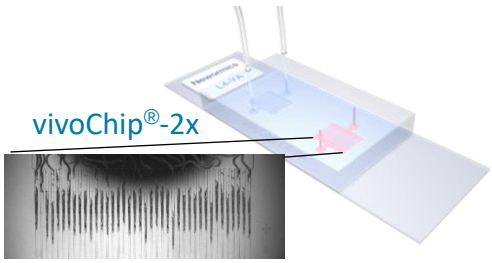
vivoVerse
ACCELERATING IN VIVO SCREENING

Application Note

High-resolution, live-imaging of *C. elegans* germline using vivoChip®

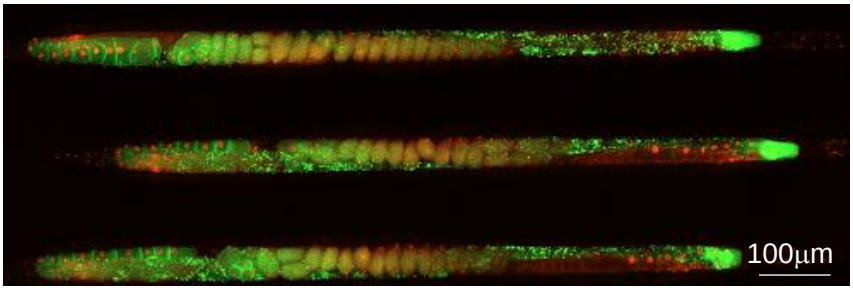
Purpose

The study of chromatin organization and defects in embryonic development of *C. elegans* using the vivoChip®, which allows for high-resolution imaging of the entire 3-dimensional (3D) structures of the germline in *C. elegans*.



Methods

- Up to 40 adult animals are immobilized and oriented in the vivoChip®-2x within 3 min.
- High-resolution images of the germlines are captured in 3D.
- The entire germline is visualized using two-color fluorescence reporters (see Fig 1).
- Chromatin organization/defects are identified and dead/viable embryo populations are quantified from the live time-lapse imaging of immobilized animals.



[1]AUM1039 ItIs37 [P-pie-1::mCherry::his-58 (pAA64) + unc-19(+)]; ItIs38 [P-pie-1::GFP::PH (PLC1delta1) + unc-19(+)] was gifted by Prof. Swathi Arur, MD Anderson.

Figure 1. Images of AUM1039 animals using 20×, 0.75NA objective in the Lionheart BioTek. The animals express a membrane-bound GFP (pie-1::gfp::PH) and a nuclear mCherry (pie-1::mCherry::his-58)[1].

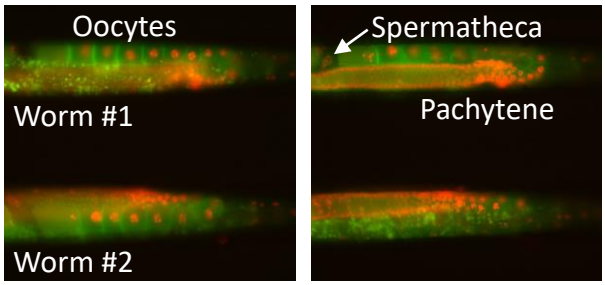


Figure 2. AUM1039 germlines from two animals immobilized inside the parallel channels showing oocytes, spermatheca, and pachytene structures in two z-stack images.

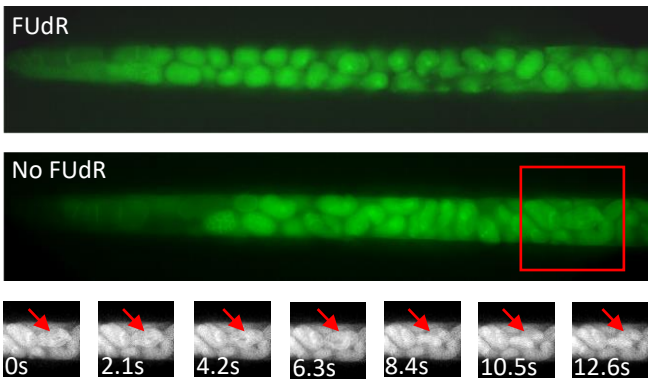


Figure 3. Adult *C. elegans* in presence and absence of FUdR, an inhibitor for DNA synthesis. Bottom panel: Time-lapse images of the ROI (red box) collected at 2.1 s intervals show movement of viable embryos.

Conclusions

- The vivoChip® enables uniform orientation of animals during immobilization for high-resolution imaging of entire germline organization.
- Anesthetic-free, time-lapse imaging provides a unique method to identify viable embryos.
- The vivoChip facilitates statistical evaluation of worm size, total number of embryos, and embryo viability for development and reproductive toxicity (DART) assessments.
- Live imaging using vivoChip® also allows researchers to investigate mechanisms of toxicity by identifying defects across different stages of meiosis and embryonic development.

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