Curriculum Vitae

PERSONAL INFORMATION

Name: Shema, Efrat (ORCiD: 0000-0002-3718-593X)
Date of birth: August 1, 1981
Nationality: Israeli
URL for web site: www.weizmann.ac.il/Biological_Regulation/Shema/

PERSONAL STATEMENT

In my lab at the Weizmann Institute of Science, my research passion is to understand human genome regulation by the development and application of novel single-molecule and single-cell technologies to visualize the epigenome. Our goal is to reveal basic mechanisms of epigenetic deregulation in cancer, identify epigenetic vulnerabilities of cancer cells, and pave the way to new therapeutic opportunities that would benefit patients.

I strongly believe that novel technologies are instrumental in advancing science and revealing new biology. Therefore, my lab is dedicated to the development of new tools that would enable high-resolution single-cell and single-molecule profiling of the epigenome. Applying these tools leads to the generation of cancer-related data sets and resources that we share with the scientific community, in hope to expand the global knowledge of this disease. We seek to understand aberrant chromatin regulation in cancer and, in this context, how we can leverage the high sensitivity and high-throughput epigenetic profiling for clinical applications. We also apply our single-molecule systems to establish novel liquid biopsy technologies, which I envision would have a major impact on early and non-invasive cancer diagnostics.

- **EDUCATION**

2012 **PhD** (direct track), Department of Molecular Cell Biology, Faculty of Biology, Weizmann Institute of Science, Israel. PhD supervisor: Prof. Moshe Oren
Thesis title: "The roles of RNF20, a chromatin modifier, in transcription regulation and cancer".

2005 **BSc** in life sciences, with honors, the Hebrew University of Jerusalem, Israel

- **CURRENT POSITION**

2017 – Now **Principal Investigator** (Senior Scientist; equivalent to Assistant Professor)
Department of Biological Regulation, Faculty of Biology, Weizmann Institute of Science, Israel
Incumbent of the Lisa and Jeffery Aronin Family Career Development Chair

- **PREVIOUS POSITIONS**

2012 – 2017 **Postdoctoral fellow** at the lab of Dr. Bradley Bernstein
Department of Pathology, Massachusetts General Hospital and Harvard Medical School, Boston, USA

2012 **Postdoctoral fellow** at the lab of Prof. Moshe Oren
Department of Molecular Cell Biology, Weizmann Institute of Science, Israel

- **FELLOWSHIPS AND AWARDS**

2021 Private donation managed by the Goldman Sachs Foundation
2021 ICRF- Research Career Development Award
2016 Harvard Epigenetics Initiative award, Harvard Medical School, USA
2015 MGH ECOR Fund for Medical Discovery postdoctoral fellowship award (1-year fellowship)
2012 Jane Coffin Childs Memorial Fund postdoctoral fellowship award (3-year fellowship)
2012 Weizmann Institute of Science National postdoctoral award for Advancing Women in Science (nationwide, 2-year award)

2012 Fulbright postdoctoral award (1-year award)
2012 UNESCO-L'OREAL national award for young women in life sciences (1-year award)
2012 EMBO postdoctoral fellowship (declined due to overlap with the Jane Coffin Childs fellowship)
2012 International Dimitris N. Chorafas award for outstanding PhD achievements, Weizmann Institute of Science, Israel

- **PATENTS**

2016 Combinatorial Single-Molecule Analysis of Chromatin (International Application No. PCT/US2016/047747)
2022 US Provisional patent application: "Methods and Kits for Analyzing Nucleosomes and Plasma Proteins"

- **SELECTED PUBLICATIONS**

Fedyuk V, Erez N, Furth N, Beresh O, Andreishcheva E, Shinde A, Jones D, Bar Zakai B, Mavor Y, Peretz P, Hubert A, Cohen JE, Salah A, Temper M, Grinshpun A, Maoz M, Zick A, Ron G, **Shema E**. (2022). Multiplexed Single-Molecule Epigenetic Analysis of Plasma-Isolated Nucleosomes for Cancer Diagnostics. ***Nature Biotechnology***. doi: 10.1038/s41587-022-01447-3

Harpaz N, Mittelman T, Beresh O, Salame TM, Furth N, Ron G, **Shema E** (2022). Single-cell epigenetic analysis reveals principles of chromatin states in H3.3-K27M gliomas. ***Molecular Cell*** 82(14):2696-2713.e9. doi: 10.1016/j.molcel.2022.05.023.

Furth N, Algranati D, Dassa B, Andryushchenko O, Fedyuk F, Kasper LH, Jones DR, Monje M, Baker SJ, **Shema E**. (2022). Dual Interactions of H3-K27M-Mutant Nucleosomes with PRC2 and MLL1 Shape the Glioma Epigenetic Landscape. ***Cell Reports*** 39(7):110836. doi: 10.1016/j.celrep.2022.110836

Furth N, Shilo S, Cohen N, Erez N, Fedyuk V, Schrager A. M, Weinberger A, Dror A. A, Zigron A, Shehadeh M, Sela E, Srouji S, Amit S, Levy I, Segal E, Dahan R, Jones D, Douek D. C, **Shema E**. (2021). Unified platform for genetic and serological detection of COVID-19 with single-molecule technology. ***PLoS ONE***. 16, 7, e0255096. doi: 10.1371/journal.pone.0255096.

Furth N, **Shema E**. (2022). It's all in the combination: decoding the epigenome for cancer research and diagnostics. ***Current Opinion in Genetics & Development*** 73:101899. doi: 10.1016/j.gde.2022.101899.

Shema E, Bernstein BE, Buenrostro JD (2019). Single-cell and single-molecule epigenomics: genome-regulation and cellular diversity at unprecedented resolution. ***Nature Genetics*** 51(1):19-25. doi: 10.1038/s41588-018-0290-x.

Shema E, Jones D, Shoresh N, Donohue L, Ram O, Bernstein BE. (2016). Single-molecule decoding of combinatorially modified nucleosomes. ***Science*** 352(6286): 717-21. DOI: 10.1126/science.aad7701.

- **RESEARCH SUPPORT (partial list)**

2021 Krenter-Katz - Interdisciplinary Research at the Interfaces of Life and Exact Sciences
2020 European Research Council Proof-of-Concept grant (ERC-PoC)
2019 German-Israeli Foundation for Scientific Research and Development
2019 Israeli Science Foundation
2018 European Research Council Starting Grant 2018 (ERC)