Abstract

Development of multicellular organisms from a single cell zygote involves the processes of cell growth, cell division, cell differentiation and programmed cell death. For proper development it is very critical that all these cell biological processes are precisely regulated in terms of space and time. In general, the process of cell growth precedes cell division as it has been observed that a cell divides into two daughter cells only after it grows beyond a minimum size threshold. More importantly, even in adult individuals, terminally differentiated post mitotic cells of diverse types attain particular sizes specific to the cell type. Therefore, one of the most intriguing aspects in cell biology research is to understand the mechanism by which the size of cell is determined. Studies with mammalian cell lines [1] and in diverse model organisms like yeast [2], *Drosophila* [3] and *Caenorhabditis elegans* [4] have identified several cell intrinsic (genetic) and cell extrinsic factors (nutrient availability, growth factors) that are involved in regulating cell growth during normal development employing a pathway that appears to be conserved [5]. Although significant efforts are being made to understand how nutrition and growth factors modulate cell growth, very limited information is available about the mechanistic basis of regulation of cell growth by mitochondrial function. We are interested to understand how the activity of mitochondria, one of the key regulators of cellular metabolism, modulates cell growth in a cell autonomous manner in post mitotic cells of *Drosophila*. For this purpose my project was to develop and design a strategy for a genome wide loss of function RNAi screen in *Drosophila* for genetic dissection of the signaling pathway from mitochondria to nucleus that regulates cell growth. Given the significant degree of conservation of genes and signaling pathways between *Drosophila* and higher vertebrates [6], understanding the mechanism in fruit flies would not only provide fundamental information but also have long range implications in diverse areas that include stem cell biology and cancer biology.