Curriculum Vitae

Shotaro Otsuka

Personal Information

Nationality :	Japan
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Research Experience

2019-	**Group Leader** *Max Perutz Labs, a joint venture of the University of Vienna and the Medical University of Vienna, Vienna Biocenter*
2017-2019	**Research scientist** *Laboratory of Dr. Jan Ellenberg, Cell Biology and Biophysics Unit, European Molecular Biology Laboratory (EMBL), Heidelberg, Germany*
2011-2017	**Postdoctoral fellow** (EMBL Interdisciplinary Postdoc programme, shared by two laboratories) *Main Lab.: Dr. Jan Ellenberg, Cell Biology and Biophysics Unit,* *Associated Lab.: Dr. Martin Beck, Structural and Computational Biology Unit, EMBL, Heidelberg, Germany*
2005-2011	**Bachelor, Master, and PhD student** *Laboratory of Prof. Kunio Takeyasu and Shigehiro Yoshimura, Graduate School of Biostudies, Kyoto University, Kyoto, Japan*

Academic Qualifications

Education

4/2006-3/2011	Kyoto University, Graduate School of Biostudies
4/2002-3/2006	Kyoto University, Faculty of Integrated Human Studies

Degrees

3/2011	Doctoral degree at Kyoto University (Life science)
3/2008	Master's degree at Kyoto University (Life science)
3/2006	Bachelor’s degree at Kyoto University (Natural Sciences)

Main areas of research and main scientific results

The lab investigates the molecular mechanisms of how cells control the intracellular communication, especially between the endoplasmic reticulum (ER) and the nucleus. The lab uses correlative live imaging with electron microscopy methodologies which enables visualizing cellular structures in situ at high temporal and spatial resolution, and combines it with quantitative live cell imaging and a microscopy-based loss-of-function screen.

In my postdoctoral research I established a novel correlative light and electron microscopy (CLEM) method and combined it with super-resolution microscopy. This “dynamic” nano-scale imaging approach allowed me to show for the first time that nuclear pores assemble via fundamentally different mechanisms in mitosis and interphase.

Funding

Research Grant

2023-2025 Austrian Research Fund (FWF) Project. “How do endoplasmic reticulum and nucleus communicate?” P36743-B.

2021-2025 Austrian Research Fund (FWF) Doctoral Program “Signaling Mechanisms in Cellular Homeostasis.”

2020-2024 Vienna Science and Technology Fund (WWTF). “Elucidating the mechanics of mitotic chromosome assembly by light-, electron-, and atomic force microscopy.” LS19-001.

Fellowships and Honors

Fellowships

4/2013-3/2016 Interdisciplinary Postdoctoral fellowship (EMBL and Marie Curie Actions COFUND)

4/2011-3/2013 Postdoctoral fellowship for research abroad (the Japan Society for the Promotion of Science (JSPS))

4/2008-3/2011 JSPS research fellowship for young scientists

Honors

6/2011 JSPS travel Grant for 61th Lindau Nobel Laureate Meeting

Fellowships obtained by lab members

2023-2025 Postdoctoral fellowship from EU H2020 - Vienna International PostDoc Program - (VIP2) to Pallavi Deolal

2021-2023 The Austrian Academy of Sciences (ÖAW) Ph.D. fellowship to Helena Bragulat Teixidor

2021 Max Perutz PhD fellowship to Helena Bragulat Teixidor

Mentoring and Teaching Experience

Lecturer

2023	Workshop: Advanced confocal laser scanning microscopy and live cell imaging
2023-	Lecture Series: Advanced Cell Biology
2023-	Lecture Series: Concepts in Molecular Biology
2020-	Lecture Series: Methods in Molecular Biology and Biochemistry
2019-	Lecture Series: Molecular Medicine II
2019	Lecture Series: Chromosome Biology I

Supervisor

2015-	3 PhD students, 5 Master students, 23 internship Master students, and 5 undergraduate students.

Course instructor

11/2016	EMBL Cell Biology and Biophysics Ph.D. Course
9/2015	EMBO practical course “Current Methods in Cell Biology”
10/2011	EMBL Cell Biology and Biophysics Ph.D. Course
9/2011	EMBO practical course “Current Methods in Cell Biology”

Professional Training

2022	EMBO workshop on Research Integrity, organized by European Molecular Biology Organization (EMBO)
2021	Leadership program "Thinking Your Way Into Leading a Research Group", organized by Dr. Iain Patten
2021	Leadership workshop "Empowering your team", organized by Vienna BioCenter Scientific Training
2019	PhD student supervision course, organized by Vienna BioCenter Scientific Training
2018	EMBO Lab Management Course, organized by European Molecular Biology Organization (EMBO)

Commissions of Trust

2020-2021	Vienna Biocenter PhD Awards committee
2019-	Thesis Advisory Committee of three PhD students at the Vienna Biocenter
2019-	PhD theses jury of two students (CNRS Montpellier and the Vienna Biocenter)

Peer Review Activities

Journals	Current Biology, EMBO Journal, Nature, Nature Communications, Nature Biotechnology, Journal of Cell Science
Grants	ERC Starting Grant, The French National Research Agency Grant

Conferences and Seminars

Invited lecturer at EMBL advanced course

4/2016 EMBL course, High-Accuracy Correlated Light and Electron Microscopy: Applications at Room Temperature and in Cryo, Heidelberg, Germany

Invited speaker at international conferences

10/2019 COST (European Cooperation in Science and Technology) Workshop on Nuclear Architecture, Lipids, and Phase Separation, Prague, Czech Republic.

9/2019 2nd Symposium on Recent Advances in Cryo-Electron Microscopy, Krakow, Poland.

5/2018 The 74th annual meeting for the Japanese Society of Microscopy, in an organized session entitled “Application of Correlative Light and Electron Microscopy”, Kurume, Japan.

Invited speaker at domestic conferences

6/2023 The 79th Annual Meeting of the Japanese Society of Microscopy, Shimane, Japan.

6/2023 The 75th Annual Meeting of the Japan Society for Cell Biology, Nara, Japan.

Selected speaker at international conferences

6/2019 Nucleocytoplasmic transport 2019, Scotland, UK

5/2019 XXVI Wilhelm Bernhard Workshop on Cell Nucleus, Dijon, France

4/2019 9th Austrian Society for Electron Microscopy Workshop, Graz, Austria

10/2017 EMBO Nuclear Structure and Dynamics meeting, L'Isle sur la Sorgue, France

9/2017 Nucleocytoplasmic transport 2017, Girona, Spain

10/2015 EMBO | EMBL Symposium: Seeing is Believing, Heidelberg, Germany

9/2015 The EMBO Meeting 2015, Birmingham, UK

12/2014 ASCB Annual Meeting 2014, Philadelphia, USA

Invited seminars

12/2022 An invited seminar at Kyoto-Vienna BioMath Workshop “Mathematical Methods for the Study of Self-organization in the Biological Sciences”, the Erwin Schrödinger International Institute for Mathematics and Physics of the University of Vienna, Vienna, Austria

10/2022 An invited seminar at Center for Anatomy and Cell Biology, Medical University of Vienna, Austria

5/2022 An invited seminar in a virtual Seminar Series on the Nuclear Pore and Nuclear Envelope, organized by Dr. Marry Dasso at NIH, USA

2016- Invited seminars in Japan (the Juntendo University School of Medicine, Fujii Memorial Institute of Medical Sciences, Tokushima University, RIKEN in Kobe, Kyoto University, National Institutes of Natural Sciences, RIKEN in Saitama, Osaka University, and National Institute of Information and Communications Technology).

Publications

Research articles

1) Forer A, **Otsuka S**. Structural evidence for elastic tethers connecting separating chromosomes in crane-fly spermatocytes. *Life Sci. Alliance*, 6(11):e202302303, (2023). DOI: 10.26508/lsa.202302303.
2) Bragulat-Teixidor H, Ishihara K, Szücs GM, **Otsuka S**. The junctions connecting the endoplasmic reticulum to the nuclear envelope are constricted and remodelled during the cell cycle. *bioRxiv*, (2023). DOI: 10.1101/2023.01.31.526419.
3) **Otsuka S***, Tempkin JOB, Zhang W, Politi AZ, Rybina A, Hossain MJ, Kueblbeck M, Callegari A, Koch B, Morero NR, Sali A, Ellenberg J*. “A quantitative map of nuclear pore assembly reveals two distinct mechanisms.” *Nature*, 613(7944):575-581, (2023). DOI: 10.1038/s41586-022-05528-w. *: Co-corresponding author.
4) Schneider MWG, Gibson BA*, **Otsuka S***, Spicer MFD, Petrovic M, Blaukopf C, Langer CCH, Batty P, Nagaraju T, Doolittle LK, Rosen MK, Gerlich DW. “A chromatin phase transition protects mitotic chromosomes against microtubule perforation.” *Nature*, 609(7925):183-190, (2022). DOI: 10.1038/s41586-022-05027-y. *Equal contribution.
5) Farrants H, Tarnawski M, Müller TG, **Otsuka S**, Hiblot J, Koch B, Kueblbeck M, Kräusslich HG, Ellenberg J, Johnsson K. “Chemogenetic Control of Nanobodies.” *Nat. Methods*, 17(3):279-282, (2020). DOI: 10.1038/s41592-020-0746-7.
6) **Otsuka S**, Steyer AM, Schorb M, Hériché JK, Hossain MJ, Sethi S, Kueblbeck M, Schwab Y, Beck M, Ellenberg J. “Postmitotic nuclear pore assembly proceeds by radial dilation of small membrane openings.” *Nat. Struct. Mol. Biol.*, 25(1):21-28, (2018). DOI: 10.1038/s41594-017-0001-9.
7) **Otsuka S**, Bui KH, Schorb M, Hossain MJ, Politi AZ, Koch B, Eltsov M, Beck M, Ellenberg J. “Nuclear pore assembly by an inside-out extrusion of the nuclear envelope.” *Elife*, 5:e19071, (2016). DOI: 10.7554/eLife.19071.
8) Lolodi O, Yamazaki H, **Otsuka S**, Kumeta M, Yoshimura SH. “Dissecting in vivo steady-state dynamics of karyopherin-dependent nuclear transport.” *Mol. Biol. Cell*, 27(1):167-76, (2016). DOI: 10.1091/mbc.E15-08-0601.
9) Yoshimura SH, **Otsuka S**, Kumeta M, Taga M, Takeyasu K. “Intermolecular disulfide bonds between nucleoporins regulate karyopherin-dependent nuclear transport.” *J. Cell. Sci.*, 126(Pt 14):3141-3150, (2013). DOI: 10.1242/jcs.124172.
10) Asally M, Yasuda Y, Oka M, **Otsuka S**, Yoshimura SH, Takeyasu K, Yoneda Y. “Nup358, a nucleoporin, functions as a key determinant of the nuclear pore complex structure remodeling during skeletal myogenesis.” *FEBS J.*, 278(4):610-621, (2011). DOI: 10.1111/j.1742-4658.2010.07982.x.
11) **Otsuka S**, Iwasaka S, Yoneda Y, Takeyasu K, Yoshimura SH. “Individual binding pockets of importin β for FG-nucleoporins have different binding properties and different sensitivities to RanGTP.” *Proc. Natl. Acad. Sci. USA*, 105(42): pp16101-16106, (2008). DOI: 10.1073/pnas.0802647105.

12) Yoshimura SH, Takahashi H, **Otsuka S**, Takeyasu K. “Development of glutathione-coupled cantilever for the single-molecule force measurement by scanning force microscopy.” *FEBS Lett.*, 580, pp3961-3965, (2006). DOI: 10.1016/j.febslet.2006.06.032.

Reviews

13) **Otsuka S***, Ellenberg J*. “Mechanisms of nuclear pore complex assembly – two different ways of building one molecular machine.” *FEBS Lett.*, 592(4):475-488, (2018). DOI: 10.1002/1873-3468.12905. *: Co-corresponding author. ‘A top 20 most read paper published in the journal between January 2017 and December 2018’.

14) Hirano Y, Takahashi H, Kumeta M, Hizume K, Hirai Y, **Otsuka S**, Yoshimura SH, Takeyasu K. “Nuclear architecture and chromatin dynamics revealed by atomic force microscopy in combination with biochemistry and cell biology.” *Pflugers Arch*, 456(1):139-53, (2008). DOI: 10.1007/s00424-007-0431-z.

Book chapters

15) Bragulat-Teixidor H, Hossain MJ, **Otsuka S**. “Visualizing Nuclear Pore Complex Assembly In Situ in Human Cells at Nanometer Resolution by Correlating Live Imaging with Electron Microscopy.” *Methods Mol. Biol.*, 2502:493-512, (2022). DOI: 10.1007/978-1-0716-2337-4_31.

16) **Otsuka S**, Szymborska A, Ellenberg J. “Imaging the assembly, structure, and function of the nuclear pore inside cells.” *Methods Cell Biol.*, 122:219-238, (2014). DOI: 10.1016/B978-0-12-417160-2.00010-2.

17) Yoshimura SH, Takahashi H, **Otsuka S**, Yokokawa M. “Atomic force microscopy as a single-molecule imaging and force measurement tool for the cell nucleus.” *Tanpakusitsu Kakusan Koso*, Kyoritsu Shuppan, Vol.51, pp1981-1988, (2006). PMID: 17471897.

Conference proceedings

18) **Otsuka S**, Hirano Y, Takahashi H, Kumeta M, Yoshimura SH. “Single-Molecule Imaging, Force Measurement and Fluorescence Observation Reveal Protein and Chromosome Dynamics around the Nuclear Envelope.” Proceedings of the 2007 International Symposium on Micro-NanoMechatronics and Human Science, IEEE, electric publication, (2007). DOI: 10.1109/MHS.2007.4420872.

19) **Otsuka S**, Takahashi H, Yoshimura SH. “Single-molecule Structural and Functional Analyses of Nuclear Pore Complex.” Proceedings of the 2006 International Symposium on Micro-NanoMechatronics and Human Science, IEEE, electric publication, (2006). DOI: 10.1109/MHS.2006.320314.