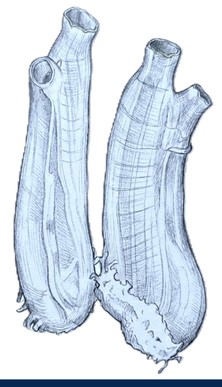

MOL231: Depdc1 localization in asymmetrically dividing TVCs under BMP perturbation

Preliminary research on embryonic development in Ciona intestinalis

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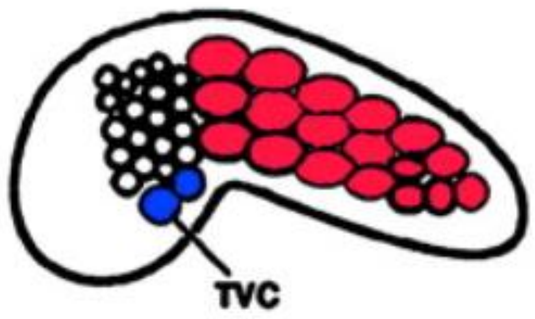
1. BACKGROUND



- Trunk ventral cells (TVCs) divide asymmetrically to generate distinct daughter cell fates.
- BMP signaling may influence cell polarity and division behavior in TVCs.
- We test how Depdc1 localization is affected after FoxF>Noggin perturbation (BMP inhibition).

2. BIOLOGICAL QUESTION

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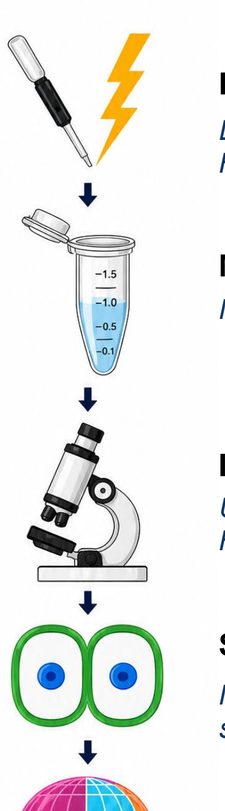
Does BMP inhibition alter the subcellular localization of Depdc1 during mitosis?

3. EXPERIMENTAL APPROACH



Electroporate embryos

Depdc1>mScarlet::Depdc1, HCD4-GFP, H2B::GFP

Methanol fixation

Methanol-fixed embryos

Identify metaphase TVCs

Using HCD4-GFP (membrane) & H2B-GFP (chromatin)

Segment cells

Membrane + nuclei segmentation

Define 3D compartments

Cortex, interior, anterior, posterior

Quantify Depdc1 signal

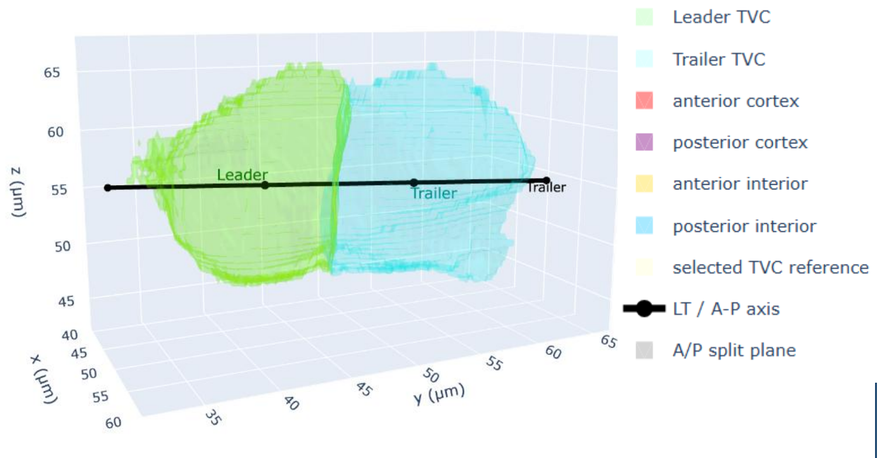
Calculate intensities per compartment

Compare WT and FoxF>Noggin

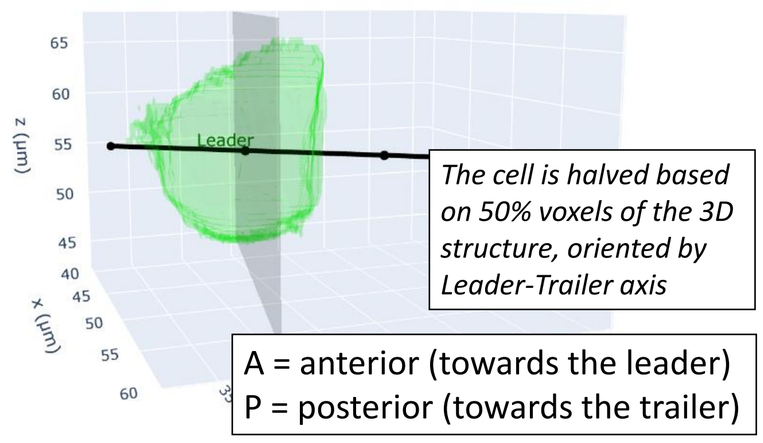
Statistical comparison

4. QUANTIFICATION STRATEGY

A Segment Leader-Trailer



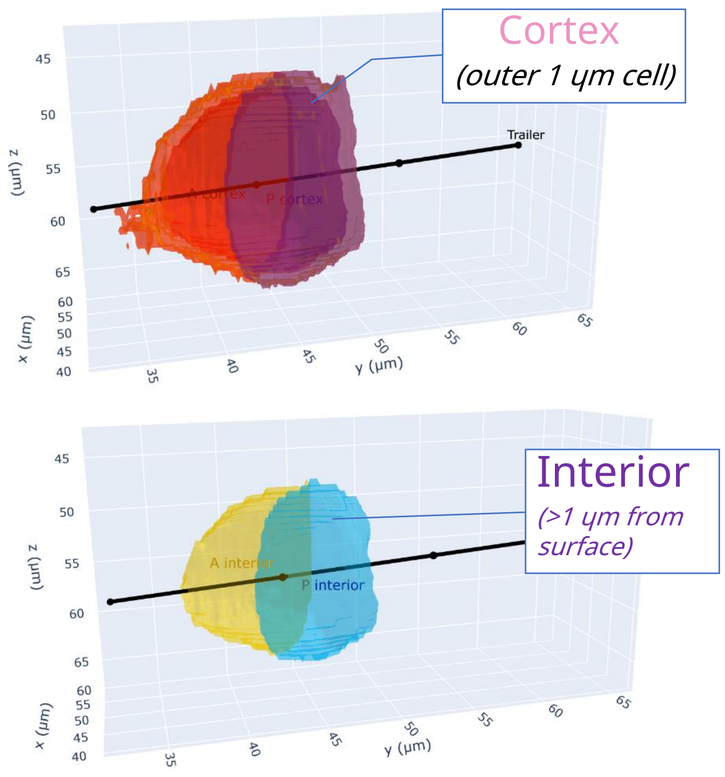
B Choose Cell to analyse and split A/P



The cell is halved based on 50% voxels of the 3D structure, oriented by Leader-Trailer axis

A = anterior (towards the leader)
P = posterior (towards the trailer)

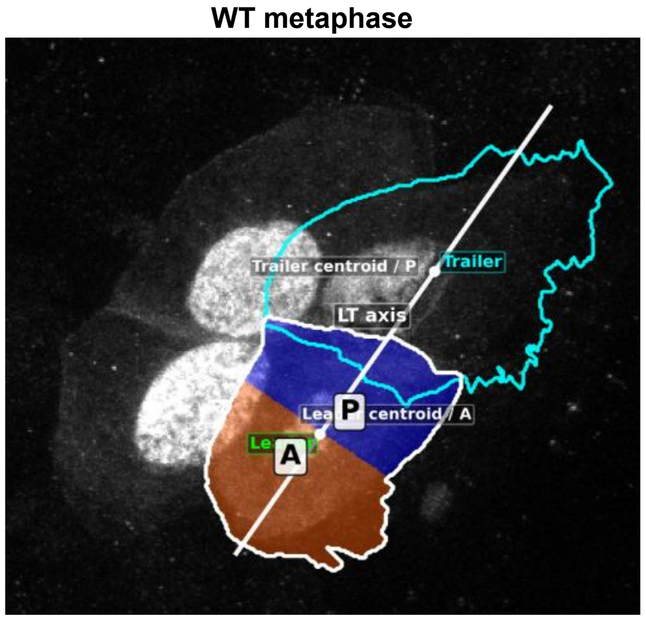
C Divide into interior/exterior



5. REPRESENTATIVE IMAGE

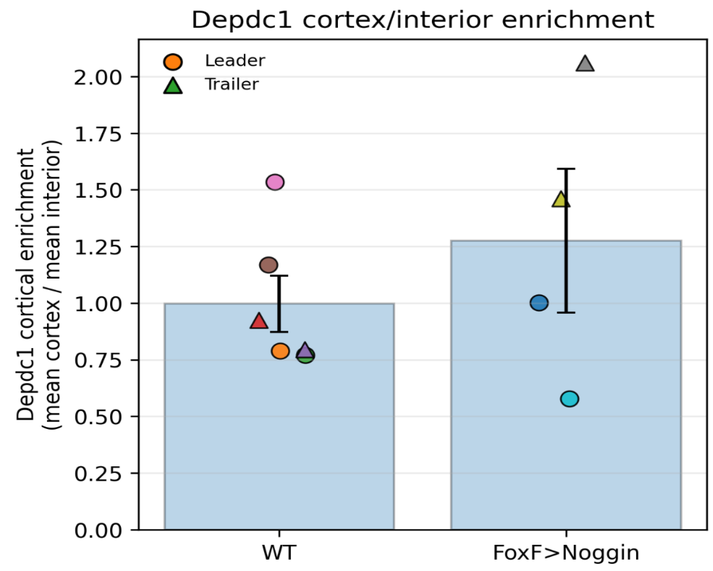
Depdc1>mScarlet::Depdc1 + HCD4-GFP membrane + H2B-GFP chromatin + γ-tubulin

WT metaphase

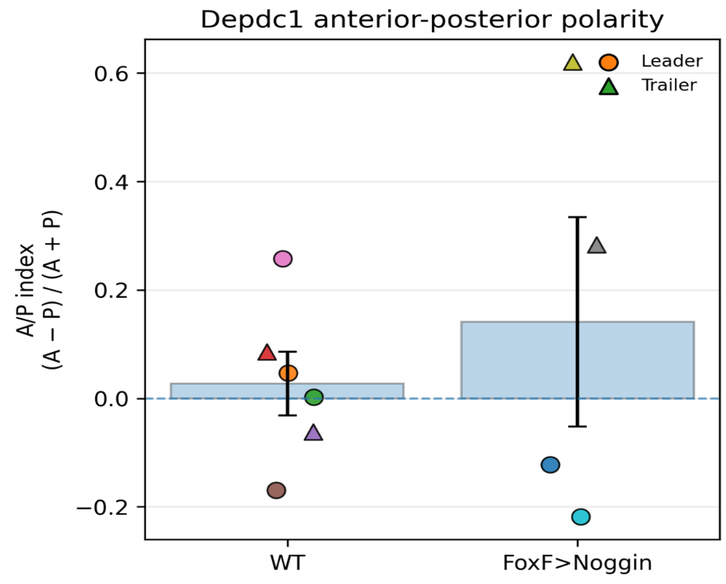


6. RESULTS

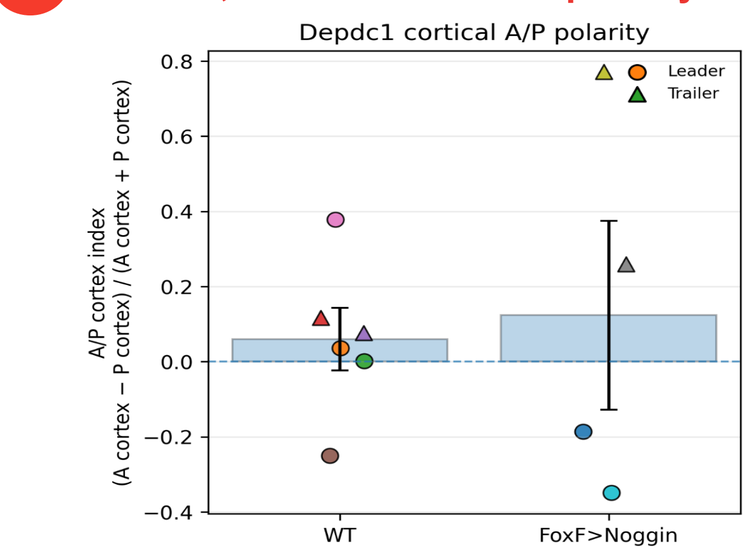
A Cortical enrichment



B Anterior vs Posterior polarity



C Cortical, Anterior-Posterior polarity



7. INTERPRETATION

- Depdc1 localization can be quantified in 3D from selected metaphase TVCs using compartment-based analysis.
- In this preliminary dataset, FoxF>Noggin embryos show a possible trend towards altered Depdc1 cortical anterior-posterior polarity compared with WT.
- The effect is variable between embryos/cells, and the current sample size is too limited for a robust statistical conclusion.
- These data therefore suggest that BMP inhibition may influence Depdc1 spatial distribution, but needs to be validated with additional cells and embryos.

8. CONCLUSION & NEXT STEPS

This is preliminary analysis validates a 3D pipeline to quantify Depdc1 subcellular localization in mitotic TVCs. Initial results suggest that BMP inhibition may alter Depdc1 cortical AP/polarity, but additional data are required.
Next step will be to increase the number of embryos/cells, include additional developmental time points, and compare multiple mitotic stages to determine whether the observed trend is consistent and statistically robust.

231.7

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2. Bernadskaya, Y. Y., Kuan, A., Tjärnberg, A., Brandenburg, J., Zhang, P., Wiechecki, K., Kaplan, N., Failla, M., Bikou, M., Madilian, O., Bruderer, N., Wang, W., & Christiaen, L. (2025). Cell cycle-driven transcriptome maturation confers multilineage competence to cardiopharyngeal progenitors. The EMBO Journal, 44(24), 7649–7676. https://doi.org/10.1038/s44318-025-00613-y
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