

Shotaro Otsuka

Personal Information

Nationality : Japan
Affiliation : Max F. Perutz Laboratories
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Research Experience

2019- **Junior Group Leader**
Max F. Perutz Laboratories, Medical University of Vienna

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)

Methods and Technologies

Post-doc

- **Super-resolution imaging** (Stimulated emission depletion (STED), Ground state depletion (GSD) microscopy) of nuclear pore assembly intermediates.
- Establishment of **correlative live imaging with electron microscopy** (CLEM) in human cells.
- **3D electron microscopy** (Electron tomography, Focused ion beam scanning electron microscope (FIB-SEM), Subtomogram averaging) of nuclear pore assembly intermediates.
- **Quantitative live cell imaging** (Human cultured cells, Multicolor 3D time-lapse imaging, Photoswitching) of nuclear pore assembly.

PhD

- Nano-scale imaging of nuclear pores using atomic force microscopy (AFM).
- Single-molecule force measurement between transport receptors and nuclear pores by AFM.
- Biophysical and kinetic analysis of nucleocytoplasmic transport (Live cell imaging, Formulating kinetic models, Measuring rate constants).
- Measurement of protein-protein dissociation constants, Recombinant protein purification by HPLC (E.coli and insect cells).

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
- 3/2010 Kyoto University travel grant for visiting distinguished laboratories abroad (the Max Planck Institute of Molecular Cell Biology and Genetics, and EMBL)
- 12/2007 Kyoto University travel grant for ASCB Annual Meeting 2007
- 12/2006 Kyoto University travel grant for ASCB Annual Meeting 2006

Publications

Peer-reviewed publications

Research articles

- 1) **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.
- 2) **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.
- 3) 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.
- 4) 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.
- 5) 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.
- 6) **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.
- 7) 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

- 8) **Otsuka S***, Ellenberg J*. "Mechanisms of assembling the nuclear pore complex: making the same machine in different ways." *FEBS Lett.*, (2018). DOI: 10.1002/1873-3468.12905. *: Corresponding author.
- 9) 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.

Non-peer-reviewed publications

Book chapters

- 10) **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.
- 11) 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

- 12) **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.
- 13) **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.