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"Unexpected role of apicobasal cell polarity genes in the salivary gland"

Drosophila melanogaster has played a pivotal role as a model organism in the study and advancement of cancer research. Recent studies have identified a tumor hotspot in the salivary gland of Drosophila, located in the transition zone between the imaginal ring cells and the giant cells of the salivary gland. When the Notch intracellular domain, NICD, is upregulated; the transition zone undergoes tumorigenesis through neoplastic growth, while the imaginal ring of the salivary gland will only undergo hyperplasic growth with the ring cells over-proliferating. This transition zone of the salivary gland serves as a novel tumor model that has the potential to provide key insights into the mechanisms of tumorigenesis.

As this transition zone tumor model is unique, we wanted to investigate how the three apicobasal cell polarity complexes (Scribble, Par, and Crumbs) function in the salivary gland. In previous studies, the Scribble polarity complex consisting of discs large (Dlg), lethal giant larvae (Lgl), and scribble (Scrib) has been investigated, and it was found that these genes function as tumor suppressors in the imaginal discs. However, when we performed an RNAi knockdown of Lgl in the entire salivary gland and a knockdown of Lgl in just the transition zone, we found that both knockdowns of Lgl were insufficient to induce tumorigenesis. We then wanted to check if NICD upregulation along with the knockdown of either Lgl or Scrib would still be able to induce tumorigenesis in the transition zone. While NICD overexpression by itself was capable of inducing tumorigenesis in the transition zone, when NICD was overexpressed along with either Lgl^{RNAi} or $Scrib^{RNAi}$, the transition zone displayed signs of suppressed tumor growth. This indicated that Lgl and Scrib may not function as tumor suppressors in the salivary gland. To further investigate these findings, experiments were performed involving Lgl^{4}, a loss of function mutation of the Lgl gene. By dissecting animals that contained the mutant allele, it was found that the loss of function of Lgl was sufficient to generate tumors in the wing discs but was unable to induce tumorigenesis in the salivary gland.

In order to characterize the cellular mechanisms of these cell polarity genes, we are currently working with the CoinFLP transgene which randomly generates RFP clones through flip-out. When paired with a binary expression system to activate the expression of a gene of interest, the CoinFLP system will generate RFP clones that are overexpressing that gene. Based on how the RFP clones are affected, we will be able to gain insight into the mechanisms of these cell polarity genes.