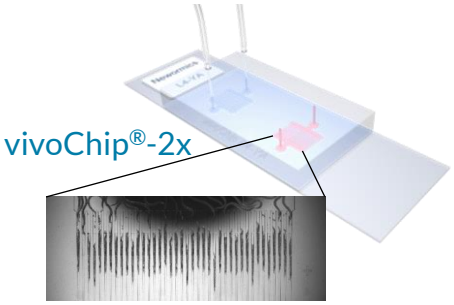
vivoVerse
ACCELERATING IN VIVO SCREENING

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×, 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.

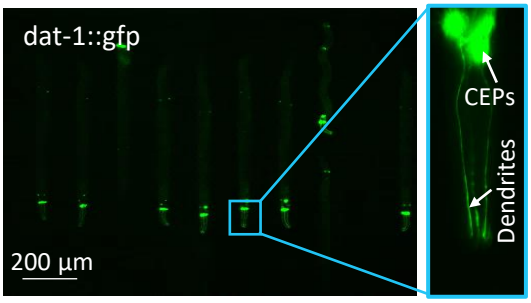
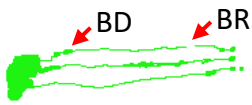
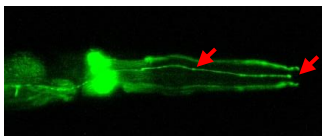
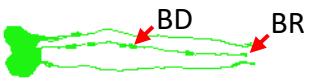
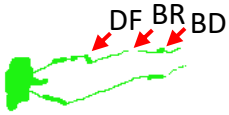
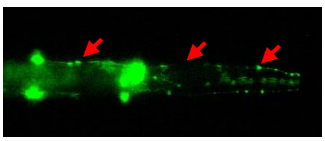
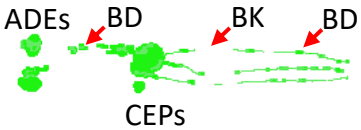


Figure 1. Images of BY200 (dat-1::gfp)[1] animals immobilized in the vivoChip®-2x.

Images from vivoChip®-2x	ImageJ analysis	Subtle phenotypes
		• Beading (BD) • Breaks (BR)
		• Beading (BD) • Tip loss (TL)
		• Beading (BD) • Breaks (BR) • Deformation (DF)
		• Beading (BD) • Breaks (BR)

CONCLUSIONS
- The vivoChip®-2x enables rapid immobilization and high-resolution imaging of entire neuronal processes using air objectives (20×, 0.75NA) or oil objectives (up to 100×).
- 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.

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

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