# THE ROLE OF HEADCASE IN THE HEMATOPOIESIS OF *DROSOPHILA MELANOGASTER*

**Gergely István Varga[1], Viktor Honti[1], Gábor Csordás[1], Róbert Márkus[1], Ferenc Jankovics[1], Tamás Lukácsovich[2], Éva Kurucz[1] and István Andó[1]**

[1]Biological Research Centre of the Hungarian Academy of Sciences, Szeged

[2]Developmental Biology Center, University of California, Irvine

**INTRODUCTION:** Similarly to mammalian blood cells, the hemocytes of *Drosophila melanogaster* are located in separate compartments and differentiate in multiple waves. This process is under the control of phylogenetically conserved epigenetic and transcription factors. Previously, we observed that although the three larval hematopoietic compartments - the sessile tissue, the circulation and the lymph gland - arise from different mesoderm anlagen, they all contribute to the formation of the effector cells: the phagocytic plasmatocytes, the melanotic crystal cells and the capsule forming lamellocytes. Currently, we are investigating genes that may be instrumental in the control of the differentiation of hemocytes. One of these is *headcase* (*hdc*), the ortholog of the human tumor suppressor HECA, which is a repressor of numerous developmental processes in *Drosophila*. Previously, we observed that *hdc* is expressed in the lymph gland, however, the hemocytes leaving the organ upon immune induction and differentiating into effectors lose *hdc* activity, which suggests that *hdc* may be a regulator of hemocyte differentiation.

**METHODS:** We applied our newly generated *hdc-Gal4* driver and numerous hemocyte specific transgenic drivers to silence *hdc* by RNAi, and used immunological markers and *in vivo* transgenic reporters to study hemocyte differentiation. The prepared samples were analyzed with fluorescent and confocal microscopy. The hematopoietic compartments were also observed with *in vivo* confocal videomicroscopy.

**RESULTS:** Silencing of *hdc* with general hemocyte specific drivers resulted in the spreading of circulating plasmatocytes, and in the loss of plasmatocyte specific marker expression in all hematopoietic compartments. Using the *hdc-Gal4* driver, we found that *hdc* is expressed not only in the hemocytes of the lymph gland, but also in the Posterior Signaling Center (PSC), the hematopoietic niche that blocks the differentiation of hematopoietic progenitors of the compartment. We found that lymph gland specific *hdc* silencing is sufficient for lamellocyte differentiation in every hematopoietic compartments. Moreover, we confined this regulatory function to the PSC.

**CONCLUSIONS:** Our results show that Hdc - expressed by the PSC cells - plays a regulatory role in the differentiation of lamellocytes.

**ACKNOWLEDGEMENT:** Our work is supported by OTKA NK-101730 and TÁMOP 4.2.2.A-11/1KONV-2012-0035 grants. The research of V. Honti and G. I. Varga was supported by the European Union and the State of Hungary, co-financed by the European Social Fund in the framework of TÁMOP-4.2.4.A/ 2-11/1-2012-0001 ‘National Excellence Program’.

**FORM:** oral presentation
**TOPIC:** theoretical