Supplementary information

1. Statistics on data

1.1 Statistics of stroke frequency of UA57 worms

Table 1. Statistics of stroke frequency of 6-OHDA treated UA57 worms at day 1, 3, 5

Test date		Day 1			Day 3			Day 5		
6-OHDA (mM)		0	5	10	0	5	10	0	5	10
Average stroke frequency (12 worms, in an hour) (stroke times/s)	1	2.55	2.18	3.015	4.97	0.32	1.25	3.34	0.08	0.02
	2	5.22	3.82	0	4.21	3.10	0	4.54	1.38	1.20
	3	4.14	4.34	0	3.52	2.06	1.9575	3.50	2.74	2.97
	4	4.06	2.80	0	4.76	0.16	0.6075	3.51	0.48	0.86
	5	3.31	3.90	0.0325	3.46	2.09	1.835	3.15	1.15	0.01
	6	3.92	3.02	1.17	4.32	2.86	1.025	3.86	1.24	0.93
	7	3.80	3.15	1.19	0.84	2.49	1.8575	3.93	0.23	2.24
	8	2.48	1.12	0.5075	4.11	0.58	0.775	3.23	1.86	0.53
	9	2.33	1.14	1.175	4.40	3.90	0.1175	3.78	1.64	0.01
	10	2.96	4.21	3.0675	4.00	4.05	1.4425	3.66	0.74	1.58
	11	3.59	4.32	1.55	2.94	1.74	0.45	4.36	1.70	0.01
	12	4.62	3.27	2.525	3.94	2.21	1.0425	2.78	0.07	0.02
N total		12	12	12	12	12	12	12	12	12
Mean		3.58	3.11	1.19	3.79	2.13	1.03	3.64	1.11	0.86
SD		0.89	1.13	1.16	1.08	1.28	0.67	0.50	0.82	0.99
SEM		0.26	0.33	0.34	0.31	0.37	0.19	0.14	0.24	0.28

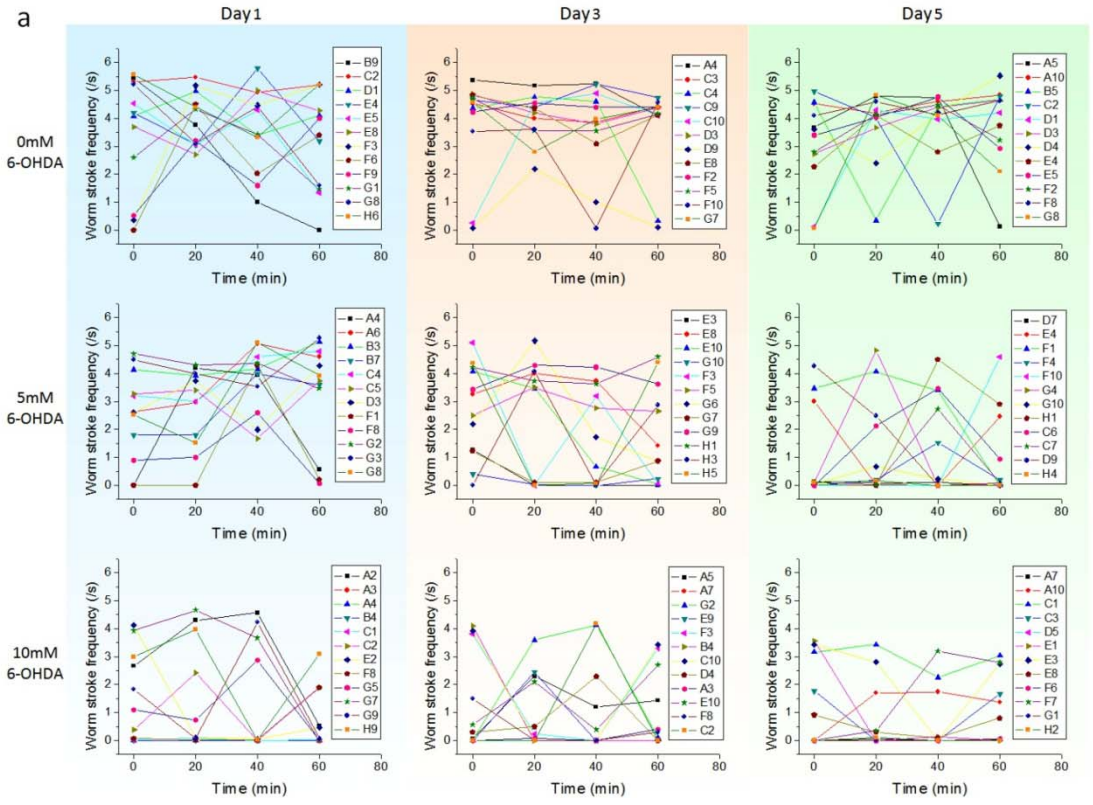


Fig. 1 Stroke frequency of individual UA57 worms in response to 6-OHDA. Movement videos of individual UA57 worms treated with different concentrations of 6-OHDA were recorded by a CCD camera mounted to a stereomicroscope for 30s, four times (at 0, 20th, 40th, 60th minute) in 1h at the 1st (defined as the 72th hour after 6-OHDA exposure), 3rd

and 5th day, respectively. The stoke frequencies (defined as the number of stoke times per second) were counted manually. The 12 symbols in each graph indicated the locations of 12 droplets chosen randomly in which individual worms were encapsulated, and the broken lines indicated the fluctuations of the individual worms' stoke frequency during the test period (1h).

1.2 Statistics of stroke frequency of CL2166 worms

Table 2. Statistics of stroke frequency of 6-OHDA treated CL2166 worms at day 1, 3, 5

Test date		Day 1			Day 3			Day 5		
6-OHDA (mM)		0	5	10	0	5	10	0	5	10
Average stroke frequency (12 worms, in an hour) (stroke times/s)	1	1.75	2.68	1.70	1.40	2.40	1.71	1.88	0.12	0.01
	2	1.78	2.17	0.60	1.64	3.26	1.05	0.13	0.45	0.26
	3	3.58	2.03	1.04	1.64	0.53	1.68	1.83	0.63	0.22
	4	1.08	1.97	0.00	1.92	0.37	1.67	1.40	0.42	0.48
	5	2.14	2.76	2.64	2.74	0.04	0.25	2.94	0.08	0.44
	6	2.09	1.64	0.27	1.34	2.58	1.06	0.88	0.20	0.43
	7	2.62	1.39	1.04	1.38	0.49	1.07	2.28	0.54	0.22
	8	0.89	0.03	1.06	1.33	1.93	0.75	1.74	0.16	0.44
	9	1.77	1.09	1.02	1.33	0.36	0.48	2.05	0.48	0.09
	10	2.46	1.78	0.80	2.09	0.85	1.20	1.56	0.38	0.08
	11	1.35	2.18	1.72	2.74	2.48	1.09	0.74	1.29	0.02
	12	1.44	2.49	1.02	2.42	1.53	0	1.77	0.02	0
N total		12	12	12	12	12	12	12	12	12
Mean		1.91	1.85	1.08	1.83	1.40	1.00	1.60	0.10	0.22
SD		0.74	0.76	0.70	0.55	1.10	0.55	0.74	0.34	0.19
SEM		0.21	0.22	0.20	0.16	0.32	0.16	0.21	0.10	0.05

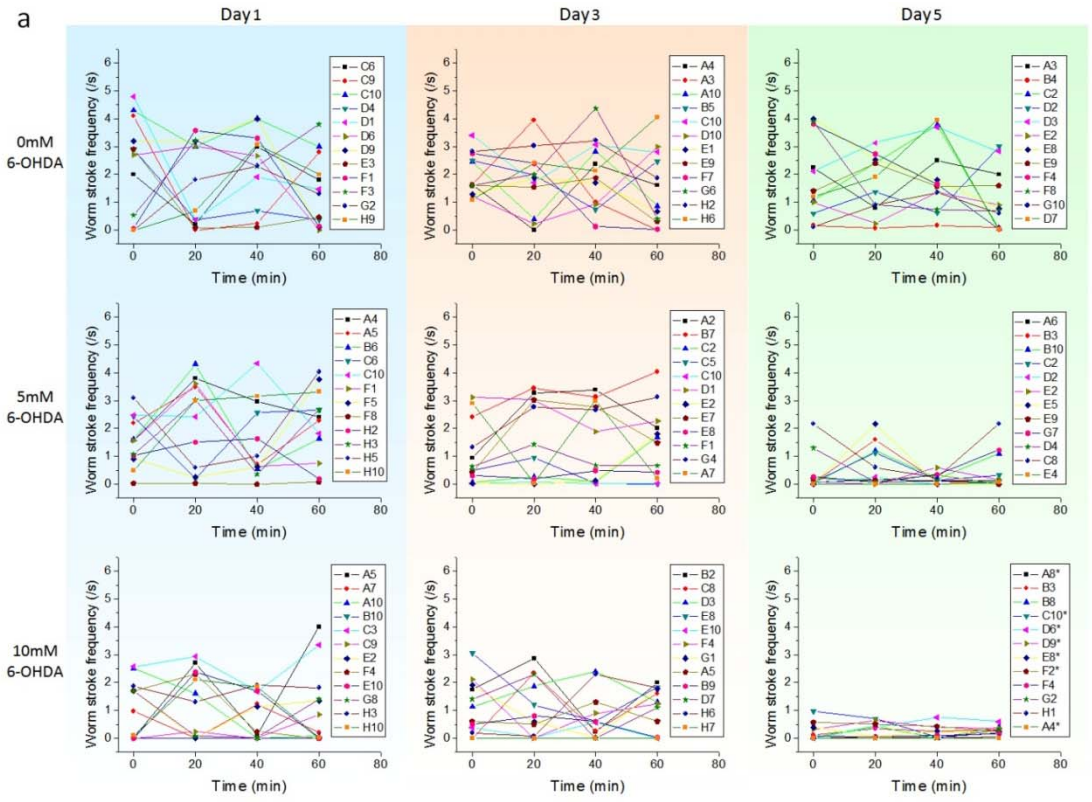


Fig. 2 Stroke frequency of individual CL2166 worms in responses to 6-OHDA. The data collection method is the same as Figure 1.

1.3 Statistics of fluorescence intensity of GFP expressed in DAergic neurons of UA57 worms

Table 3. Statistics of s fluorescence intensity of 6-OHDA treated UA57 worms at day 3

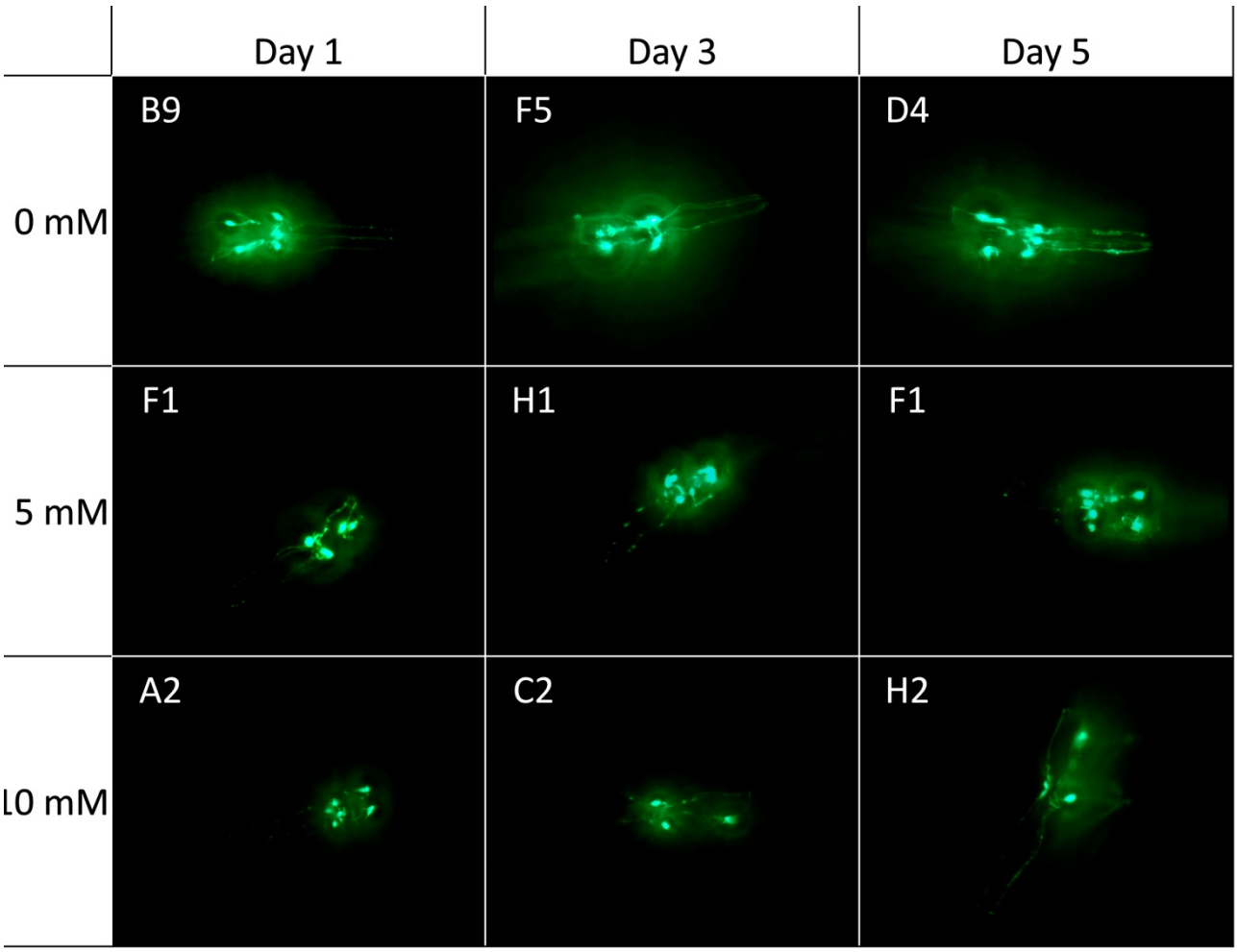
6-OHDA (mM)	N total	Average fluorescence intensity (e5)	SD	SEM
0 mM	12	19.11	4.33	1.25
5 mM	12	10.17	2.80	0.81
10 mM	12	5.20	1.72	0.50

1.4 Fluorescence intensity of GFP induced by oxidative stress of CL2166 worms

Table 4. Statistics of s fluorescence intensity of 6-OHDA treated CL2166 worms at day 3

6-OHDA (mM)	N total	Average fluorescence intensity (e6)	SD	SEM
0 mM	12	5.14	2.12	0.61
5 mM	12	6.13	2.47	0.71
10 mM	12	7.26	2.67	0.77

2 Typical enlarged fluorescence images of DAergic neurons of 6-OHDA treated UA57 worms at day 1, 3, 5



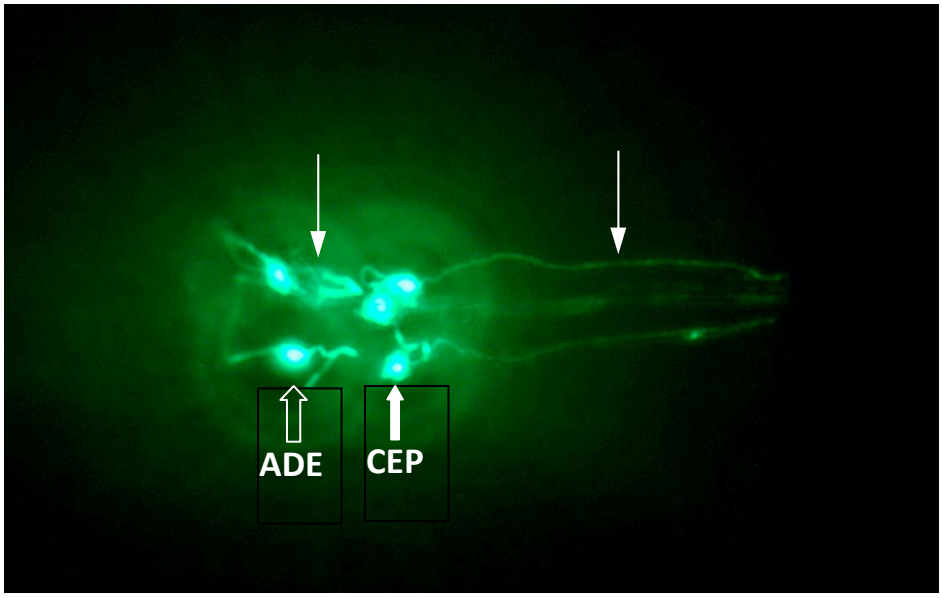


Fig.3 An enlarged fluorescence image of a UA57 with six DAergic neurons in the head. The white arrows indicate the locations of two ADE and four CEP. Thin arrows identify CEP and ADE processes. Thick closed arrow points to four CEP cell bodies. Thick open arrow indicates location of two ADE cell bodies.

3 Biocompatibility validation of the device

L1 larvae could survive in S medium droplets surrounded by FC-40 (2% EA surfactant) for more than 5 days (no food supply or excreta discharging). Compared with L1 larvae cultured in multiwell plate in the same condition, the size and mobility behavior of worms in droplets had no significant difference at least in 5 days.

And we also encapsulated 24 adult worms in droplets and the survival graph in 4 days is shown below (Fig 4). Most of the adult worms could survive, lay eggs, and the eggs could hatch normally (Fig 5).

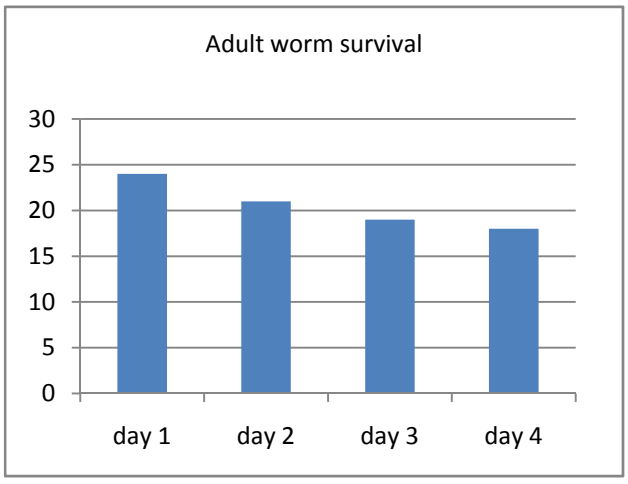


Fig 4. Survival of 24 adult worms encapsulated in droplets

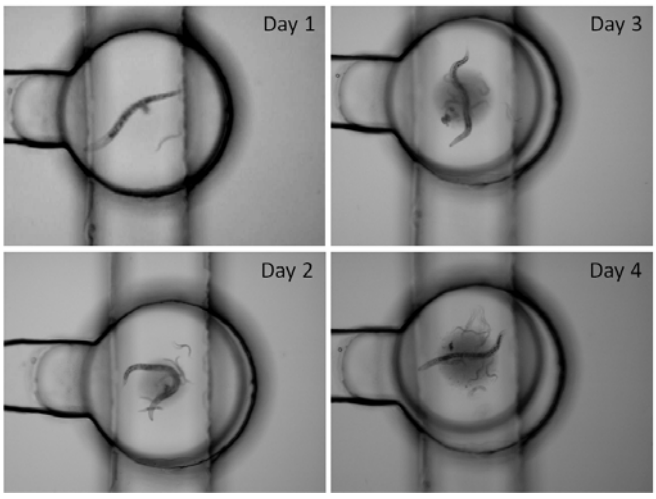


Fig 5. Photos of an adult worm encapsulated in droplet from day 1 to day 4

4 Some working parameters of the device

The duration time of the tested worms in the droplets was less than 2 h with good viability, which didn't produce significant stress on worms)

The speed of droplet generation: 15 seconds

The time of whole operation process (from the fist droplet being generated to the last droplet being trapped): 30 mins

The time of immobilizing the worms encapsulated in droplets: less than 1 min.

The probability of the droplets encapsulated with single worm: 30-40%