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 DNhe2LS (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, pH of the cells is ~7.2.
• However, in cancer cells, pH of the cells increases 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

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.

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