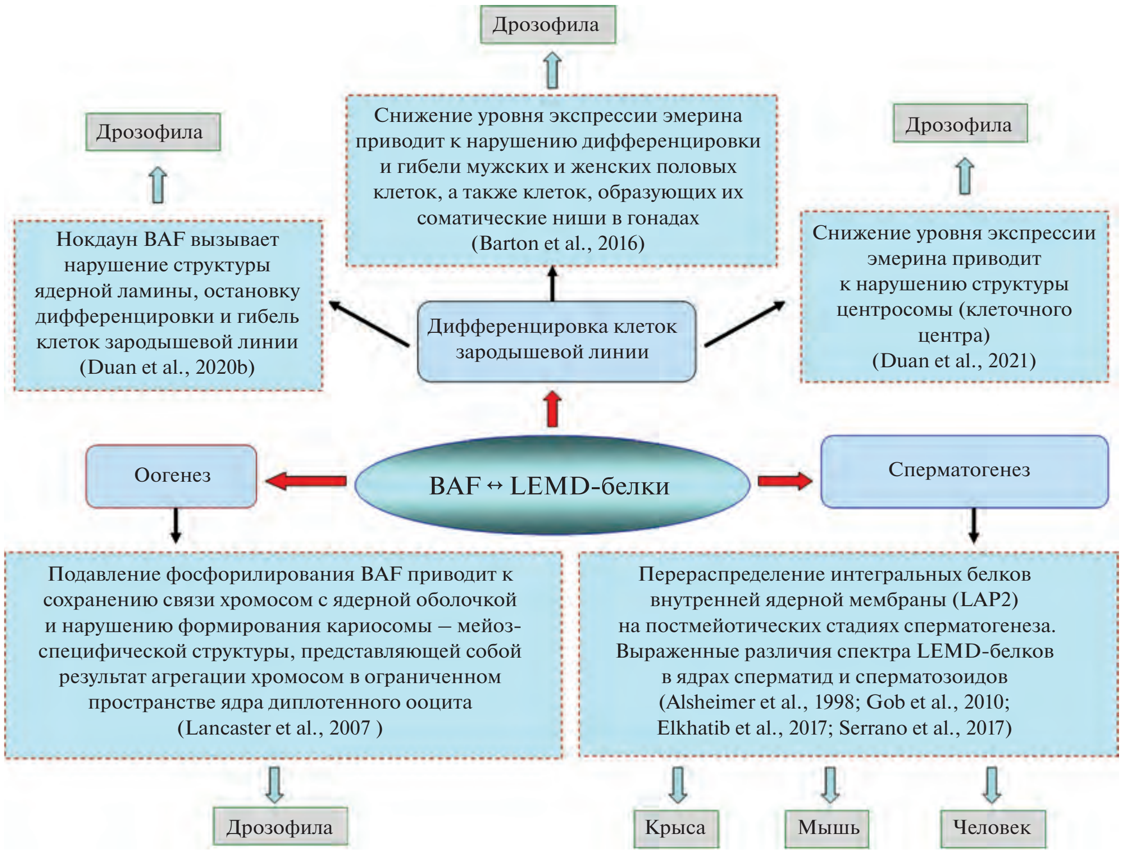

Рис. 4. Основные пути участия BAF и LEMD-белков в формировании половых клеток. Приведены ссылки на работы, в которых содержатся соответствующие экспериментальные доказательства.

ФИНАНСИРОВАНИЕ РАБОТЫ

Работа выполнена при финансовой поддержке Российского научного фонда (проект № 22-24-00380).

СОБЛЮДЕНИЕ ЭТИЧЕСКИХ СТАНДАРТОВ

При подготовке работы авторы не проводили какие-либо исследования с использованием животных или людей в качестве объектов.

КОНФЛИКТ ИНТЕРЕСОВ

Авторы заявляют об отсутствии конфликта интересов.

СПИСОК ЛИТЕРАТУРЫ

Богданов Ю.Ф., Гришаева Т.М. 2020. Консерватизм, изменчивость и эволюция мейоза. М.: Товарищество научных изданий КМК. 345 с. (*Bogdanov Yu.F., Grishaeva T.M.* 2020. Conservation, variation an evolution of meiosis. Moscow: KMK Scientific Press. 345 p.)

Дондуа А.К. 2018. Биология развития. СПб.: Изд-во С.-Петерб. ун-та. 812 с. (*Dondua A.K.* 2018. Developmental biology. Saint Petersburg: Saint Petersburg University Publishing House. 812 p.)

Alsheimer M., Fecher E., Benavente R. 1998. Nuclear envelope remodelling during rat spermiogenesis: distribution and expression pattern of LAP2/thymopoietins. J. Cell Sci. V. 111. P. 2227. https://doi.org/10.1242/jcs.111.15.2227

Asencio C., Davidson I.F., Santarella-Mellwig R., Ly-Hartig T.B.N., Mall M., Wallenfang M.R., Mattaj I.W., Gorjánácz M. 2012. Coordination of kinase and phosphatase activities by Lem4 enables nuclear envelope reassembly during mitosis. Cell. V. 150. P. 122. https://doi.org/10.1016/j.cell.2012.04.043

Bailly C., Vergoten G. 2021. Interaction of obtusilactone B and related butanolide lactones with the barrier-to-autointegration factor 1 (BAF1). A computational study. Curr. Res. Pharmacol. Drug Discov. V. 2: 100059. https://doi.org/10.1016/j.crphar.2021.100059

Barrales R.R., Forn M., Georgescu P.R., Sarkadi Z., Braun S. 2016. Control of heterochromatin localization and silencing by the nuclear membrane protein Lem2. Genes Dev. V. 30. P. 133. https://doi.org/10.1101/gad.271288.115

Barton L.J., Lovander K.E., Pinto B.S., Geyer P.K. 2016. *Drosophila* male and female germline stem cell niches require the nuclear lamina protein Otefin. Dev. Biol. V. 415. P. 75. https://doi.org/10.1016/j.ydbio.2016.05.001

Barton L.J., Soshnev A.A., Geyer P.K. 2015. Networking in the nucleus: a spotlight on LEM-domain proteins. Curr. Opin. Cell Biol. V. 34. P. 1.
https://doi.org/10.1016/j.ceb.2015.03.005

Bogolyubov D. 2018. Karyosphere (karyosome): a peculiar structure of the oocyte nucleus. Int. Rev. Cell Mol. Biol. V. 337. P. 1.
https://doi.org/10.1016/bs.ircmb.2017.12.001

Brachner A., Foisner R. 2011. Evolvement of LEM proteins as chromatin tethers at the nuclear periphery. Biochem. Soc. Trans. V. 39. P. 1735.
https://doi.org/10.1042/BST20110724

Brachner A., Braun J., Ghodgaonkar M., Castor D., Zlopasa L., Ehrlich V., Jiricny J., Gotzmann J., Knasmüller S., Foisner R. 2012. The endonuclease Ankle-1 requires its LEM and GIY-YIG motifs for DNA cleavage *in vivo*. J. Cell Sci. V. 125. P. 1048.
https://doi.org/10.1242/jcs.098392

Bradley C.M., Ronning D.R., Ghirlando R., Craigie R., Dyda F. 2005. Structural basis for DNA bridging by barrier-to-autointegration factor. Nat. Struct. Mol. Biol. V. 12. P. 935.
https://doi.org/10.1038/nsmb989

Burla R., La Torre M., Maccaroni K., Verni F., Giunta S., Saggio I. 2020. Interplay of the nuclear envelope with chromatin in physiology and pathology. Nucleus. V. 11. P. 205.
https://doi.org/10.1080/19491034.2020.1806661

Cabanillas R., Cadinanos J., Villameytide J.A., Perez M., Longo J., Richard J.M., Alvarez R., Duran N.S., Illan R., Gonzalez D.J., López-Otín C. 2011. Nestor-Guillermo progeria syndrome: a novel premature aging condition with early onset and chronic development caused by BANF1 mutations. Am. J. Med. Genet. A. V. 155A. P. 2617.
https://doi.org/10.1002/ajmg.a.34249

Cai M., Huang Y., Ghirlando R., Wilson K.L., Craigie R., Clore G.M. 2001. Solution structure of the constant region of nuclear envelope protein LAP2 reveals two LEM-domain structures: one binds BAF and the other binds DNA. EMBO J. V. 20. P. 4399.
https://doi.org/10.1093/emboj/20.16.4399

Cai M., Huang Y., Zheng R., Wei S.-Q., Ghirlando R., Lee M.S., Craigie R., Gronenborn A.M., Clore G.M. 1998. Solution structure of the cellular factor BAF responsible for protecting retroviral DNA from autointegration. Nature Struct. Biol. V. 5. P. 903.
https://doi.org/10.1038/2345

Caputo S., Couprie J., Duband-Goulet I., Kondé E., Lin F., Braud S., Gondry M., Gilquin B., Worman H.J., Zinn-Justin S. 2006. The carboxyl-terminal nucleoplasmic region of MAN1 exhibits a DNA binding winged helix domain. J. Biol. Chem. V. 281. P. 18 208.
https://doi.org/10.1074/jbc.M601980200

Cohen M., Lee K.K., Wilson K.L., Gruenbaum Y. 2001. Transcriptional repression, apoptosis, human disease and the functional evolution of the nuclear lamina. Trends Biochem. Sci. V. 26. P. 41.
https://doi.org/10.1016/s0968-0004(00)01727-8

Correia Soeiro M.N., Vergoten G., Bailly C. 2022. Molecular docking of brazilin and its analogs to barrier-to-autointegration factor 1 (BAF1). Ann. N. Y. Acad. Sci. V. 1511. P. 154.
https://doi.org/10.1111/nyas.14742

Dechat T., Vlcek S., Foisner R. 2000. Review: lamina-associated polypeptide 2 isoforms and related proteins in cell cycle-dependent nuclear structure dynamics. J. Struct. Biol. V. 129. P. 335.
https://doi.org/10.1006/jsbi.2000.4212

Duan T., Cupp R., Geyer P.K. 2021. *Drosophila* female germline stem cells undergo mitosis without nuclear breakdown. Curr. Biol. V. 31. P. 1450–1462.e3.
https://doi.org/10.1016/j.cub.2021.01.033

Duan T., Green N., Tootle T.L., Geyer P.K. 2020a. Nuclear architecture as an intrinsic regulator of *Drosophila* female germline stem cell maintenance. Curr. Opin. Insect. Sci. V. 37. P. 30–38.
https://doi.org/10.1016/j.cois.2019.11.007

Duan T., Kitzman S.C., Geyer P.K. 2020b. Survival of *Drosophila* germline stem cells requires the chromatin-binding protein Barrier-to-autointegration factor. Development. V. 147: dev186171.
https://doi.org/10.1242/dev.186171

Elkhatib R.A., Paci M., Boissier R., Longepied G., Auguste Y., Achard V., Bourgeois P., Levy N., Branger N., Mitchell M.J., Metzler-Guillemain C. 2017. LEM-domain proteins are lost during human spermiogenesis but BAF and BAF-L persist. Reproduction. V. 154. P. 387.
https://doi.org/10.1530/REP-17-0358

Foisner R. 2003. Cell cycle dynamics of the nuclear envelope. Scientific World J. V. 3. P. 1.
https://doi.org/10.1100/tsw.2003.06

Furukawa K. 1999. LAP2 binding protein 1 (L2BP1/BAF) is a candidate mediator of LAP2-chromatin interaction. J. Cell Sci. V. 112. P. 2485.
https://doi.org/10.1242/jcs.112.15.2485

Furukawa K., Sugiyama S., Osouda S., Goto H., Inagaki M., Horigome T., Omata S., McConnell M., Fisher P.A., Nishida Y. 2003. Barrier-to-autointegration factor plays crucial roles in cell cycle progression and nuclear organization in *Drosophila*. J. Cell Sci. V. 116. P. 3811.
https://doi.org/10.1242/jcs.00682

Gant T.M., Harris C.A., Wilson K.L. 1999. Roles of LAP2 proteins in nuclear assembly and DNA replication: truncated LAP2β proteins alter lamina assembly, envelope formation, nuclear size, and DNA replication efficiency in *Xenopus laevis* extracts. J. Cell Biol. V. 144. P. 1083.
https://doi.org/10.1083/jcb.144.6.1083

Gorjánácz M., Klerkx E.P., Galy V., Santarella R., López-Iglesias C., Askjaer P., Mattaj I.W. 2007. *Caenorhabditis elegans* BAF-1 and its kinase VRK-1 participate directly in post-mitotic nuclear envelope assembly. EMBO J. V. 26. P. 132.
https://doi.org/10.1038/sj.emboj.7601470

Göb E., Schmitt J., Benavente R., Alsheimer M. 2010. Mammalian sperm head formation involves different polarization of two novel LINC complexes. PLoS One. V. 5: e12072.
https://doi.org/10.1371/journal.pone.0012072

Haraguchi T., Koujin T., Segura-Totten M., Lee K.K., Matsuoka Y., Yoneda Y., Wilson K.L., Hiraoka Y. 2001. BAF is required for emerin assembly into the reforming nuclear envelope. J. Cell Sci. V. 114. P. 4575. https://doi.org/10.1242/jcs.114.24.4575

Hirano Y., Segawa M., Ouchi F.S., Yamakawa Y., Furukawa K., Takeyasu K., Horigome T. 2005. Dissociation of emerin from barrier-to-autointegration factor is regulated through mitotic phosphorylation of emerin in a *Xenopus* egg cell-free system. J. Biol. Chem. V. 280. P. 39925. https://doi.org/10.1074/jbc.m503214200

Holaska J.M., Lee K.K., Kowalski A.K., Wilson K.L. 2003. Transcriptional repressor germ cell-less (GCL) and barrier-to-autointegration factor (BAF) compete for binding to emerin *in vitro*. J. Biol. Chem. V. 278. P. 6969. https://doi.org/10.1074/jbc.M208811200

Huber M.D., Guan T., Gerace L. 2009. Overlapping functions of nuclear envelope proteins NET25 (Lem2) and emerin in regulation of extracellular signal-regulated kinase signaling in myoblast differentiation. Mol. Cell Biol. V. 29. P. 5718. https://doi.org/10.1128/MCB.00270-09

Jamin A., Wiebe M.S. 2015. Barrier to autointegration factor (BANF1): interwoven roles in nuclear structure, genome integrity, innate immunity, stress responses and progeria. Curr. Opin. Cell Biol. V. 34. P. 61. https://doi.org/10.1016/j.ceb.2015.05.006

Jiang X., Xia L., Chen D., Yang Y., Huang H., Yang L., Zhao Q., Shen L., Wang J., Chen D. 2008. Otefin, a nuclear membrane protein, determines the fate of germline stem cells in *Drosophila* via interaction with Smad complexes. Dev. Cell. V. 14. P. 494. https://doi.org/10.1016/j.devcel.2008.02.018

Lancaster O.M., Cullen C.F., Ohkura H. 2007. NHK-1 phosphorylates BAF to allow karyosome formation in the *Drosophila* oocyte nucleus. J. Cell Biol. V. 179. P. 817. https://doi.org/10.1083/jcb.200706067

Leatherman J.L., Levin L., Boero J., Jongens T.A. 2002. *germ cell-less* Acts to repress transcription during the establishment of the *Drosophila* germ cell lineage. Curr. Biol. V. 12. P. 1681. https://doi.org/10.1016/S0960-9822(02)01182-X

Lee K.K., Gruenbaum Y., Spann P., Liu J., Wilson K.L. 2000. *C. elegans* nuclear envelope proteins emerin, MAN1, lamin, and nucleoporins reveal unique timing of nuclear envelope breakdown during mitosis. Mol. Biol. Cell. V. 11. P. 3089. https://doi.org/10.1091/mbc.11.9.3089

Lee M.S., Craigie R. 1998. A previously unidentified host protein protects retroviral DNA from autointegration. Proc. Natl. Acad. Sci. USA. V. 95. P. 1528. https://doi.org/10.1073/pnas.95.4.1528

Li J., Hu B., Fang L., Gao Y., Shi S., He H., Liu X., Yuan C. 2018. Barrier-to-autointegration factor 1: A novel biomarker for gastric cancer. Oncol. Lett. V. 16. P. 6488. https://doi.org/10.3892/ol.2018.9432

Li J., Wang T., Pei L., Jing J., Hu W., Sun T., Liu H. 2017. Expression of VRK1 and the downstream gene *BANF1* in esophageal cancer. Biomed. Pharmacother. V. 89. P. 1086. https://doi.org/10.1016/j.biopha.2017.02.095

Liu J., Rolef-Ben Shahar T., Riemer D., Treinin M., Spann P., Weber K., Fire A., Gruenbaum Y. 2000. Essential roles for *Caenorhabditis elegans* lamin gene in nuclear organization, cell cycle progression, and spatial organization of nuclear pore complexes. Mol. Biol. Cell. V. 11. P. 3937. https://doi.org/10.1091/mbc.11.11.3937

Marcelot A., Petitalot A., Ropars V., Le Du M.H., Samson C., Dubois S., Hoffmann G., Miron S., Cuniasse P., Marquez J.A., Thai R., Theillet F.X., Zinn-Justin S. 2021a. Di-phosphorylated BAF shows altered structural dynamics and binding to DNA, but interacts with its nuclear envelope partners. Nucleic Acids Res. V. 49. P. 3841. https://doi.org/10.1093/nar/gkab184

Marcelot A., Worman H.J., Zinn-Justin S. 2021b. Protein structural and mechanistic basis of progeroid laminopathies. FEBS J. V. 288. P. 2757. https://doi.org/10.1111/febs.15526

Marcelot A., Zinn-Justin S., Cuniasse P. 2022. The conformation of the intrinsically disordered N-terminal region of Barrier-to-autointegration factor (BAF) is regulated by pH and phosphorylation. J. Mol. Biol. V. 435: 167888. https://doi.org/10.1016/j.jmb.2022.167888

Martins S., Eikvar S., Furukawa K., Collas P. 2003. HA95 and LAP2β mediate a novel chromatin–nuclear envelope interaction implicated in initiation of DNA replication. J. Cell Biol. V. 160. P. 177. https://doi.org/10.1083/jcb.200210026

Mattout-Drubezki A., Gruenbaum Y. 2003. Dynamic interactions of nuclear lamina proteins with chromatin and transcriptional machinery. Cell Mol. Life Sci. V. 60. P. 2053. https://doi.org/10.1007/s00018-003-3038-3

Molitor T.P., Traktman P. 2014. Depletion of the protein kinase VRK1 disrupts nuclear envelope morphology and leads to BAF retention on mitotic chromosomes. Mol. Biol. Cell. V. 25. P. 891. https://doi.org/10.1091/mbc.E13-10-0603

Naetar N., Ferraioli S., Foisner R. 2017. Lamins in the nuclear interior – life outside the lamina. J. Cell Sci. V. 130. P. 2087. https://doi.org/10.1242/jcs.203430

Nili E., Cojocaru G.S., Kalma Y., Ginsberg D., Copeland N.G., Gilbert D.J., Jenkins N.A., Berger R., Shaklai S., Amariglio N., Brok-Simoni F., Simon A.J., Rechavi G. 2001. Nuclear membrane protein, LAP2β, mediates transcriptional repression alone and together with its binding partner GCL (germ-cell-less). J. Cell Sci. V. 114. P. 3297. https://doi.org/10.1242/jcs.114.18.3297

Paquet N., Box J.K., Ashton N.W., Suraweera A., Croft L.V., Urquhart A.J., Bolderson E., Zhang S.D., O'Byrne K.J., Richard D.J. 2014. Néstor-Guillermo Progeria Syndrome: A biochemical insight into Barrier-to-autointegration factor 1, alanine 12 threonine mutation. BMC Mol. Biol. V. 15: 27. https://doi.org/10.1186/s12867-014-0027-z

Pereira C.D., Serrano J.B., Martins F., da Cruz E. Silva O.A.B., Rebelo S. 2019. Nuclear envelope dynamics during mammalian spermatogenesis: new insights on male fertility. Biol. Rev. Camb. Philos. Soc. V. 94. P. 1195. https://doi.org/10.1111/brv.12498

*Pekovic V., Harborth J., Broers J.L., Ramaekers F.C., van Engelen B., Lammens M., von Zglinicki T., Foisner R., Hutchison C., *Markiewicz E.* 2007. Nucleoplasmic LAP2α–lamin A complexes are required to maintain a proliferative state in human fibroblasts. J. Cell Biol. V. 176. P. 163. https://doi.org/10.1083/jcb.200606139

Puente X.S., Quesada V., Osorio F.G., Cabanillas R., Cadiñanos J., Fraile J.M., Ordóñez G.R., Puente D.A., Gutiérrez-Fernández A., Fanjul-Fernández M., Lévy N., Freije J.M.P., López-Otín C. 2011. Exome sequencing and functional analysis identifies BANF1 mutation as the cause of a hereditary progeroid syndrome. Am. J. Hum. Genet. V. 88. P. 650. https://doi.org/10.1016/j.ajhg.2011.04.010

Qi R., Xu N., Wang G., Ren H., Li S., Lei J., Lin Q., Wang L., Gu X., Zhang H., Jiang Q., Zhang C. 2015. The laminA/C-LAP2α-BAF1 protein complex regulates mitotic spindle assembly and positioning. J. Cell Sci. V. 128. P. 2830. https://doi.org/10.1242/jcs.164566

Rose M., Bai B., Tang M., Cheong C.M., Beard S., Burgess J.T., Adams M.N., O'Byrne K.J., Richard D.J., Gandhi N.S., Bolderson E. 2021. The impact of rare human variants on barrier-to-auto-integration factor 1 (Banf1) structure and function. Front. Cell Dev. Biol. V. 9: 775441. https://doi.org/10.3389/fcell.2021.775441

Samson C., Petitalot A., Celli F., Herrada I., Ropars V., Le Du M.H., Nhiri N., Jacquet E., Arteni A.-A., Buendia B., Zinn-Justin S. 2018. Structural analysis of the ternary complex between lamin A/C, BAF and emerin identifies an interface disrupted in autosomal recessive progeroid diseases. Nucleic Acids Res. V. 46. P. 10460. https://doi.org/10.1093/nar/gky736

Samwer M., Schneider M.W.G., Hoefler R., Schmalhorst P.S., Jude J.G., Zuber J., Gerlich D.W. 2017. DNA cross-bridging shapes a single nucleus from a set of mitotic chromosomes. Cell. V. 170. P. 956–972.e923. https://doi.org/10.1016/j.cell.2017.07.038

Segura-Totten M., Kowalski A.K., Craigie R., Wilson K.L. 2002. Barrier-to-autointegration factor: major roles in chromatin decondensation and nuclear assembly. J. Cell Biol. V. 158. P. 475. https://doi.org/10.1083/jcb.200202019

Segura-Totten M., Wilson K.L. 2004. BAF: roles in chromatin, nuclear structure and retrovirus integration. Trends Cell Biol. V. 14. P. 261. https://doi.org/10.1016/j.tcb.2004.03.004

Serrano J.B., Martins F., Sousa J.C., Pereira C.D., van Pelt A.M., Rebelo S., da Cruz E., Silva O.A. 2017. Descriptive analysis of LAP1 distribution and that of associated proteins throughout spermatogenesis. Membranes (Basel). V. 7: 22. https://doi.org/10.3390/membranes7020022

Shen Q., Eun J.W., Lee K., Kim H.S., Yang H.D., Kim S.Y., Lee E.K., Kim T., Kang K., Kim S., Min D.H., Oh S.N., Lee Y.J., Moon H., Ro S.W. et al. 2018. Barrier to autointegration factor 1, procollagen-lysine, 2-oxoglutarate 5-dioxygenase 3, and splicing factor 3b subunit 4 as early-stage cancer decision markers and drivers of hepatocellular carcinoma. Hepatology. V. 67. P. 1360. https://doi.org/10.1002/hep.29606

Snyers L., Erhart R., Laffer S., Pusch O., Weipoltshammer K., Schöfer C. 2018. LEM4/ANKLE-2 deficiency impairs post-mitotic re-localization of BAF, LAP2α and LaminA to the nucleus, causes nuclear envelope instability in telophase and leads to hyperploidy in HeLa cells. Eur. J. Cell Biol. V. 97. P. 63. https://doi.org/10.1016/j.ejcb.2017.12.001

Snyers L., Löhnert R., Weipoltshammer K., Schöfer C. 2022. Emerin prevents BAF-mediated aggregation of lamin A on chromosomes in telophase to allow nuclear membrane expansion and nuclear lamina formation. Mol. Biol Cell. V. 33: ar137. https://doi.org/10.1091/mbc.E22-01-0007

Torras-Llort M., Medina-Giró S., Escudero-Ferruz P., Lipinszki Z., Moreno-Moreno O., Karman Z., Przewloka M.R., Azorín F. 2020. A fraction of barrier-to-autointegration factor (BAF) associates with centromeres and controls mitosis progression. Commun. Biol. V. 3: 454. https://doi.org/10.1038/s42003-020-01182-y

Vivante A., Brozgol E., Bronshtein I., Levi V., Garini Y. 2019. Chromatin dynamics governed by a set of nuclear structural proteins. Genes Chromosomes Cancer. V. 58. P. 437. https://doi.org/10.1002/gcc.22719

Wagner N., Kagermeier B., Loserth S., Krohne G. 2006. The *Drosophila melanogaster* LEM-domain protein MAN1. Eur. J. Cell Biol. V. 85. P. 91. https://doi.org/10.1016/j.ejcb.2005.10.002

Wagner N., Krohne G. 2007. LEM-domain proteins: new insights into lamin-interacting proteins. Int. Rev. Cytol. V. 261. P. 1. https://doi.org/10.1016/S0074-7696(07)61001-8

Wang X., Xu S., Rivolta C., Li L.Y., Peng G.-H., Swain P.K., Sung C.-H., Swaroop A., Berson E.L., Dryja T.P., Chen S. 2002. Barrier to autointegration factor interacts with the cone-rod homeobox and represses its transactivation function. J. Biol. Chem. V. 277. P. 43288. https://doi.org/10.1074/jbc.M207952200

Wong X., Melendez-Perez A.J., Reddy K.L. 2022. The nuclear lamina. Cold Spring Harb. Perspect. Biol. V. 14: a040113. https://doi.org/10.1101/cshperspect.a040113

Zetka M., Paouneskou D., Jantsch V. 2020. The nuclear envelope, a meiotic jack-of-all-trades. Curr. Opin. Cell Biol. V. 64. P. 34. https://doi.org/10.1016/j.ceb.2019.12.010

Zhang G. 2020. Expression and prognostic significance of BANF1 in triple-negative breast cancer. Cancer Manag. Res. V. 12. P. 145. https://doi.org/10.2147/CMAR.S229022

Zheng R., Ghirlando R., Lee M.S., Mizuuchi K., Krause M., Craigie R. 2000. Barrier-to-autointegration factor (BAF) bridges DNA in a discrete, higher-order nucleoprotein complex. Proc. Natl. Acad. Sci. USA. V. 97. P. 8997. https://doi.org/10.1073/pnas.150240197

Zhuang X., Semenova E., Maric D., Craigie R. 2014. Dephosphorylation of barrier-to-autointegration factor by protein phosphatase 4 and its role in cell mitosis. J. Biol. Chem. V. 289. P. 1119. https://doi.org/10.1074/jbc.M113.492777

Functional Interactions of BAF and LEM Proteins in the Formation of Germ Cells

I. O. Bogolyubova[a] and D. S. Bogolyubov[a, *]

[a] *Institute of Cytology, Russian Academy of Sciences, St. Petersburg, 194064 Russia*

**e-mail: dbogol@mail.ru*

Recovery of the nuclear structure after cell division requires special interactions between the integral proteins of the inner nuclear membrane having a special LEM domain (LEMD), nuclear lamina proteins (lamins) and the conserved BAF protein that serves as a central link in these interactions, providing topological relationships between chromatin and nuclear envelope. The dynamic transformations of these protein ensembles in the mitotic cycle are characterized in detail at the molecular level, however, less attention is paid to the developing germ cells undergoing meiotic divisions, despite of their nuclei, especially in diplotene oocytes, differ significantly in structure from the somatic nucleus. This review summarizes the still relatively scarce experimental data proving the significance of functional interactions between BAF and LEMD proteins for gamete formation, from the selection of germline cells to the transformation of haploid spermatids into morphologically mature spermatozoa.

Keywords: nuclear architecture, nuclear envelope, gametogenesis, meiosis, germ cells, BAF, LEM-D proteins, VRK1