

Probing metastatic markers in increased intracellular pH environment

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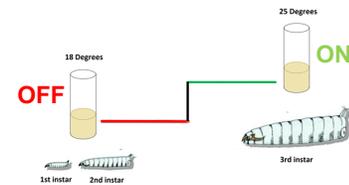
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Abstract

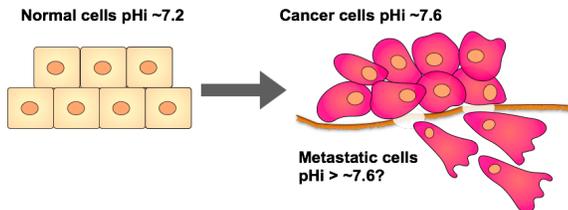
One of the leading causes of human mortality in the world, a common attribute found in cancer cells, is increased intracellular pH (pHi). Studies have suggested that increased pHi is essential for cells to migrate and proliferate. Previously, it had been shown that over-expression of the Sodium-proton exchanger, *DNhe2* (homolog of the mammalian *NHE1*), increases pHi in the *Drosophila* eye and wing imaginal disc. When *Dnhe2* is co-expressed with the oncogenic gene *RasV12*, invasive cell migration is induced along with hallmark phenotypes of metastatic cells such as cells expanding from the basal compartment of the wing disc towards its anterior-posterior boundary and the wing disc doubles in size. Building upon prior studies, we investigate for molecular mechanisms of metastasis in the basal compartment of the wing disc when expressing *RasV12* with *DNhe2E3* (inactive *DNhe2*) or *DNhe2L6* (overexpression of *DNhe2*).

Research Questions

- What is the optimal temperature shift condition for *UASRasV12; UASDnhe2L6*?
- Does co-expressing *Dnhe2* with *RasV12* increase cell proliferation?
- Are cell sizes larger when co-expressing *Dnhe2* and *RasV12*?

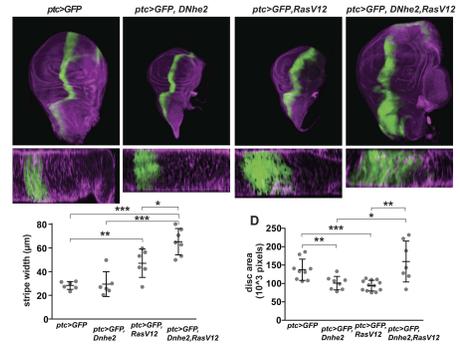


Cancer Cells Consecutively have Increased pHi



- Increased pHi is a common attribute of cancer cells. In normal cell environment, pHi of the cells is ~7.2.
- However, in cancer cells, pHi of the cells increased to ~7.6.
- Proposed Model: If increased pHi is involved for cells to migrate, does metastatic cells have a pHi higher than ~7.6 found in cancer cells?

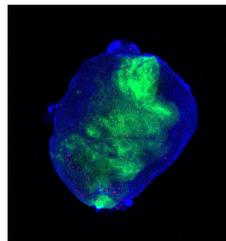
Co-Expressing *Dnhe2* and *RasV12* shows invasive cell behaviors



Grillo-Hill et al., 2015

Project Activities or Findings

Expression of *RasV12* in the wing disc demonstrates cancer characteristics as single-cell invasion and migration are occurring in the basal compartment and migrating to the anterior-posterior boundary. At this moment, we are working on the temperature shift conditions since our current conditions are not optimized for the *RasV12* fly line. Currently, we are growing flies for X days at 18° C before shifting to 25° C. This results in a wing disc as shown to the right, where the tumor is massive and severely distorts the entire tissue. These results suggest that our current temperature shift condition is not optimized and needs to be adjusted. For future studies, we will work on optimizing the temperature shift condition for transgenic flies expressing *RasV12*.



Citations and Funding

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