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Shrivani Sriskanthadevan-Pirahas, Joshua Lee, Savraj S. Grewal

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The EGF/Ras pathway controls growth in *Drosophila* via ribosomal RNA synthesis.

Shrivani Sriskanthadevan-Pirahas[1], Joshua Lee[1] and Savraj S. Grewal[1*]

[1]Clark H Smith Brain Tumour Centre, Arnie Charbonneau Cancer Institute, Alberta Children's Hospital Research Institute, and Department of Biochemistry and Molecular Biology Calgary, University of Calgary, Alberta T2N 4N1, Canada.

[*]Author for correspondence (grewalss@ucalgary.ca)

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ABSTRACT

The Ras small G-protein is a conserved regulator of cell and tissue growth during animal development. Studies in *Drosophila* have shown how Ras can stimulate a Raf-MEK-ERK signaling pathway to control cell growth and proliferation in response to epidermal growth factor (EGF) stimulation. This work has also defined several transcription factors that can function as downstream growth effectors of EGF/Ras/ERK pathway by stimulating mRNA transcription. Here we report on stimulation of RNA polymerase I (Pol I)-mediated ribosomal RNA (rRNA) synthesis as a growth effector of Ras/ERK signalling in *Drosophila.* We show that Ras/ERK signalling promotes an increase in nucleolar size in larval wing discs, which is indicative of increased ribosome synthesis. We also find that activation of Ras/ERK signalling promotes rRNA synthesis both *in vivo* and in cultured *Drosophila* S2 cells. We show that Ras signalling can regulate the expression of the Pol I transcription factor TIF-IA, and that this regulation requires dMyc. Finally, we find that TIF-IA-mediated rRNA synthesis is required for Ras/ERK signalling to drive proliferation in both larval and adult *Drosophila* tissues. These findings indicate that Ras signalling can promote ribosome synthesis in *Drosophila*, and that this is one mechanism that contributes to the growth effects of the Ras signalling pathway.