

DBT-InStem study the respiratory system of small fruit fly

New Delhi, Sep 16: Organs of *Drosophila* larva typically comprise post-mitotic cells that are replaced by adult progenitor (imaginal) cells during the pupal period to generate the organs of the adult fly.



A recent report from the laboratory of Dr. Arjun Guha in the Regulation of Cell Fate theme at inStem, focuses on a subset of larval cells of the respiratory (tracheal) system (tracheoblasts) that are not replaced but, instead become imaginal cells. These larval cells proliferate and contribute towards the development of adult tracheal structures. The group has been investigating mechanisms underlying the switch from the larval to the imaginal fate.

In this current study (Amrutha et al 2020), the group investigates the mechanism by which an ATR/Chk1 axis is regulated in tracheoblasts. The findings reveal that canonical Wnt signaling orchestrates G2 arrest by transcriptional upregulation of Chk1 in cells that have ATR activity. Wnt signaling is mediated by four Wnts (Wg, Wnt5, Wnt6, and Wnt10) that are expressed at high levels in arrested tracheoblasts. Surprisingly, none of the Wnts are dispensable and these act synergistically to induce Chk1 expression. The downregulation of Wnt signaling in tracheoblasts leads to downregulation of Chk1 expression and to mitotic re-entry. It's also found that mitotic re-entry is concomitant with the upregulation of TGF- β signaling that induces the imaginal fate. This study has further shown that the juxtaposition of the positive and negative regulators of G2-M in tracheoblasts is necessary for cellular and organ growth.

This study will soon be published in eLife.

Reference:

Amrutha K., Kunnappallil R.S., Bagul A.V., Verma P., Guha A. (2020). Multiple Wnts act synergistically to induce Chk1/Graves expression and mediate G2 arrest in *Drosophila* tracheoblasts. eLife (Manuscript accepted, Sept, 2020)

Contact : Amrita Tripathy; Email:tripathya@instem.res.in (Communications team)

DBT-Instem website: <https://instem.res.in/>