

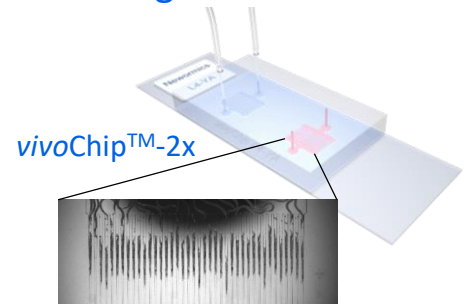


APPLICATION NOTE

Multi-parametric phenotyping of *C. elegans* neuronal degeneration

Purpose

Neuro-degeneration studies in *C. elegans* require high-resolution imaging of a large number of immobilized animals. The *vivoChip* enables detection of sub-lethal, multi-parametric, and neuron-specific phenotypic changes in 40 *dat-1::gfp* labeled animals at once.



Method

- Up to 40 adult animals are immobilized in the *vivoChip*-2x within 3 min.
- Dopaminergic neurons labeled with *dat-1::gfp* are imaged at high magnifications (20 \times , 0.75NA).
- Neuronal degenerations are induced in adult animals by treatment with the neurotoxin MPP+ iodide.
- Defined classes of structural aberrations (phenotypes) are evaluated in the immobilized animals.

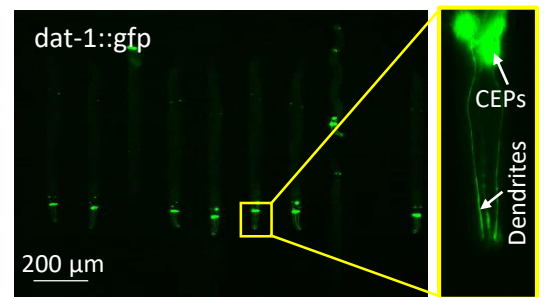


Figure 1. Images of BY200 (*dat-1::gfp*) animals immobilized in the *vivoChip*-2x.

Images from <i>vivoChip</i> -2x	ImageJ analysis	Subtle phenotypes
		<ul style="list-style-type: none"> ➤ Beading (BD) ➤ Breaks (BR)
		<ul style="list-style-type: none"> ➤ Beading (BD) ➤ Tip loss (TL)
		<ul style="list-style-type: none"> ➤ Beading (BD) ➤ Breaks (BR) ➤ Deformation (DF)
		<ul style="list-style-type: none"> ➤ Beading (BD) ➤ Breaks (BR)

Conclusions

- The *vivoChip*-2x enables rapid immobilization and high-resolution imaging of entire neuronal processes using air objectives (20 \times , 0.75NA) or oil objectives (up to 100 \times).
- Simultaneous immobilization of 40 animals side-by-side facilitates fast imaging and simple manual scoring of multi-parametric neuronal degeneration phenotypes using ImageJ software.
- High-resolution imaging of anesthetized animals (for complete immobilization) allows researchers to identify even subtle neuronal degeneration phenotypes enabling investigation of the mechanisms of neuronal toxicity.

¹BY200 (*dat-1::gfp*) strain was provided by Dr. Michael Aschner, Albert Einstein College of Medicine.