

ARTHUR I. SKOULTCHI, Ph.D.

Positions:

University Chairman, Department of Cell Biology

Judith and Burton P. Resnick Professor, Department of Cell Biology

Albert Einstein College of Medicine

Research interests:

Our laboratory is interested in understanding the mechanisms controlling mammalian development and cell differentiation. We study the epigenetic functions of chromatin proteins and transcription factors in control of gene expression in mouse embryonic stem cells, in murine red blood cells, and in *Drosophila*. Our approaches involve directed gene inactivation and transgenesis in mice and *Drosophila*. We also study control of proliferation and differentiation in red blood cell progenitors and in leukemia cells in which normal development is disrupted. Currently there are two major projects underway in the lab: (1) Role of H1 linker histones and chromatin remodeling factors in chromatin structure, DNA methylation, the histone code, and gene expression in mice and *Drosophila*; (2) Control of proliferation and differentiation in normal and leukemic red blood cells.

Current grant funding:

R01GM129244 (Skoultschi) Regulation of Nuclear Functions by Drosophila Linker Histone 07/01/18-05/31/23

R01GM116143 (Skoultschi) Functions of Mammalian H1 Histones in Gene Regulation 04/01/98-05/31/21

Recent publications (selected):

Willcockson, M. A., Heaton, S. E., Weiss, C. N., Bartholdy, B. A., Botbol, Y., Mishra, L. N., Sidhwani, D. S., Wilson, T. J., Pinto, H. B., Maron, M. I., Skalina, K. A., Toro, L. N., Zhao, J., Lee, C. H., Hou, H., Yusufova, N., Meydan, C., Osunsade, A., David, Y., Cesarman, E., Melnick, A. M., Sidoli, S., Garcia, B. A., Edelman, W., Macian, F. & Skoultschi, A. I. H1 histones control the epigenetic landscape by local chromatin compaction. *Nature* 589, 293-298, (2021). doi:10.1038/s41586-020-3032-z

Heaton, S. E., Pinto, H. D., Mishra, L. N., Hamilton, G. A., Wheat, J. C., Swist-Rosowska, K., Shukeir, N., Dou, Y., Steidl, U., Jenuwein, T., Gamble, M. J. & Skoultschi, A. I. H1 linker histones silence repetitive elements by promoting both histone H3K9 methylation and chromatin compaction. *Proc Natl Acad Sci U S A* 117, 14251-14258, (2020). doi:10.1073/pnas.1920725117

Willcockson, M. A., Taylor, S. J., Ghosh, S., Heaton, S. E., Wheat, J. C., Wilson, T. J., Steidl, U. & Skoultschi, A. I. Runx1 promotes murine erythroid progenitor proliferation and inhibits differentiation by preventing Pu.1 downregulation. *Proc Natl Acad Sci U S A* 116, 17841-17847, (2019). doi:10.1073/pnas.1901122116

Fyodorov DV, Zhou BR, Skoultschi AI, Bai Y. Emerging roles of linker histones in regulating chromatin structure and function *Nat Rev Mol Cell Biol.* Mar;19(3):192-206, (2018). PMID: PMC5897046

Andreyeva EN, Bernardo TJ, Kolesnikova TD, Lu X, Yarinich LA, Bartholdy BA, Guo X, Posukh OV, Heaton S, Willcockson MA, Pindyurin AV, Zhimulev IF, Skoultschi AI, Fyodorov DV. Regulatory functions and chromatin loading dynamics of linker histone H1 during endoreplication in *Drosophila*. *Genes Dev.* Mar 15;31(6):603-616, (2017). PMID: PMC5393055

Xu N., A.V. Emelyanov, D.V. Fyodorov, and A.I. Skoultschi. *Drosophila* linker histone H1 coordinates STAT-dependent organization of heterochromatin and suppresses tumorigenesis caused by hyperactive JAK-STAT signaling. *Epigenetics Chromatin.* Jul 28;7:16. (2014). PMID: PMC4149798

Lu, X., S.N. Wontakal, H. Kavi, B.J. Kim, P.M. Guzzardo, A.V. Emelyanov, N. Xu, G.J. Hannon, J. Zavadil, D.V. Fyodorov and A.I. Skoultschi. *Drosophila* H1 regulates the genetic activity of heterochromatin by recruitment of Su(var)3-9. *Science* 340(6128): 78-81, (2013). PMID: PMC3756538

Yang S.M., B.J. Kim, L. Norwood-Toro and A.I. Skoultschi. H1 linker histone promotes epigenetic silencing by regulating both DNA methylation and histone H3 methylation. *Proc Natl Acad Sci U S A*, 110(5):1708-13, (2013). PMID: PMC3562819

Wontakal SN, Guo X, Will B, Shi M, Raha D, Mahajan MC, Weissman S, Snyder M, Steidl U, Zheng D, Skoultschi AI. A large gene network in immature erythroid cells is controlled by the myeloid and B Cell transcriptional regulator PU.1. *PLoS Genet.* 2011, 7(6), e1001392. PubMed Central PMID: PMC3111485.

Wontakal SN, Guo X, Smith C, MacCarthy T, Bresnick EH, Bergman A, Snyder MP, Weissman SM, Zheng D, Skoultschi AI. A core erythroid transcriptional network is repressed by a master regulator of myelo-lymphoid differentiation. *Proc Natl. Acad. Sci. USA* 2012, 6:109(10):3832-7. PubMed PMID: 22357756.