

CURRICULUM VITAE

PERSONAL DETAILS

Born 13 May 1972, Israel.
Nationality: Israel
Family status: Married + Two
Address: 16 Ashtori Hafarchi St., Tel Aviv Israel.
Tel.: +972-2-6584194 (Office), +972-52-5347550 (Mobile)
Fax: +972-2-5494573
Email: amnon.buxboim@mail.huji.ac.il
URL: <https://www.cse.huji.ac.il/labs/buxboim/publications.php>

EDUCATION

The Hebrew University of Jerusalem (1994-1997)

B.Sc. in Physics (major) and Mathematics (minor).

The Hebrew University of Jerusalem (1999-2001)

M.Sc. in condensed matter physics (theory). Supervisor: Prof. Avraham Schiller.

Thesis title: “Current Characteristics of the Single-Electron Transistor at the Degeneracy Point”.

The Weizmann Institute of Science (2002-2008)

Ph.D. in synthetic biology and soft matter physics. Supervisor: Prof. Roy Bar-Ziv.

Thesis title: “Cell-Free Gene Expression on a Chip”.

ACADEMIC APPOINTMENTS

Associate professor (2021 – present)

The Hebrew University of Jerusalem

Head of academic program (2015 – present)

Bioengineering graduate program.

Director (2015 –2017)

Alexander Grass Center for Bioengineering.

Academic director (2015 –2017, 2021-present)

BioDesign Program in Medical Innovation.

Assistant professor (September 2013 – 2021)

Institute of Life Sciences and school of Computer Science and Engineering.

University of Pennsylvania (2008-2013)

Postdoctoral fellow, Biophysical engineering laboratory.

AWARDS AND ACKNOWLEDGMENT

Awardee (2013-14)

The Golda Meir Lectureship Fellowship.

Awardee (2016 –2021)

European Research Council –Starting Grant (ERC-StG).

Management committee member (2016 –2021)

COST Action 15214: An integrative action for multidisciplinary studies on cellular structural networks.

Conference organizer (June 2017)

The International COST School & The Batsheva de Rothschild Seminar, Ye'arim, Judean Hills, Israel.

Committee member (2016 –2021)

Israel Science Foundation - biophysics.

Committee member (2019 –2020)

US-Israel Binational Science Foundation - bioengineering.

**PARTICIPATION IN SCIENTIFIC CONFERENCES, LECTURES, AND OTHER ACTIVITY
(SINCE 2014)**

1. Nuclear Mechanosensitivity: Matrix physics regulates lamin-A,C phosphorylation. ILANIT FISEB conference, Eilat, Israel (2014). *Lecture*.
2. BioDesign: Medical Innovation. BME-IDEA EU Symposium, London, UK (2015). *Invited talk*.
3. Mechanobiology of cell-fate decision making. Gottingen University, Germany (2016). *Lecture*.
4. BioDesign: Medical Innovation. LCSB, Luxembourg (2016). *Lecture*.
5. The nuclear lamina directs cellular mechanosensitivity. ISMBE Annual Meeting, Haifa, Israel (2016). *Lecture*.
6. Computer-based assessment of embryo quality for infertility clinical applications. ISRASTEM Annual Meeting, Tel Aviv, Israel (2016). *Lecture*.
7. Nuclear lamins are regulators of cellular homeostasis. Israeli Biophysical Society, Ben Gurion University, Israel (2016). *Lecture*.
8. Nuclear mechanotransduction: Stickiness of lamin-A is regulated by applied tensile forces and the composition of the nuclear lamina. EuroCellNet Workshop, Prague, Czech Republic (2017). *Lecture*.
9. A- and B-Type Lamins Regulate Nucleus Mechanics and Cellular Homeostasis. The Nuclear Lamina and Nuclear Organization International Meeting, Ma'ale Hachamisha, Israel (2017). *Lecture*.
10. Nucleus mechanobiology in a live organism: Nucleus mechanics and gene regulation. Intermediate Filaments Gordon Research Conference, Luca, Italy (2018). *Lecture*.
11. Active nuclear mechanotransduction in cultured cells and in a living organism. EMBO Workshop on Nuclear Mechanogenomics, Singapore (2018). *Lecture*.
12. Choosing the “right embryo”: Combining machine learning and mechanical characterization of oocyte maturation and preimplantation embryo development. University of Copenhagen, Denmark (2018). *Lecture*.
13. Improving Morphokinetic Classification of Embryo Developmental and Implantation Potential Using Artificial Intelligence Tools. Annual meeting of the Israeli Fertility Association, Tel Aviv, Israel (2018). *Lecture*.
14. Evaluating the developmental potential of oocytes and preimplantation embryos based on mechanical and machine learning tools. Annual meeting of the Israeli Stem Cell Society, Tel Aviv, Israel (2018). *Lecture*.
15. Evaluating the developmental potential of oocytes and preimplantation embryos based on mechanical and machine learning tools. 52nd annual meeting of the Israeli Society of Microscopy, Tel Aviv, Israel (2018). *Lecture*.
16. Evaluating the developmental potential of oocytes and preimplantation embryos based on mechanical and machine learning tools. Annual meeting of the Israeli Association of Medical Informatics, Tel Aviv, Israel (2018). *Lecture*.

17. Mechanics and deep learning for evaluating the developmental potential of oocytes and embryos. The Israeli Fertility Association Meeting, Tel Aviv University, Israel (2019). *Lecture*.
18. Mechanics and deep learning for evaluating the developmental potential of oocytes and embryos. The European Intermediate Filaments Meeting, Turku Finland (2019). *Lecture*.
19. ICSI Based Mechanical Analysis of the Developmental Potential of Human Oocytes. The Annual Israeli Fertility Association Meeting, Tel Aviv, Israel (2019). *Lecture*.
20. Improving morphokinetic classification of embryo developmental and implantation potential using artificial intelligence tools. 1st Congress on Women Health, Tel Aviv, Israel (2019). *Lecture*.
21. Mechanobiology of oocyte maturation. ILANIT FISEB conference, Eilat, Israel (2020). *Lecture*.
22. From Embryogenesis to Tissue Maintenance and Regeneration. Frontiers in Stem Cell Biology, Ein Bokek, Israel (2022). Invited talk.

RESEARCH GRANTS

Past grants

- 2014-2017: Israel Science Foundation (ISF), “Nuclear Mechanosensitivity: Matrix-elasticity directs the remodeling of the nuclear lamina to regulate gene expression”, Amnon Buxboim, \$205,000.
- 2014-2017: Israel Science Foundation (ISF) - Equipment, “Microrheology of Single Cells and Nuclei”, Amnon Buxboim, \$260,000.
- 2016-2017: INCPM, “Nuclear Mechanosensitivity: Matrix-elasticity directs the remodeling of the nuclear lamina to regulate gene expression”, Amnon Buxboim, ₪74,000/74,000.
- 2016-2017: KAMIN, “Early evaluation of embryo developmental competence for IVF infertility treatments”, Amnon Buxboim and Assaf Ben-Meir (Hadassah), ₪440,000/660,000.
- 2016-2018: Mobileye Research Fund, “Evaluation of human embryo developmental potential by machine learning”, Amnon Buxboim, \$10,000/10,000 per year.
- 2016-2019: Niedersächsisches Vorab, “Mapping the interactions of lamin-A/C in cell cycle and in mechanotransduction signaling”, Amnon Buxboim and Heinz Neumann (Göttingen), €127,000/254,000.
- 2017-2018: NOFAR, “Developing RF catheter ablation technology for maintaining stable tissue coupling using applied suction”, Amnon Buxboim and Ram Elazary (Hadassah), ₪350,000/700,000.
- 2018-2019: BSF, “Single Cell Mechanobiology: Resolving Cellular Heterogeneity of Mesenchymal Stem Cells via Drop-Seq Gene Expression Analysis of Matrix-Directed Differentiation”, Amnon Buxboim and Anindita Basu (University of Chicago), \$75,000/150,000.
- 2019-20: NOFAR, “Developing single-cell level full-length transcriptional profiling of cancer tumors”. Oren Ram and Amnon Buxboim. ₪260,000/520,000.
- 2016-2021: European Research Council Starting Grant (ERC-StG), “Mechanobiology of Bovine Reproduction”, Amnon Buxboim, €1,500,000/1,500,000.

Active grants

- 2020-2023: BIRAX, “How does ageing-associated niche stiffening disrupt nucleus mechanotransduction signaling and suppresses the regenerative capacity of adult CNS progenitor cells?”, Amnon Buxboim and Robin Franklin (Cambridge UK). £200,000/400,000.
- 2021-2023: Bioconvergence, “Developing a device for assessing the developmental potential of preimplantation embryos via real-time mechanical characterization”, Amnon Buxboim ₪880,000/880,000.

2021-2023: ERC PoC, “An embryo transfer decision-support tool optimizes live-birth rates in IVF treatments”, Amnon Buxboim €150,000/150,000.

2022-2023: Hebrew University of Jerusalem and University of Illinois Joint Research and Innovation Seed Grants Program, “Reconstituting the microenvironment of chronic tissue injury to improve cell therapy”, Amnon Buxboim and Jae-Won Shin €25,000/50,000.

Pending grants

ISF, “Regulation of RNA nuclear export by nuclear lamins and matrix elasticity”, Amnon Buxboim.

NSF-BSF, “How does cellular mechanobiology determine brain organoid structure and rheology?”, Amnon Buxboim, Orly Reiner, and Jennifer M. Schwartz.

AMNON BUXBOIM | LIST OF PUBLICATIONS

Citations: 3,900

h-index: 18

ARTICLES

1. Kam, D., Olender, A., Rudich, A., Kan-Tor, Y., Buxboim, A.# Shoseyov, O.,# and Magdassi, S.# 3D Printing of Resilin in Water by Multiphoton Absorption Polymerization. *Advanced Functional Materials*. *Accepted*. DOI: 10.1002/adfm.202210993.
2. Amitai, T., Kan-Tor, Y., Or, Y., Shoham, Z., Shofaro, Y., Richter, D., Har-Vardi, I., Ben-Meir, A., Srebnik, N., and Buxboim, A. Embryo classification beyond pregnancy: Early prediction of first trimester miscarriage using machine learning. *J Assist Reprod Genet*, doi:10.1007/s10815-022-02619-5 (2022).
3. Neumann-Staubitz, P., Kitsberg, D., Buxboim, A. and Neumann, H. A method to map the interaction network of the nuclear lamina with genetically encoded photo-crosslinkers in vivo. *Front Chem* 10, 905794, doi:10.3389/fchem.2022.905794 (2022).
4. Sun, X., Bavli, D., Kozulin, C., Motzik, A., Buxboim, A. & Ram, O. CloneSeq - Single-cell clonal 3D culture and analysis protocol. *STAR Protoc* 2, 100794, doi:10.1016/j.xpro.2021.100794 (2021).
5. Schachter-Safrai, N.,* Kan-Tor, Y.,* Karavani, G., Or, Y., Shufaro, Y., Har-Vardi, I., Buxboim, A.# & Ben-Meir, A.# Does quantity equal quality?-A morphokinetic assessment of embryos obtained from young women with decreased ovarian response to controlled ovarian stimulation. *J Assist Reprod Genet* 38, 1115-1122, doi:10.1007/s10815-021-02113-4 (2021).
6. Karavani, G.,* Kan-Tor, Y.,* Schachter-Safrai, N., Levitas, E., Or, Y., Ben-Meir, A., Buxboim, A.# & Har-Vardi, I.# Does sperm origin-Ejaculated or testicular-Affect embryo morphokinetic parameters? *Andrology-Us* 9, 632-639, doi:10.1111/andr.12952 (2021).
7. Farraj, Y.,* Buxboim, A.,* Cohen, J. E., Kan-Tor, Y., Glasner Hagege, S., Weiss, D., Goldman, V. & Beatus, T. Measuring pupil size and light response through closed eyelids. *Biomed Opt Express* 12, 6485-6495, doi:10.1364/BOE.435508 (2021).
8. Brielle, S., Bavli, D., Motzik, A., Kan-Tor, Y., Sun, X., Kozulin, C., Avni, B., Ram, O.# & Buxboim, A.# Delineating the heterogeneity of matrix-directed differentiation toward soft and stiff tissue lineages via single-cell profiling. *Proc Natl Acad Sci U S A* 118, doi:10.1073/pnas.2016322118 (2021).
9. Bavli, D.,* Sun, X.,* Kozulin, C.,* Ennis, D., Motzik, A., Biran, A., Brielle, S., Alajem, A., Meshorer, E., Buxboim, A.# & Ram, O.# CloneSeq: A highly sensitive analysis platform for the characterization of 3D-cultured single-cell-derived clones. *Dev Cell* 56, 1804-1817 e1807, doi:10.1016/j.devcel.2021.04.026 (2021).
10. Zuela-Sopilniak, N., Bar-Sela, D., Charar, C., Wintner, O., Gruenbaum, Y.# & Buxboim, A.# Measuring nucleus mechanics within a living multicellular organism: Physical decoupling and attenuated recovery rate are physiological protective mechanisms of the cell nucleus under high mechanical load. *Mol Biol Cell* 31, 1943-1950, doi:10.1091/mbc.E20-01-0085 (2020).

11. Wintner, O., Hirsch-Attas, N., Schlossberg, M., Brofman, F., Friedman, R., Kupervaser, M., Kitsberg, D. & Buxboim, A. A Unified Linear Viscoelastic Model of the Cell Nucleus Defines the Mechanical Contributions of Lamins and Chromatin. *Adv Sci (Weinh)* **7**, 1901222, doi:10.1002/advs.201901222 (2020).
12. Kan-Tor, Y., Zabari, N., Erlich, I., Szeskin, A., Amitai, T., Richter, D., Or, Y., Shoham, Z., Hurwitz, A., Har-Vardi, I., Gavish, M., Ben-Meir, A.# & Buxboim, A.# Automated Evaluation of Human Embryo Blastulation and Implantation Potential using Deep-Learning. *Adv Intell Syst-Ger* **2**, doi:ARTN 2000080 10.1002/aisy.202000080 (2020).
13. Kan-Tor, Y., Ben-Meir, A. & Buxboim, A. Can deep learning automatically predict fetal heart pregnancy with almost perfect accuracy? *Hum Reprod* **35**, 1473, doi:10.1093/humrep/deaa083 (2020).
14. Buxboim, A., Irianto, J., Swift, J., Athirasala, A., Shin, J. W., Rehfeldt, F. & Discher, D. E. Coordinated increase of nuclear tension and lamin-A with matrix stiffness outcompetes lamin-B receptor that favors soft tissue phenotypes. *Mol Biol Cell* **28**, 3333-3348, doi:10.1091/mbc.E17-06-0393 (2017).
15. Athirasala, A., Hirsch, N. & Buxboim, A. Nuclear mechanotransduction: sensing the force from within. *Curr Opin Cell Biol* **46**, 119-127, doi:10.1016/j.ceb.2017.04.004 (2017).
16. Drori, A., Kan-tor, Y., Nadorp, B., Goldstein, C., Buxboim, A., Nahmias, Y. & Levy, L. When Every Second Counts: Novel Device to Shorten Chest Tube Insertion Time in a Pre-hospital setting. *Pulmonary Therapy*. **2**, 2, 215–219 (2016).
17. Dingal, P. C., Bradshaw, A. M., Cho, S., Raab, M., Buxboim, A., Swift, J. & Discher, D. E. Fractal heterogeneity in minimal matrix models of scars modulates stiff-niche stem-cell responses via nuclear exit of a mechanorepressor. *Nat Mater* **14**, 951-960, doi:10.1038/nmat4350 (2015).
18. Shin, J. W., Buxboim, A., Spinler, K. R., Swift, J., Christian, D. A., Hunter, C. A., Leon, C., Gachet, C., Dingal, P. C., Ivanovska, I. L., Rehfeldt, F., Chasis, J. A. & Discher, D. E. Contractile forces sustain and polarize hematopoiesis from stem and progenitor cells. *Cell Stem Cell* **14**, 81-93, doi:10.1016/j.stem.2013.10.009 (2014).
19. Ivanovska, I., Swift, J., Irianto, J., Spinler, S., Shin, J. W., Buxboim, A., and Discher, D.E. Nuclear Imaging in Mechanobiology. *Handbook of Imaging in Biological Mechanics* **32**, 397-409 (2014).
20. Buxboim, A., Swift, J., Irianto, J., Spinler, K. R., Dingal, P. C., Athirasala, A., Kao, Y. R., Cho, S., Harada, T., Shin, J. W. & Discher, D. E. Matrix elasticity regulates lamin-A,C phosphorylation and turnover with feedback to actomyosin. *Curr Biol* **24**, 1909-1917, doi:10.1016/j.cub.2014.07.001 (2014).
21. Swift, J., Ivanovska, I. L., Buxboim, A., Harada, T., Dingal, P. C., Pinter, J., Pajeroski, J. D., Spinler, K. R., Shin, J. W., Tewari, M., Rehfeldt, F., Speicher, D. W. & Discher, D. E. Nuclear lamin-A scales with tissue stiffness and enhances matrix-directed differentiation. *Science* **341**, 1240104, doi:10.1126/science.1240104 (2013).
22. Swift, J., Harada, T., Buxboim, A., Shin, J. W., Tang, H. Y., Speicher, D. W. & Discher, D. E. Label-free mass spectrometry exploits dozens of detected peptides to quantify lamins in wildtype and knockdown cells. *Nucleus-Phila* **4**, 450-459, doi:10.4161/nucl.27413 (2013).
23. Shin, J. W., Swift, J., Ivanovska, I., Spinler, K. R., Buxboim, A. & Discher, D. E. Mechanobiology of bone marrow stem cells: from myosin-II forces to compliance of matrix and nucleus in cell forms and fates. *Differentiation* **86**, 77-86, doi:10.1016/j.diff.2013.05.001 (2013).

24. Heyman, Y., Buxboim, A., Wolf, S. G., Daube, S. S. & Bar-Ziv, R. H. Cell-free protein synthesis and assembly on a biochip. *Nat Nanotechnol* **7**, 374-378, doi:10.1038/nnano.2012.65 (2012).
25. Friedrich, B. M., Buxboim, A., Discher, D. E. & Safran, S. A. Striated acto-myosin fibers can reorganize and register in response to elastic interactions with the matrix. *Biophys J* **100**, 2706-2715, doi:10.1016/j.bpj.2011.04.050 (2011).
26. Buxboim A. and Discher, D.E. Mechanical Interactions between Cells and Tissues. *Polymer Science A Comprehensive Reference* 9, 201-9. Elsevier USA (2012).
27. Daube, S. S., Bracha, D., Buxboim, A. & Bar-Ziv, R. H. Compartmentalization by directional gene expression. *Proc Natl Acad Sci U S A* **107**, 2836-2841, doi:10.1073/pnas.0908919107 (2010).
28. Buxboim, A., Rajagopal, K., Brown, A. E. & Discher, D. E. How deeply cells feel: methods for thin gels. *J Phys Condens Matter* **22**, 194116, doi:10.1088/0953-8984/22/19/194116 (2010).
29. Buxboim, A., Ivanovska, I. L. & Discher, D. E. Matrix elasticity, cytoskeletal forces and physics of the nucleus: how deeply do cells 'feel' outside and in? *J Cell Sci* **123**, 297-308, doi:10.1242/jcs.041186 (2010).
30. Buxboim, A. & Discher, D. E. Stem cells feel the difference. *Nat Methods* **7**, 695-697, doi:10.1038/nmeth0910-695 (2010). News & Views.
31. Buxboim, A., Geron, E., Alon, R. & Bar-Ziv, R. A biochip model of lymphocyte locomotion on confined chemokine tracks. *Small* **5**, 1723-1726, doi:10.1002/smll.200900042 (2009).
32. Buxboim, A., Daube, S. S. & Bar-Ziv, R. Ultradense synthetic gene brushes on a chip. *Nano Lett* **9**, 909-913, doi:10.1021/nl8039124 (2009).
33. Buxboim, A., Daube, S. S. & Bar-Ziv, R. Synthetic gene brushes: a structure-function relationship. *Mol Syst Biol* **4**, 181, doi:10.1038/msb.2008.20 (2008).
34. Buxboim, A., Bar-Dagan, M., Frydman, V., Zbaida, D., Morpurgo, M. & Bar-Ziv, R. A single-step photolithographic interface for cell-free gene expression and active biochips. *Small* **3**, 500-510, doi:10.1002/smll.200600489 (2007).
35. Buxboim, A. & Schiller, A. Current characteristics of the single-electron transistor at the degeneracy point. *Phys Rev B* **67**, doi:ARTN 165320. 10.1103/PhysRevB.165320 (2003).

PREPRINTS

36. Zabari, N., Kan-Tor, Y., Or, Y., Shoham, Z., Shofaro, Y., Richter, D., Har-Vardi, I., Ben-Meir, A., Srebnik, N. and Buxboim, A. Delineating the heterogeneity of preimplantation development via unsupervised clustering of embryo candidates for transfer using automated, accurate and standardized morphokinetic annotation. *medRxiv* (2022). doi.org/10.1101/2022.03.29.22273137.
37. Kan-Tor, Y., Srebnik, N., Gavish, M., Shalit, U. and Buxboim, A. Evaluating the heterogeneous effect of extended incubation to blastocyst transfer on the implantation outcome via causal inference. *bioRxiv* (2021). doi.org/10.1101/2021.11.02.466894.

*Equal authorship.

#Equal correspondence.

PATENTS

1. Bar-Ziv, R., Morpurgo, M., **Buxboim, A.**, Bar-Dagan, M., Frydman, V., and Zbaida, D. EP1833987B1: Single-Step Platform for On-Chip Integration of Bio-Molecules. Filing date: 2005-12-15 Status: Expired. Publication date: 2007-11-22.
2. Nahmias, Y., Hasin, T., Goldstein, Y., and **Buxboim, A.** Jugular venous assessment. Filing date: 2016-06-21. US Granted Patent. US11,234,643 (USA). Status: Granted 2022-12-01.
3. Cohen, J., Goldman, V., Farraj, Y.N., **Buxboim, A.**, Mintz, Y., Fried, E., Gahl, L., Beatus, T., and Yoav, K.T. Device and method for determination of pupil size in a subject having closed eyelids. Filing date: 2017-06-15. US Granted patent: US11,122,972B2 (USA). Status: Granted 2021-09-21. JP2018564813A (Japan). Status: Pending. Publication date: 2019-07-04. EP3471595A4 (EU). Status: Pending. Licensed to Brainwatch (eHealth Ventures), 25 August 2020.
4. Eliaz, R., Demma, Y.A., Menshes, Z., Hazan, O., Abramov, E., Nahmias, Y., **Buxboim, A.**, Yoav, K.-T., Mintz, Y., and Fried, E. Device, system and method for pericardial access. Filing date: 12-16-2019. US20200163695A1 (USA). Status: Pending. Licensed to CardioVia (N.G.T incubator), 15 April, 2018.
5. Batash, T., Shafran-Tikva, S., Ehrlich, A., Nahmias, Y., **Buxboim, A.**, Blinder, Y., Mintz, Y., Fried, E., and Orbach, D. Filing date: 12-18-2020. US20210260311A1 (USA): Methods, devices, kits and systems for delivery of large volume of pressurized gas by inhalation. Status: Pending.
6. Paz, S.P., Kolodny, Y., Bar-Sela, D., Nahmias, Y., **Buxboim, A.**, Blinder, Y., Mintz, Y., Fried, E. Indwelling urinary catheters. Filing date: 2019-12-26. US20210244912A1 (USA): Status: Pending.