Drosophila: A New Model for Studying Nuclear Actin

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This research establishes Drosophila oogenesis as a new system for the study of in vivo nuclear actin rod biology. The study examines the differences in length and frequency of the nuclear actin rods produced by the germline expression of GFP-tagged Actin-5C, -42A, and -57B during Drosophila oogenesis or follicle development. This research also attempts to understand how the cellular stress of aging impacts the formation of nuclear GFP-Actin rods produced by the three proteins. The control sample consisted of follicles from four day old Drosophila for each genotype. The experimental (aging) sample consisted of follicles from seven-day-old Drosophila for each genotype. An epifluorescent microscope was used to quantitatively assess the nuclear actin rods in the nurse cells of stage 5-9 follicles. Follicles were scored for their percentage of rod containing nurse cells: 0%, less than 25%, 25 to 75%, or more than 75%. The rods were also categorized by length in relation to the diameter of the nucleus: short (1/4 of the nucleus), medium (1/2 the nucleus), or long (the entire nucleus). The results reveal that Actin gene 42A produces the longest, most prevalent rods and both these traits increase with age. The quantitative analysis parameters provides an unbiased genetic screening tool to quantify and further understand the function and regulation of nuclear actin rods. As nuclear actin rods are likely to be similarly formed and regulated in all contexts, these studies will help provide a better understanding of the role of nuclear actin rods in neurodegenerative diseases like Alzheimer's.

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