

CURRICULUM VITAE

Elena Ezhkova, PhD

Icahn School of Medicine at Mount Sinai
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APPOINTMENTS/EMPLOYMENT

01/2011 – 06/2016	Assistant Professor (tenure-track)
07/2016 – 12/2018	Associate Professor (tenure-track)
01/2019 – 04/2020	Associate Professor with tenure
05/2020 – present	Professor with tenure Director of P30-supported Skin Biology and Diseases Resource-based Center (SBDRC) at Mount Sinai Icahn School of Medicine at Mount Sinai Department of Cell, Developmental, and Regenerative Biology Department of Dermatology Black Family Stem Cell Institute NCI-designated Tisch Cancer Center

GAPS IN EMPLOYMENT

Not applicable

EDUCATION

1994-1998	B.S. Student, Department of Physics, Moscow State University, Russia
1998-2000	M.S. Student, Department of Physics, Moscow State University, Russia
2000-2005	Ph.D. Student, Cold Spring Harbor Laboratory Graduate School, Cold Spring Harbor, NY, USA. Supervisor: Dr. William Tansey
2005-2010	Postdoctoral Fellow, The Rockefeller University, NY, USA. Supervisor: Dr. Elaine Fuchs, Rebecca C. Lancerfield Professor, HHMI Investigator.

CERTIFICATION

Not applicable

LICENSURE

Not applicable

HONORS/AWARDS

1998	B.S. Diploma with Honors, Moscow State University, Russia
2000	M.S. Diploma with Honors and University Gold Medal, Moscow State University, Russia
2000-2005	Engelhorn Scholar, Cold Spring Harbor Laboratory
2005-2006	Women and Science Postdoctoral Fellow
2006-2009	LSRF Postdoctoral Fellow (sponsored by the New York Stem Cell Foundation)
2009-2010	HHMI Postdoctoral Fellow
2010-2014	NIH K99/R00 Pathway to Independence Award
2012-2014	Basil O'Connor Starter Award, March of Dimes Foundation
2013-2017	Ellison Foundation New Scholar in Aging
2014	Dr. Harold and Golden Lamport Research Award
2016-2020	Standing member of the ACTS NIH Study Section

2017 Irma T. Hirschl Career Scientist Award
2019-2025 Elected co-vice-chair/co-chair of the GRC Epidermal Differentiation and Keratinization (conference postponed due to COVID-19)

PATENTS

Not applicable

OTHER PROFESSIONAL ROLES

Extramural

Grant reviewer:

1. MRC grant reviewer, UK (2014-present)
2. Ad hoc NIH ACTS study section, NIH (2014-2015)
3. Ad hoc P30 grants, NIH/NIAMS (2015, 2018)
4. Ad hoc member of the Board of Scientific Counselors, NIEHS/NIH (2019)
5. Standing member of the NIH ACTS study section (2016-2020)
5. Ad hoc P50 grant reviewer, NIAMS (2021)

Paper/abstract reviewer:

1. Reviewer of ISSCR meeting abstracts (2012, 2013)
2. Reviewer of SID, IID meeting abstracts (2018, 2020)
3. Invited Guest Editor: Journal of Molecular Biology (2016), PLOS Genetics (2017); Genes (2021)
4. Ad hoc reviewer for Journals: Cell, Science, Nature Genetics, Cell Stem Cell, Nature Cell Biology, Journal of Experimental Medicine, Molecular Cell, Developmental Cell, Nature Structural and Molecular Biology, Nature Communications, Nature Reviews Molecular Cell Biology, Cell Reports, Genes & Development, eLife, EMBO Journal, PNAS, Development, Current Biology, PLOS Genetics, MCB, Genetics, JCB, JID, Developmental Biology, Biology Open, Experimental Dermatology.

Intramural (at ISMMS)

1. PhD Admission committee member (2012-2014)
2. Curriculum Committee member (2014)
3. Department of Developmental and Regenerative Biology, Faculty Search Committee member, Icahn School of Medicine at Mount Sinai (2015-2016)
4. MS Admission Committee member (2015-2017)
5. PhD applicant interviewing and recruitment (2011-present)
6. MD/PhD Admission Committee, voting member (2015-present)
7. Faculty Search Committee member, Department of Cell, Developmental, and Regenerative Biology, Icahn School of Medicine at Mount Sinai (2017-2018)
8. Chair of the faculty search committee, Black Family Stem Cell Institute, Icahn School of Medicine at Mount Sinai (2019-present)
9. Advisory board member, Stem Cell Engineering CoRE, Black Family Stem Cell Institute, Icahn School of Medicine at Mount Sinai (2019-present)

RESEARCH PROFILE (see also IMPACT statement below)

1. My laboratory has made major contributions to the field of Merkel cell biology. We identified ATOH1, SOX2, and ISL1 as critical transcriptional regulators of Merkel cell differentiation. We discovered that in epidermal progenitors, the Polycomb repressive complex (PRC) 2 represses Merkel cell lineage program. We showed that loss of PRC2-mediated repression leads to activation of expression of *Atoh1*, *Sox2*, and *Isl1* genes in epidermal progenitors leading to an ectopic production of Merkel cells. Additionally, we showed that FGFR2-mediated signaling is required for Merkel cell formation. Finally, we identified that a population of SOX9(+) cells located within the developing hair follicles in the mouse back skin as Merkel cell progenitors.

Bardot SE, Zheng J, Valdes VJ, Perdigoto CN, Silva JM, **Ezhkova E.** (2013) 'Polycomb subunits Ezh1 and Ezh2 regulate the Merkel cell differentiation program in skin stem cells.' *EMBO Journal*, 32(14):1990-2000.

Perdigoto C, Bardot ES, Valdes VJ, Santoriello FJ, **Ezhkova E.** (2014) 'Embryonic maturation of epidermal Merkel cells is controlled by a redundant transcription factor network.' *Development*, 141(24):4690-6.

Perdigoto CN, Dauber KL, Bar C, Tsai PC, Valdes VJ, Cohen I, Santoriello FJ, Zhao D, Zheng D, Hsu YC, **Ezhkova E.** (2016) Polycomb-Mediated Repression and Sonic Hedgehog Signaling Interact to Regulate Merkel Cell Specification during Skin Development. *PLoS Genet.* Jul 14;12(7).

Nguyen MB, Cohen I, Kumar V, Xu Z, Bar C, Dauber-Decker KL, Tsai PC, Marangoni P, Klein OD, Hsu YC, Chen T, Mikkola ML, **Ezhkova E.** (2018) FGF signalling controls the specification of hair placode-derived SOX9 positive progenitors to Merkel cells. *Nature Communications* Jun 13;9(1):2333. doi: 10.1038/s41467-018-04399-y

Nguyen MB, Valdes VJ, Cohen I, Pothula V, Zhao D, Zheng D, **Ezhkova E.** (2019) Dissection of Merkel cell formation in hairy and glabrous skin reveals a common requirement for FGFR2-mediated signaling. *Exp Dermatol.* Apr;28(4):374-382. doi: 10.1111/exd.13901.

2. We are interested in uncovering the role of chromatin regulators in control of skin development and skin stem cell specification. Our recent studies were focused on the Polycomb repressive complex (PRC) 1 and PRC2 that function together to establish Polycomb-mediated gene control. Our research findings have shown that PRC2 is a key transcriptional regulator that maintains epidermal stem cells in an undifferentiated and proliferative state. We have also identified that PRC1 functions both as a transcriptional repressor and a transcriptional activator to mediate proper skin development, maintain epidermal integrity, and direct hair follicle stem cell specification.

Cohen I, Zhao D, Bar C, Valdes VJ, Dauber-Decker KL, Nguyen MB, Nakayama M, Rendl M, Bickmore WA, Koseki H, Zheng D, **Ezhkova E.** (2018) PRC1 Fine-tunes Gene Repression and Activation to Safeguard Skin Development and Stem Cell Specification. *Cell Stem Cell.* May 3;22(5):726-739.e7.

Cohen I, Zhao D, Menon G, Koseki H, Zheng D, **Ezhkova E.** (2019) PRC1 preserves epidermal tissue integrity independently of PRC2. *Genes & Development.* Jan 1;33(1-2):55-60. (cover image)

Bar C, Cohen I, Zhao D, Pothula V, Litskevitch A, Koseki H, Zheng D, **Ezhkova E.** Polycomb Repressive Complex 1 Controls Maintenance of Fungiform Papillae by Repressing Sonic Hedgehog Expression. *Cell Reports.* 2019 Jul 2;28(1):257-266.e5.

Cohen I, Bar C, Liu H, Valdes VJ, Zhao D, Galbo PM Jr, Silva JM, Koseki H, Zheng D, **Ezhkova E.** Polycomb complexes redundantly maintain epidermal stem cell identity during development. *Genes & Development.* 2021 Mar 1;35(5-6):354-366.

Li MY, Flora P, Pu H, Bar C, Silva J, Cohen I, Galbo PM Jr, Liu H, Yu X, Jin J, Koseki H, D'Orazio JA, Zheng D, **Ezhkova E.** UV-induced reduction in Polycomb repression promotes epidermal pigmentation. *Developmental Cell.* 2021 Sep 27;56(18):2547-2561.e8. doi: 10.1016/j.devcel.2021.08.006. Epub 2021 Sep 1. PMID: 34473941.

URL link to all published work:

<https://www.ncbi.nlm.nih.gov/myncbi/elena.ezhkova.1/bibliography/public/>

CLINICAL PROFILE

Not applicable

IMPACT

Identification of the molecular mechanisms controlling the self-renewal and differentiation processes of stem cells is fundamentally important to expand our understanding of both tissue development and the progression of various tissue disorders, including cancer. The studies in my laboratory focus on two research areas:

1. Determine the role of the Polycomb complexes in control of epithelial stem cells during development, adulthood, and disease.

Polycomb repressive complex (PRC) 1 and PRC2 are two complexes that are thought to function together to establish Polycomb-mediated gene repression. Our research findings have shown that PRC2 is a key transcriptional regulator, which maintains epidermal stem cells in an undifferentiated and proliferative state

during development (*Cell, 2008; Genes & Development, 2011*). The PRC2 complex does so by targeting and repressing differentiation and cell cycle inhibitor genes. Our studies of the PRC1 complex have shown that PRC1 functions both as a transcriptional repressor and as a transcriptional activator in the skin. Importantly, PRC1-mediated gene activating functions are critical for hair follicle development and for the establishment of the adult bulge stem cell compartment (*Cell Stem Cell, 2018*). These studies raised important questions such as, whether PRC1 and PRC2 function together to control epidermal stem cell fate. By performing side by side comparison of the role of PRC1 and PRC2, we elucidated that PRC1 functions together with PRC2 to silence genes, whereas PRC1 functions independently of PRC2 to promote gene expression (*Genes & Development, 2019*). To gain insight into repressive functions of Polycomb complexes, we performed coablation of both PRC1 and PRC2 complexes in embryonic epidermal progenitors and observed severe defects in epidermal stratification, a phenotype not observed in the single PRC1-null or PRC2-null epidermis. Molecular dissection showed a loss of epidermal identity that was linked to a strong expression of nonlineage transcription factors that were otherwise repressed in single knockouts. Together these findings highlighted the importance of functional redundancy between PRC1 and PRC2 to silence unwanted lineage genes and thus to provide a repressive safety net to preserve epidermal lineage identity (*Genes & Development, 2021*).

We have also expanded our studies to other epithelial tissues such as oral epithelia and discovered that while PRC1 complex is required for lingual papillae development, PRC2 is dispensable (*Cell Reports, 2019*). This study also showed that PRC1 is required for proper maintenance of fungiform papillae by repressing the *Shh* gene and preventing ectopic SHH signaling in non-taste cells.

Our recent work has been focused on uncovering the role of Polycomb complexes in control of adult skin stem cells, skin regeneration and skin diseases. We identified that low-dose UVB exposure leads to a drastic reduction in Polycomb levels in the epidermis. Ablation of Polycomb function in the epidermis results in epidermal pigmentation via a p53-independent pathway. Notably, we identify Polycomb-regulated protein, type II collagen, as a critical regulator of melanogenesis (*Developmental Cell, 2021*)

2. Uncover the molecular mechanisms controlling Merkel cell development.

Merkel cells are innervated and terminally differentiated epidermal cells that are critical mediators of light touch sensations. We identified SOX2, ISL1, and ATOH1 as key transcription factors that are required for Merkel cell differentiation (*Development, 2014*). We also showed that the PRC2 complex represses the Merkel cell differentiation program in embryonic epidermal progenitors by silencing the *Atoh1*, *Sox2*, and *Isl1* genes (*EMBO Journal, 2013; JID, 2016*). We uncovered that Merkel cells are formed in developing hair follicles and skin epithelial Shh signaling is required to specify the Merkel cell lineage (*PLoS Genetics, 2016*). We recently identified a population of SHH-responding SOX9(+) cells located within developing hair follicles as Merkel cell progenitors and showed that FGFR2-mediated signaling is required to commit SOX9(+) cells to the Merkel cell lineage (*Nature Communications, 2018*). We also dissected the molecular mechanisms that control Merkel cell formation in areas of the skin devoid of hair, such as the glabrous paw skin. Interestingly, we found that SOX9(+) cells do not give rise to Merkel cells in the glabrous paw skin suggesting that different Merkel cell progenitors exist in different skin regions (*Exp Dermatology, 2019*).

Our current work is focused on identifying mechanisms that control Merkel cell regeneration in both homeostatic and wounded adult skin. We are also expanding our studies on the biology of Merkel cells to understanding the biology of Merkel cell carcinoma, a deadly skin cancer with no effective treatment (*PNAS, 2019*).

GRANTS, CONTRACTS, FOUNDATION SUPPORT

PAST GRANTS

<u>List Funding Source, Project Title & Number</u>	<u>Role in Project</u>	<u>Dates</u>	<u>Direct Costs/per year</u>	<u>Supplemental Info</u>
1. 5R00AR057817; NIH/NIAMS Title: Elucidating the functions of epigenetic regulators of skin stem cell control	PI	12/11-07/14	\$139,557	
2. Basil O'Connor Award; March of Dimes Title: Toward design of therapies to accelerate epidermal barrier formation in preterm babies	PI	02/12-01/14	\$68,000	

3. Avon Corporation Title: Uncovering molecular mechanisms of human skin aging	PI	07/14-06/15	\$26,000	
4. IDEA grant N11G-152; NYSTEM Title: Characterization of multipotent embryonic skin stem cells	PI	03/13-02/15	\$137,500	
5. New Scholar in Aging; Ellison Medical Foundation Title: Toward Understanding the Molecular Mechanisms of Skin Stem Cell Aging	PI	10/13-09/17	\$92,000	
6. Young Scientist Cancer Research Award; Tisch Cancer Center Title: Toward design of a pre-clinical model of Merkel cell carcinoma	PI	01/16-12/17	\$25,000	
7. R01AR063724-S1; NIH/NIAMS STAR Supplement Program Title: Uncover transcriptional regulators in Merkel cell fate determination	PI	07/18-06/20	\$150,000	

PAST FELLOWSHIPS IN THE LAB

<u>List Funding Source, Project Title & Number</u>	<u>Role in Project</u>	<u>Dates</u>	<u>Direct Costs/per year</u>	<u>Supplemental Info</u>
1. DOD Postdoctoral Fellowship Title: Insight Into Skin Tumorigenesis Highlighting the Function of Epigenetic Regulators in SCC Formation	J. Zhang (postdoc)	09/12-12/13	\$80,000	
2. EMBO Postdoctoral Fellowship Title: Dissection of the role of Polycomb repressor complexes in the control of Merkel cell development	C. Perdigoto (postdoc)	11/12-12/13	\$46,000	
3. Pew Latin American Postdoctoral Fellow Title: Uncovering molecular mechanism orchestrating the establishment of epigenetic memory of skin stem cells	J. Valdes (postdoc)	08/13-07/15	\$30,000	
4. SDBBD T32 training grant; NIH Title: Regulators of skin barrier formation	K. Dauber (PhD student)	05/14-04/16	\$42,700	
5. CONACYT Postdoctoral Fellowship Title: Polycomb regulation of epidermal stem cells	J. Valdes (postdoc)	07/16-04/17	\$25,000	
6. NYSTEM Training grant Postdoctoral Fellowship Title: Lineage selectors in skin epithelium cell-fate specification	I. Cohen (postdoc)	11/18-10/19	\$47,587	

7. Merksammer Scholarship Title: Uncovering mechanisms of oral epithelium development	C. Bar (PhD student)	01/16-12/20	\$38,000	
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CURRENT GRANTS and SRA

<u>List Funding Source, Project Title & Number</u>	<u>Role in Project</u>	<u>Dates</u>	<u>Direct Costs/per year</u>	<u>Supplemental Info</u>
1. R01AR063724; NIH/NIAMS Title: Toward understanding the molecular mechanisms of Merkel cell fate determination	PI	09/12–07/22	\$225,000	
2. R01AR069078; NIH/NIAMS Title: Toward understanding the roles of the Polycomb complex in skin control	PI	12/16–08/25	\$264,000	
3. R01DC017400; NIH/NIDCD Title: Elucidating the role of Polycomb Repressive Complexes in Lingual Papillae Development	PI	07/18–06/23	\$230,000	
4. P30 AR079200; NIH/NIAMS Title: Skin Biology and Diseases Resource-based Center at Mount Sinai	PI	09/21–08/26	\$500,000	
5. W81XWH2110564 RA200253; DoD Rare Cancer Research Program Idea Development Award Title: Exploring Merkel cell stem cells as cells of origin of Merkel cell carcinoma	PI	09/21-09/24	\$118,000	
6. Irma T. Hirschl Career Scientist Award Title: Uncovering molecular mechanisms of Merkel cell carcinoma tumorigenesis	PI	01/17–12/21	\$35,000	

CURRENT FELLOWSHIPS IN THE LAB

<u>List Funding Source, Project Title & Number</u>	<u>Role in Project</u>	<u>Dates</u>	<u>Direct Costs/per year</u>	<u>Supplemental Info</u>
1. NYSTEM Training grant Postdoctoral Fellowship Title: The role of Polycomb Repressive Complexes in adult hair regeneration	P. Flora (postdoc)	11/19–10/21	\$47,587	
2. T32 training grant (5T32CA078207); Training program in cancer biology Title: Toward investigating the molecular mechanisms of Merkel cell carcinoma formation	M. Weber (PhD student)	08/20–07/22	\$24,816	
3. NIH/NIAMS Diversity Supplement (3R01AR069078-S1)	M. Branch (PhD student)	09/21-08/25	\$55,326	

PENDING/SUBMITTED GRANTS

N/A

CLINICAL TRIALS PARTICIPATION

Not applicable

TRAINEES

<u>Name</u>	<u>Level of Trainee</u>	<u>Role in Training & Inclusive Dates of Training</u>	<u>Training Venue</u>	<u>Trainees' Current Status/Employment</u>
Jisheng Zhang	Postdoc	Mentor: 01/11-12/13	Academia	Assistant Professor, Qingdao University of Science and Technology (China)
Evan Bardot	Technician	Mentor: 01/11-08/14	Academia	Associate Editor, Nature Communications
Frank Sontoriello	Technician	Mentor: 05/14-05/15	Academia	Postdoc, Princeton University
Carolina Perdigoto	Postdoc	Mentor: 11/12-06/16	Scientific Publishing	Chief Editor, Nature Structural & Molecular Biology
Julian Valdes	Postdoc	Mentor: 07/12-04/16	Academia	Assistant Professor, National Autonomous University of Mexico (Mexico City)
Katie Dauber	PhD Student	Mentor: 07/13-09/17	Academia	Senior research coordinator, Northwell Health
Idan Cohen	Postdoc	Mentor: 11/14-12/19	Academia	Assistant Professor, Ben-Gurion University of the Negev (Israel)
Carmit Bar	PhD Student / Postdoc	Mentor: 08/14-07/21	Scientific Publishing	Scientific Associate, IMPRINT Publication Science
Meng-Yen Li	Postdoc	Mentor: 02/18-present	Academia	
Minh Nguyen	Postdoc	Mentor: 01/17-present	Academia	
Pooja Flora	Postdoc	Mentor: 09/18-present	Academia	
Radhika Rao	Postdoc	Mentor: 09/21-present	Academia	
Madison Weber	PhD Student	Mentor: 12/19-present	Academia	
Meagan Brunch	PhD Student	Mentor: 1/21-present	Academia	
Eden Teferi	Associate Researcher	Mentor: 10/21-present	Academia	
Sergei Ezhkov	Technician	Mentor: 03/16-present	Academia	

TEACHING ACTIVITIES (at ISMMS)**Lecturer**

<u>Teaching Activity/Topic</u>	<u>Level</u>	<u>Role</u>	<u>Indicate Level and Number of Learners Taught, and Venue</u>	<u>Number of hours week/month/yr</u>	<u>Evaluation Summary</u>	<u>Years Taught</u>

Meet the Authors Course	MD/PhD and PhD	Lecturer	35	1h per year		2013
Problem Solving in Biomedical Science MD/PhD Course	MD/PhD	Lecturer	15	1.5h per year		2013-2014
Introduction to the Journal Club I	MD/PhD and PhD	Lecturer	10	1.5h per year		2013
Systems and Developmental Biology and Birth Defects Course	PhD	Lecturer	35	1h per year		2016
Introduction to the Journal Club II	MD/PhD and PhD	Lecturer	10	4.5h per year		2011-present
Biomedical Sciences Core Course for PhD/MS students	PhD	Lecturer	35	7.5h per year		2013-present
DSCB Stem Cell Biology Course	PhD	Lecturer	15	4h per every 2 years		2014-present
Biomedical Sciences Course for MD/PhD students	MD/PhD	Lecturer	15	2h per year		2015-present

Committee member

<u>Teaching Activity/Topic</u>	<u>Level</u>	<u>Role</u>	<u>Indicate Level and Number of Learners Taught, and Venue</u>	<u>Number of hours week/month/yr</u>	<u>Evaluation Summary</u>	<u>Years Taught</u>
Rachel Sennett	PhD	Committee member	1	1.5h per year		2011-2014
Brandon Kent	PhD	Committee member	1	4.5h per year		2012-2015
Yifei Sun	PhD	Committee member	1	1.5h per year		2014-2015
Yilfiz Koca	PhD	Committee member	1	1.5h per year		2013-2014
Rajal Sharma	MD/PhD	Committee member	1	1.5h per year		2016-2017
Lauren Schiff	PhD	Committee member	1	1.5h per year		2016-2019
Sai Thulabandu (Case Western University)	PhD	Committee member	1	1.5h per year		2018-2021

Alicia Ho	PhD	Committee member	1	1.5h per year		2020-present
Felix Rosemann	PhD	Committee member	1	1.5h per year		2020-present

Participation in outreach programs (high school students)

<u>Program / High School</u>	<u>Role in project</u>	<u>Number of participating students</u>	<u>Period</u>
The Nightingale-Bamford School, New York, NY	PI	1-2 students / per summer	2015-current
Urban Barcode Research Program, Cold Spring Harbor Lab, DNA Learning Center, Cold Spring Harbor, NY	PI	2 students / per year	2016-2019

ADMINISTRATIVE LEADERSHIP APPOINTMENTS

INTERNAL:

Research or Clinical (ISMMS):

1. PhD Admission Committee member (2012-2014)
2. Curriculum Committee member (2014)
3. Department of Developmental Biology, Faculty Search Committee member (2015-2016)
4. MS Admission Committee member (2015-2016)
5. PhD applicant interview and recruitment (2011-present)
6. MD/PhD Admission Committee, voting member (2015-present)
7. Department of CDRB, Faculty Search committee member, Icahn School of Medicine at Mount Sinai (2017-2021)
8. Chair/member of the faculty search committee, Black Family Stem Cell Institute, Icahn School of Medicine at Mount Sinai (2019-present)
9. Advisory member, Stem Cell Engineering CoRE, Black Family Stem Cell Institute, Icahn School of Medicine at Mount Sinai (2019-present)
10. **Director of The Mount Sinai Skin Biology and Diseases Resource-based Center (SBDRC), supported by the P30 NIH/NIAMS grant. (2021-present)**

General Administration:

Not applicable

EXTERNAL:

1. Organizer of the Satellite Symposium on Skin Epigenetics, The 77th Annual SID Annual Meeting, Chicago, IL (2019)
2. Elected member of the Committee on Scientific Programs, Society of Investigative Dermatology (2019-2023)
3. Elected co-vice-chair/co-chair of the Gordon Conference on Epidermal Differentiation and Keratinization (2019-2025) (conference postponed due to COVID)
4. Organizer of the New York Skin Club meeting (2019, 2020, 2021)

PUBLICATIONS

Peer Reviewed Original Contributions.

* Indicates publications for which the candidate is a senior author.

** Indicates publications for which the candidate is the corresponding author.

A. Original, Peer Reviewed Articles

1. **Ezhkova E**, Tansey WP. Proteasomal ATPases link ubiquitylation of histone H2B to methylation of histone H3. *Mol Cell*. 2004 Feb 13;13(3):435-42.

2. Lee D, **Ezhkova E**, Li B, Pattenden SG, Tansey WP, Workman JL. The proteasome regulatory particle alters the SAGA coactivator to enhance its interactions with transcriptional activators. *Cell*. 2005 Nov 4;123(3):423-36.
3. **Ezhkova E**, Pasolli HA, Parker JS, Stokes N, Su IH, Hannon G, Tarakhovskiy A, Fuchs E. Ezh2 orchestrates gene expression for the stepwise differentiation of tissue-specific stem cells. *Cell*. 2009 Mar 20;136(6):1122-35.
4. Silva JM, **Ezhkova E**, Silva J, Heart S, Castillo M, Campos Y, Castro V, Bonilla F, Cordon-Cardo C, Muthuswamy SK, Powers S, Fuchs E, Hannon GJ. Cyfip1 is a putative invasion suppressor in epithelial cancers. *Cell*. 2009 Jun 12;137(6):1047-61.
5. **Ezhkova E**, Lien WH, Stokes N, Pasolli HA, Silva JM, Fuchs E. EZH1 and EZH2 cogovern histone H3K27 trimethylation and are essential for hair follicle homeostasis and wound repair. *Genes & Development*. 2011 Mar 1;25(5):485-98.
- 6*. Leung A, Cajigas I, Jia P, **Ezhkova E**, Brickner JH, Zhao Z, Geng F, Tansey WP. Histone H2B ubiquitylation and H3 lysine 4 methylation prevent ectopic silencing of euchromatic loci important for the cellular response to heat. *Mol Biol Cell*. 2011 Aug 1;22(15):2741-53.
- 7*. Bardot ES, Valdes VJ, Zhang J, Perdigoto CN, Nicolis S, Hearn SA, Silva JM, **Ezhkova E**. Polycomb subunits Ezh1 and Ezh2 regulate the Merkel cell differentiation program in skin stem cells. *EMBO Journal*. 2013 Jul 17;32(14):1990-2000.
- 8*. Llobet-Navas D, Rodríguez-Barrueco R, Castro V, Ugalde AP, Sumazin P, Jacob-Sendler D, Demircan B, Castillo-Martín M, Putcha P, Marshall N, Villagrasa P, Chan J, Sanchez-Garcia F, Pe'er D, Rabadán R, Iavarone A, Cordon-Cardo C, Califano A, López-Otín C, **Ezhkova E**, Silva JM. The miR-424(322)/503 cluster orchestrates remodeling of the epithelium in the involuting mammary gland. *Genes & Development*. 2014 Apr 1;28(7):765-82.
- 9*. Llobet-Navas D, Rodríguez-Barrueco R, de la Iglesia-Vicente J, Olivan M, Castro V, Saucedo-Cuevas L, Marshall N, Putcha P, Castillo-Martín M, Bardot E, **Ezhkova E**, Iavarone A, Cordon-Cardo C, Silva JM. The microRNA 424/503 cluster reduces CDC25A expression during cell cycle arrest imposed by transforming growth factor β in mammary epithelial cells. *Mol Cell Biol*. 2014 Dec 1;34(23):4216-31.
- 10**. Perdigoto CN, Bardot ES, Valdes VJ, Santoriello FJ, **Ezhkova E**. Embryonic maturation of epidermal Merkel cells is controlled by a redundant transcription factor network. *Development*. 2014 Dec;141(24):4690-6.
- 11*. Wurm S, Zhang J, Guinea-Viniegra J, García F, Muñoz J, Bakiri L, **Ezhkova E**, Wagner EF. Terminal epidermal differentiation is regulated by the interaction of Fra-2/AP-1 with Ezh2 and ERK1/2. *Genes & Development*. 2015 Jan 15;29(2):144-56.
- 12**. Dauber KL, Perdigoto CN, Valdes VJ, Santoriello FJ, Cohen I, **Ezhkova E**. Dissecting the roles of Polycomb repressive complex 2 subunits in the control of skin development. *Journal of Investigative Dermatology*. 2016 Aug;136(8):1647-1655.
- 13*. Goldman O, Valdes VJ, **Ezhkova E**, Gouon-Evans V. The mesenchymal transcription factor SNAIL-1 instructs human liver specification. *Stem Cell Research* 2016 May 21;17(1):62-68.
- 14**. Perdigoto CN, Dauber KL, Bar C, Tsai PC, Valdes VJ, Cohen I, Santoriello FJ, Zhao D, Zheng D, Hsu YC, **Ezhkova E**. Polycomb-Mediated repression and sonic hedgehog signaling interact to regulate Merkel cell specification during skin development. *PLoS Genet*. 2016 Jul 14;12(7):e1006151.
- 15*. Zhang B, Tsai PC, Gonzalez-Celeiro M, Chung O, Boumard B, Perdigoto CN, **Ezhkova E**, Hsu YC. Hair follicles' transit amplifying cells govern concurrent dermal adipocyte production through sonic hedgehog. *Genes & Development*. 2016 Oct 15;30(20):2325-2338.
- 16*. Rodríguez-Barrueco R, Nekritz ER, Bertucci F, Sanchez-Garcia F, Yu4 J, Zeleke T, Gorbatenko A, Birnbaum D, **Ezhkova E**, Cordon-Cardo C, Finetti P, Llobet-Navas D, Silva JM. The miR-424(322)/503 is a breast cancer

tumor suppressor whose loss promotes resistance to chemotherapy. *Genes & Development*. 2017 Mar 15;31(6):553-566.

17**. Cohen I, Zhao D, Bar C, Valdes VJ, Dauber-Decker KL, Nguyen MB, Nakayama M, Rendl M, Bickmore WA, Koseki H, Zheng D, **Ezhkova E**. PRC1 Fine-tunes gene repression and activation to safeguard skin development and stem cell specification. *Cell Stem Cell*. 2018 May 3;22(5):726-739.e7.

18**. Nguyen MB, Cohen I, Kumar V, Xu Z, Bar C, Dauber-Decker KL, Tsai PC, Marangoni P, Klein OD, Hsu YC, Chen T, Mikkola ML, **Ezhkova E**. FGF signalling controls the specification of hair placode-derived SOX9 positive progenitors to Merkel cells. *Nature Communications*. 2018 Jun 13;9(1):2333. doi: 10.1038/s41467-018-04399-y

19**. Cohen I, Zhao D, Menon G, Koseki H, Zheng D, **Ezhkova E**. PRC1 preserves epidermal tissue integrity independently of PRC2. *Genes & Development*. 2019 Jan 1;33(1-2):55-60. (cover image)

20**. Nguyen MB, Valdes VJ, Cohen I, Pothula V, Zhao D, Zheng D, **Ezhkova E**. Dissection of Merkel cell formation in hairy and glabrous skin reveals a common requirement for FGFR2-mediated signaling. *Exp Dermatol*. 2019 Apr;28(4):374-382. doi: 10.1111/exd.13901.

21**. Bar C, Cohen I, Zhao D, Pothula V, Litskevitch A, Koseki H, Zheng D, **Ezhkova E**. Polycomb Repressive Complex 1 Controls Maintenance of Fungiform Papillae by Repressing Sonic Hedgehog Expression. *Cell Reports*. 2019 Jul 2;28(1):257-266.e5.

22*. Harold A, Amako Y, Hachisuka J, Bai Y, Li MY, Kubat L, Gravemeyer J, Franks J, Gibbs JR, Park HJ, **Ezhkova E**, Becker JC, Shuda M. Conversion of Sox2-dependent Merkel cell carcinoma to a differentiated neuron-like phenotype by T antigen inhibition. *Proc Natl Acad Sci U S A*. 2019 Oct 1;116(40):20104-20114.

23**. Cohen I, Bar C, Liu H, Valdes VJ, Zhao D, Galbo PM Jr, Silva JM, Koseki H, Zheng D, **Ezhkova E**. Polycomb complexes redundantly maintain epidermal stem cell identity during development. *Genes & Development*. 2021 Mar 1;35(5-6):354-366.

24**. Li MY, Flora P, Pu H, Bar C, Silva J, Cohen I, Galbo PM Jr, Liu H, Yu X, Jin H, Koseki H, D'Orazio JA, Zheng D, **Ezhkova E**. UV-induced reduction in Polycomb repression promotes epidermal pigmentation. *Developmental Cell* (in press)

25**. Li MY, Flora P, Pu H, Bar C, Silva J, Cohen I, Galbo PM Jr, Liu H, Yu X, Jin J, Koseki H, D'Orazio JA, Zheng D, **Ezhkova E**. UV-induced reduction in Polycomb repression promotes epidermal pigmentation. *Developmental Cell*. 2021 Sep 27;56(18):2547-2561.e8. doi: 10.1016/j.devcel.2021.08.006. Epub 2021 Sep 1. PMID: 34473941.

B. Original, Peer Reviewed Articles (currently under review)

N/A

C. Reviews, Book Chapters and Editorials

#= co-corresponding author

1. **Ejkova E**, Tansey WP. Old dogs and new tricks: meeting on mechanisms of eukaryotic transcription. *EMBO Rep*. 2002 Mar;3(3):219-23.

2. **Ezhkova E**, Tansey WP. Chromatin immunoprecipitation to study protein-DNA interactions in budding yeast. *Methods Mol Biol*. 2006;313:225-44.

3. **Ezhkova E**, Fuchs E. Regenerative medicine: An eye to treating blindness. *Nature*. 2010 Jul 29;466(7306):567-8.

4**. Perdigoto CN, Valdes VJ, Bardot ES, **Ezhkova E**. Epigenetic regulation of skin: focus on the Polycomb complex. *Cell Mol Life Sci*. 2012 Jul;69(13):2161-72.

5**. Perdigoto CN, Bardot ES, **Ezhkova E**. SWItching on epidermal cell fate. *Cell Stem Cell*. 2013 Feb 7;12(2):141-2.

6**. Perdigoto CN, Valdes VJ, Bardot ES, **Ezhkova E**. Epigenetic regulation of epidermal differentiation. *Cold Spring Harb Perspect Med*. 2014 Feb 1;4(2).

7**. Cohen I, **Ezhkova E**. Cbx4: A new guardian of p63's domain of epidermal control. *J Cell Biol*. 2016 Jan 4;212(1):9-11.

8**. Chen YG[#], **Ezhkova E[#]**, Ostankovitch M[#]. Molecular Mechanisms Regulating Stem Cells Fate. *J Mol Biol*. 2016 Mar 17.

9**. Dauber KL, Cohen I, **Ezhkova E**. Polycomb genes and their roles in skin development and regeneration. Springer's Volume "Epigenetic Regulation of Skin Development and Regeneration", Life Sciences Cell Biology Stem Cell Biology and Regenerative Medicine. 2018. pp.75-104

10**. Miroshnikova YA, Cohen I, **Ezhkova E[#]**, Wickström SA[#]. Epigenetic gene regulation, chromatin structure, and force-induced chromatin remodelling in epidermal development and homeostasis. *Curr Opin Genet Dev*. 2019 May 18;55:46-51.

11**. Bar C, Valdes VJ[#], **Ezhkova E[#]**. Chromatin immunoprecipitation of low number of FACS-purified epidermal cells. *Methods Mol Biol*. 2020;2154:197-215.

12**. Cohen I, Bar C, **Ezhkova E**. Activity of PRC1 and histone H2AK119 monoubiquitination: revising popular misconceptions. *Bioessays*. 2020 May;42(5):e1900192.

13**. Flora P, **Ezhkova E**. Regulatory mechanisms governing epidermal stem cell function during development and homeostasis. *Development*. 2020 Nov 15;147(22):dev194100.

14**. Flora P, Dalal G, Cohen I, Ezhkova E. Polycomb repressive complex(es) and their role in adult stem cells. *Genes* (in press)

INVITED LECTURES/PRESENTATIONS

2003-2010

1. 'Mechanism of Eukaryotic Transcription', Cold Spring Harbor Conference (selected talk), NY; August 2003.
2. Cold Spring Harbor Laboratory In-House Seminar (invited speaker), Cold Spring Harbor Laboratory, NY; April 2004.
3. NYSCF Third Annual Translational Stem Cell Research Conference (invited speaker), NY; October 2008.
4. 'Mouse Genetics & Genomics: Development & Disease', Cold Spring Harbor Conference (selected talk), NY; November 2008.
5. Department of Stem Cell and Regenerative Biology, Harvard University (invited talk), MA; February 2008.
6. Department of Dermatology, Columbia University Medical School (invited talk), NY; March 2008.
7. 1st International Conference of Regenerative Surgery (invited speaker), Rome, Italy; August 2009.
8. Stem Cell Biology Meeting, Cold Spring Harbor Laboratory (selected talk), NY; September 2009.
9. 'Genetic-Epigenetic Basis of Skin Diseases' (selected talk), Montagna Symposium on the Biology of Skin, Portland, OR; October 2009.
10. New York Mouse Development Club Meeting (invited speaker), Mount Sinai School of Medicine, NY; November 2009.
11. Department of Pathology, Weill Cornell School of Medicine (invited talk), NY; November 2009.
12. Black Family Stem Cell Institute, Mount Sinai School of Medicine (invited talk), NY; November 2009.
13. Cold Spring Harbor Laboratory (invited talk), NY; December 2009.
14. Department of Developmental Biology, Sloan Kettering Institute (invited talk), NY; January 2010.
15. Department of Pathology, NYU Medical School (invited talk), NY; January 2010.
16. Department of Biology, New York University (invited talk), NY; February 2010.
17. Department of Genetics, Rutgers University (invited talk), NJ; February 2010.
18. Skirball Institute, NYU Medical School (invited talk), NY; April 2010.

19. Northeastern Regional meeting of the Society of Developmental Biology (invited speaker), Woods Hole, MA; April 2010.

2011-2014

20. Gordon Conference on Epithelial Differentiation & Keratinization (selected talk), VT; July 2011.
21. Gordon Conference on Barrier Function of Mammalian Skin (invited speaker), NH; August 2011.
22. 'Dermatogenetics' Meeting (selected talk), Miami, FL; February 2012.
23. Faculty Talk, Mount Sinai MD/PhD Revisit week (invited speaker), NY; April 2012
24. 'Epigenetic Control of Skin Development and Regeneration' International Symposium (invited speaker), Bradford, UK; April 2012.
25. Columbia University Medical School Cancer Center Seminar Series (invited speaker); December 2012.
26. International Society of Investigative Dermatology Meeting (selected talk), Edinburgh, UK; May 2013
27. NYSTEM meeting (selected talk), New York, NY; May 2013
28. Ohio State University Cancer Center Seminar Series (invited speaker), Columbus, OH; June 2013.
29. Chromatin Club (invited speaker), Icahn School of Medicine at Mount Sinai, New York, NY; September 2013.
30. Gotham Society for Mouse Development Meeting (invited speaker), Icahn School of Medicine at Mount Sinai, New York, NY; October 2013.
31. 5th Annual Workshop 'Stem cells and Skin', Rutgers University (invited speaker), NJ; November 2013.
32. 'Nuclear Organization and Function Meeting' (selected talk), Cold Spring Harbor Conference, NY; August 2014

2015

33. 'Transcriptional and Epigenetic Influences on Stem Cell States' Meeting (selected talk), Keystone Meeting, CO; March 2015
34. Mid-Atlantic Society for Developmental Biology Meeting (invited speaker), Princeton, NJ; March 2015
35. Society of Investigative Dermatology Meeting (selected talk), Atlanta, GA; May 2015
36. Gordon Conference on Epithelial Differentiation & Keratinization (selected talk), Sunday River Newry, ME; July 2015
37. 'Harnessing Stem Cells to Reveal Novel Skin Biology and Disease Treatment', Montagna Symposium on the Biology of Skin (invited speaker), Portland, OR; October 2015

2016

38. 'Molecular and Cellular Basis of Growth and Regeneration' (invited speaker, session chair), Keystone Meeting, Breckenridge, CO; January 2016
39. Faculty talk for the PhD Admission Week (invited speaker), Icahn School of Medicine at Mount Sinai, New York, NY; February 2016.
40. 'Epigenetic response to environmental stimuli-novel technologies challenge unsolved problems Symposium (invited speaker), RIKEN Wako, Japan; February 2016
41. Seminar at RIKEN Yokohama (invited speaker), Yokohama, Japan; February 2016
42. 'Epigenetic Control of Skin Development and Regeneration' International Symposium (invited speaker), Bradford, UK; March 2016
43. Society of Investigative Dermatology Meeting (selected talk), Scottsdale, AZ; May 2016
44. 'The Skin: Our Sensory Organ for Itch, Pain, Touch and Pleasure' (invited speaker), Montagna Symposium on the Biology of Skin, Portland, OR; October 2016.

2017

45. Departmental seminar, The Mount Sinai Diabetes, Obesity and Metabolism Institute, Icahn School of Medicine at Mount Sinai (invited speaker); January 2017
46. Gordon Conference on Epithelial Differentiation & Keratinization (invited sectional chair; oral presentation), Renaissance Tuscany Il Ciocco Lucca (Barga), Italy; May 2017
47. Departmental seminar, Department of Molecular, Cellular, and Developmental Biology, University of Colorado at Boulder, CO (invited speaker); September 2017
48. Departmental seminar, Department of Pathology, University of Colorado at Denver, CO (invited speaker); September 2017
49. European Society of Dermatological Research (ESDR) meeting, Symposium on Skin Epigenetics (invited

speaker), Salzburg, Austria; September 2017.

50. Departmental seminar, Center for Skin Sciences, University of Bradford, Bradford, UK (invited speaker); October 2017.

51. Departmental seminar, Department of Biochemistry, SUNY at Buffalo, Buffalo, NY (invited speaker); November 2017.

2018

52. Departmental seminar, Department of Cell, Developmental and Regenerative Biology, ISMMS, New York, NY (invited speaker); February 2018.

53. Departmental seminar, Department of Dermatology, University of Pennsylvania, Philadelphia, PA (invited speaker); February 2018.

54. International Workshop on Merkel Cell Carcinoma Research, NCI, Rockville, MD (invited participant); March 2018.

55. Department of Biochemistry, University of Maryland at Baltimore, Baltimore, MD (invited speaker); April 2018

56. 59th annual Northeast Regional Society of Developmental Biologists, Woods Hole, MA (invited speaker); April 2018.

57. Departmental seminar, Harvard University Medical School, The Cutaneous biology research center, MGH, Boston, MA (invited speaker); April 2018.

58. Departmental seminar, Yale Stem Cell Center, Yale University, New Haven, CT (invited lecture); April 2018.

59. International Investigative Dermatology (IID) Meeting, Orlando, FL (invited sectional chair); May 2018.

60. Second Annual UC Irvine Skin Symposium, Irvine, CA (invited speaker); September 2018.

61. Dahlem Colloquia Nanosymposium: Transcriptional Control, Max Planck Institute for Molecular Genetics, Berlin, Germany (invited lecture); October 2018.

62. Frontiers in Cancer Research (FCR) Conference, Heidelberg, Germany (invited speaker); October 2018

63. 118th International Titisee Conference, 'Cell heterogeneity & tissue architecture', Titisee/Black Forest, Germany (invited speaker); October 2018.

64. Departmental seminar, Department of Molecular Biology and Genetics, Cornell University, Ithaca, NY (invited speaker); October 2018

65. Forum for clinical mentored K awardees, NIH/NIAMS, Bethesda, MD (invited participant); December 2018

66. Departmental seminar, Department of Cell Biology & Regenerative Medicine, The Medical University of South Carolina, Charleston, SC (invited speaker); December 2018.

2019

67. Cold Spring Harbor Laboratory, Watson School of Biological Sciences, Cold Spring Harbor, NY (invited speaker); February 2019

68. CEDAR (Cancer Early Detection Advanced Research), OHSU, Portland, OR (invited speaker); February 2019.

69. The 11th World Congress for Hair Research, Pre-Meeting Course on Hair Epigenetics, Sitges, Spain (co-chair, invited speaker); April 2019

70. The 77th Annual SID Annual Meeting, Satellite Symposium on Skin Epigenetics, Chicago, IL (co-organizer, invited speaker); May 2019.

71. New York Stem Cell Foundation, Alumni Retreat, New York, NY (invited speaker); June 2019

72. ASXL-Related Disorders summer meeting, Ann Arbor, MI (invited speaker); July 2019.

73. Stem Cell Biology Meeting, Cold Spring Harbor Laboratory, NY (invited speaker); September 2019

74. 1st International Symposium on Merkel Cell Carcinoma, Tampa, FL (invited speaker); October 2019

2020

75. State-of-the-art lecture, The 78th Annual SID Annual Meeting, Scottsdale (invited speaker; virtual meeting due to COVID-19); AZ, May 2020

76. Keystone Symposia on Tissue Plasticity: Preservation and Alteration of Cellular Identity, Park City, UT (invited speaker; virtual meeting due to COVID-19); October 2020

77. Departmental seminar, Division of Pharmaceutical Sciences, The School of Pharmacy, University of Wisconsin-Madison, WI (invited speaker; virtual seminar due to COVID-19); November 2020.

2021

78. Departmental seminar, Department of Developmental Biology at the University of Pittsburgh School of Medicine, PA (invited speaker; virtual seminar due to COVID-19); January 2021
79. Penn Epigenetics Institute Seminar Series, University of Pennsylvania, Philadelphia, PA (invited speaker; virtual seminar due to COVID-19); April 2021
80. The 79th Annual SID Annual Meeting, Virtual meeting (session chair; virtual meeting due to COVID-19); May 2021
81. SJSTEN 2021 Meeting: Collaboration, Innovation and Community, Virtual meeting (invited speaker; virtual meeting due to COVID-19); August 2021.

VOLUNTARY PRESENTATIONS

N/A

MEDIA RESOURCE EDUCATIONAL MATERIALS

Not applicable