

Regulation of blood cell fate and sessile tissue function in *Drosophila melanogaster*

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INTRODUCTION: The differentiation of hemocytes, the blood cells of *Drosophila melanogaster*, is regulated by conserved epigenetic and transcription factors. The compartmentalization of hemocytes shows several analogies to their mammalian counterparts. In the larva, hemocytes are located in three hematopoietic compartments: the lymph gland, the sessile hematopoietic tissue and the circulation. The lymph gland was described as a hematopoietic niche that contains precursor hemocytes. Although genetic experiments led to the comprehension of a complex regulatory network within the lymph gland, less is known about factors that maintain the integrity and ensure the function of the sessile tissue. To understand regulatory mechanisms and to identify differentiation factors in the sessile tissue, we use a special transgenic system that enables tracing and cell fate transformation of entire hemocyte lineages.

METHODS: We developed a transgenic system via which we analyzed the effect of silencing and ectopic expression of several factors on hemocyte differentiation. Hemocytes were characterized by the expression patterns of our specific immunological markers and transgenic reporters. Larvae were analyzed with our newly established *in vivo* confocal video-microscopy and immunofluorescence method (Csordás et al. 2014).

RESULTS: We identified two factors - Eater and Headcase - that play a role in the maintenance of integrity and in the regulation of hemocyte differentiation in the sessile tissue. Silencing of *eater* resulted in the disintegration of the sessile tissue without the differentiation of lamellocytes. Silencing of *headcase* led to the loss of plasmatocyte marker expression and to the differentiation of lamellocytes. We found that the sessile hemocytes are interconnected with cytonemes that appear upon immune induction and in late larval stage.

CONCLUSIONS: Eater is responsible for hemocyte attachment in the sessile tissue. Headcase is a repressor of lamellocyte cell fate and may play a role in the communication of hemocyte compartments. Cytonemes may serve as universal tools in the communication of hemocytes for non-cell-autonomous differentiation events.

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