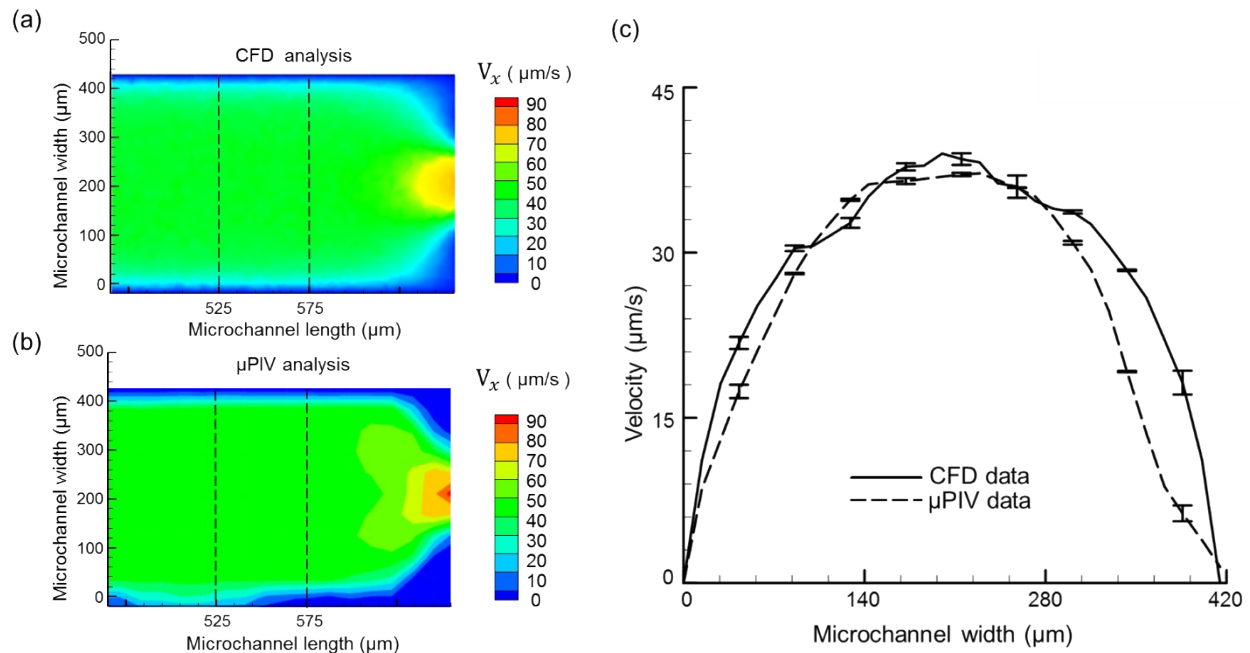
Fig. E2. The velocity contour along the X-direction on the top plane depicts the maximum velocity at the center of the plane. (a) Numerical & (b) Micro particle image velocimetry (µPIV) analysis. (c) Comparison between numerical data and µPIV analysis data at an axial plane near the top of the microchannel which illustrates a high degree of relevance as illustrated both the data exhibiting a high correlation of $R^2 = 0.95$.
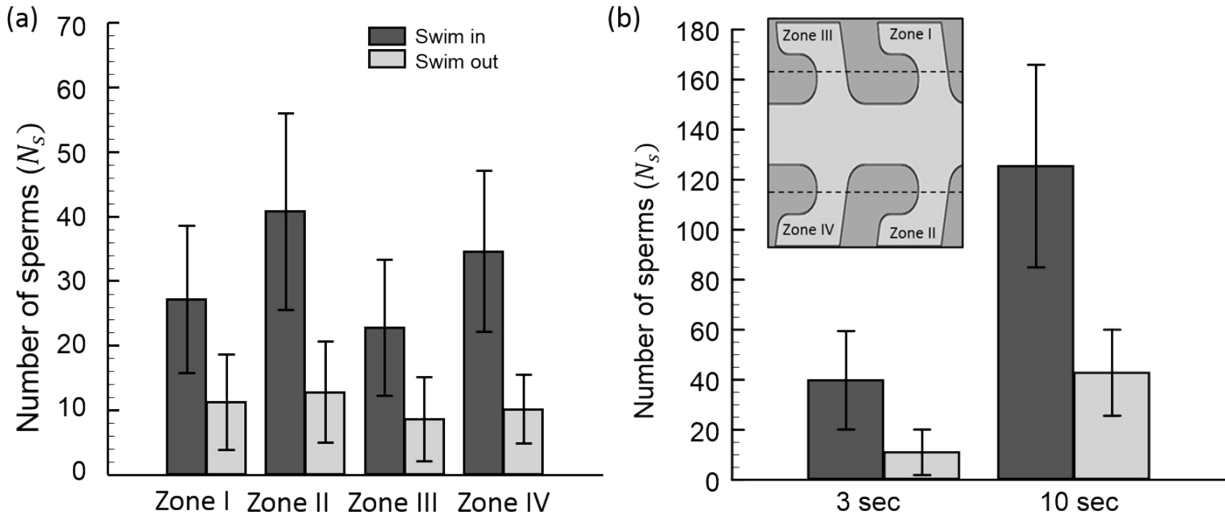
Fig. E3. The number of sperms retained for a 10-second time window at a flow rate of 0.7 μL/min. (a) The number of sperms swimming in and out for four different retention zones illustrates a similar trend where the number of sperms swimming in is higher than the number of sperms swimming out. (b) The total number of sperms quantified from four different sperm retention zones observed for 3-second and 10-second windows. The results are illustrated in Mean ± SD from five independent (*N=5*) experiments illustrating the similar trends in sperm retention.

Suplimentray video 1: The sperm retention zones were quantified between two horizontally located consecutive baffles through the numerical simulation. The sperm retention for different flow rate was quantified by tracking the sperm locomotion.

Suplimentray video 2: Demonstartion of overall sperm retention for Device II at an optimized flow rate of 0.7 μL/min.