## BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
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| NAME | POSITION TITLE : Assistant Professor<br>Microscopy Core Facility Director<br>Dept of Molecular Pharmacology & Physiology<br>Univ of South Florida Morsani College of Medicine |
|---|---|
| Byeong Jake Cha | |
| eRA COMMONS USER NAME<br>Chabj | |

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

| INSTITUTION AND LOCATION | DEGREE *(if applicable)* | YEAR(s) | FIELD OF STUDY |
|---|---|---|---|
| Seoul National University, Seoul, Korea | BS | 1988 | Biology |
| Seoul National University, Seoul, Korea | M.Sc. | 1990 | Biology |
| University of Utah, Salt Lake City, Utah | Ph.D. | 1999 | Cell & Dev. Biology |
| University of Massachusetts Medical School, Worcester, MA | Postdoc | 1999-2005 | Cell & Dev. Biology |

### A. Personal Statement

The main research focus in our laboratory is on the mechanism of cell polarization that is fundamental for cell differentiation and function. We have utilized high-resolution microscopic techniques to dissect the mechanisms and dynamics underlying these cell biological phenomena. For these purposes, we have developed and performed several fluorescence-based imaging assays using laser scanning/spinning disk confocal microscopy and digital deconvolution for high-resolution analysis of the localization or organization of mRNA, RNA-binding proteins, and cytoskeletal components in both live cells and fixed specimens. These assays have been widely applied to dissect subcellular processes in cells that are under the condition of drug treatment and/or genetic mutations. Currently, as an advanced microscopy and cell imaging core laboratory, we utilize our expertise to provide support for experimental design and analyses using state-of-the-art microscopy systems. We also collaborate with researchers and scientists to expand imaging capability and to develop new imaging assays. Our laboratory also presents workshops and seminars to educate and train students and researchers on new imaging techniques and its applications to their researches as well as on imaging analyses of biological phenomena.

### B. Positions and Honors.

**Professional Experience**

1988-1990 Instructor, Developmental Biology Laboratory Course, Seoul National University, Seoul, Korea
1988-1990 Teaching Assistant, Marine Biology, Seoul National University, Seoul, Korea
1991-1992 Research Associate, Seoul National University, Seoul, Korea and Indiana University, Bloomington, IN.
1992-1999 Teaching Assistant, Developmental Biology Laboratory, Cell and Developmental Biology and Genetics, University of Utah, Salt Lake City, UT
2005–2009 Assistant Professor, Department of Cell and Developmental Biology, Vanderbilt University, Nashville, TN
2009-2014 Assistant Professor (Courtesy appointment), Department of Pathology & Cell Biology, University of South Florida, Tampa, FL
2014~present Assistant Professor, Department of Molecular Pharmacology & Physiology, University of South Florida, Tampa, FL

**Honors**

1988 Honors Graduate, Department of Biology, Seoul National University
1999 Riser Award for Outstanding Graduate Research from Department of Biology, University of Utah
2002-2004 Postdoctoral Research Fellowship, Harold Whitworth Pierce Charitable Trust of the Medical Foundation.

## C. Contribution to science

- **In vivo imaging of mRNA localization**. mRNA localization and local proteins synthesis is essential mechanism for cell polarity and function during cell differentiation and development. The mechanism underlying asymmetric mRNA localization has been a key question in cell biology. I have developed an in vivo live cell imaging assay using Drosophila oocytes to investigate the mechanism and found a novel microtubule cytoskeleton based mechanism for asymmetric localization of several mRNAs.

  Bratu, D.P., **Cha, B.J.**, Mhlanga, M.M., Kramer, F.R., and Tyagi, S. (2003). Visualizing the distribution and transport of mRNAs in living cells. *Proc. Natl. Acad. Sci. USA* 100, 13308-13313. PMCID: PMC263795. http://www.pnas.org/cgi/pmidlookup?view=long&pmid=14583593

  Arn, E. A., **Cha, B. J**., Theurkauf, W. E., and Macdonald, P. M. (2003). Recognition of a *bicoid* mRNA localization signal by a protein complex containing Swallow, Nod, and RNA binding proteins. *Developmental Cell* 4, 41-51. PMID: 12530962. http://www.sciencedirect.com/science/article/pii/S1534580702003970

  **Cha, B. J**., Serbus, L. R., Koppetsch, B. S., and Theurkauf, W. E. (2002). Kinesin I-dependent cortical exclusion restricts pole plasm to the oocyte posterior. *Nature Cell Biology* 4, 592-598. PMID: 12134163. http://www.nature.com/ncb/journal/v4/n8/full/ncb832.html

  **Cha, B.J**. Koppetsch, B.S., and Theurkauf, W.E. (2001). In vivo analysis of *Drosophila bicoid* mRNA localization reveals a novel microtubule-dependent axis specification pathway. *Cell* 106, 35-46. PMID: 11461700. http://www.sciencedirect.com/science/article/pii/S0092867401004196

- **Regulation of microtubule assembly and organization by a microtubule-associated protein**. Proper assembly and organization of microtubule (MT) cytoskeleton is essential for normal distribution of intracellular organelles and materials in developing oocytes and differentiating cells such as neuron. Microtubule-associated proteins (MAPs) play an important role in this process. I have investigated the role of a *Xenopus* MAP called XMAP250 in the organization of the developing oocytes and embryos using microinjection of purified antibodies, in vitro MT assembly assays, and laser scanning confocal microscopy. My research revealed the essential function of XMAP250 in stabilization of polarized oocyte MTs and spindle morphology and stability in early *Xenopus* embryos.

  **Cha, B.J**., Cassimeris, L., and Gard, D.L. (1999). XMAP230 is required for normal spindle assembly in vivo and in vitro. *J. Cell Science* 112, 4337-4346. PMID: 10564651. http://jcs.biologists.org/content/112/23/4337.long

  **Cha, B.J**., and Gard, D.L. (1999). XMAP230 is required for the assembly and organization of cortical microtubules in fertilized *Xenopus* eggs. *Developmental Biology* 205, 275-286. PMID: 9917363. http://www.sciencedirect.com/science/article/pii/S0012160698991230

  **Cha, B.J**., Error, B., and Gard, D.L. (1998). XMAP230 is required for the assembly and organization of acetylated microtubules in *Xenopus* oocytes and eggs. *J. Cell Science* 111, 2315-2327. PMID: 9683627. http://jcs.biologists.org/content/111/16/2315.long

  Gard, D.L., **Cha, B.J**., and King, E. (1997). The organization and animal-vegetal asymmetry of cytokeratin filaments in stage VI *Xenopus* oocytes is dependent upon F-actin and microtubules. *Developmental Biology* 184, 95-114. PMID: 9142987. http://www.sciencedirect.com/science/article/pii/S0012160697985080

- **Confocal Imaging Analysis**. As a director of microscopy core facility, I have been actively involved in several research projects by providing expertise in experimental design, image acquisition, and data analyses. These research projects include characterization of type XII collagen in osteoblast polarity formation, imaging of RSV virus infection, multispectral imaging of endothelial cells, meiotic and mitotic cell

cycle imaging in *Drosophila*, and live imaging and 4D analysis of neutrophils in Zebrafish embryos in response to *Bartonella* infection.

Lima, A., **Cha, B.J**., Amin J., Smith, L.K., and Anderson, B. (2014). Zebrafish embryo model of *Bartonella henselae* infection. *Zebrafish, 11, 434-446.* PMID: 25026365 (PubMed – in process). http://online.liebertpub.com/doi/abs/10.1089/zeb.2014.1001

Beard Jr, R.S., Haines, R.J., Wu, K.Y., Reynolds, J.J., Davis, S.M., Elliott, J.E., Malinin, N.L., Chatterjee, V., **Cha, B.J**., Wu, M.H., and Yuan, S.Y. (2014). Non-muscle myosin light chain kinase is required for β-catenin/Foxo1-dependent downregulation of claudin-5 in interleukin-1β-mediated brain endothelial cell barrier dysfunction. *J. Cell Science, 127, 1840-53.* PMID: 24522189 [PubMed – in process] http://jcs.biologists.org/content/127/8/1840.long

San-Juan-Vergara, H. Sampayo-Escobar, V., Reyes, N., **Cha, B.J**., Pacheco-Lugo, L., Peeples, M.E., Collins, P.L., Wong, T., Mohapatra, S.S. (2011). Cholesterol-rich Microdomains as Docking Platforms for Respiratory Syncytial Virus in Normal Human Bronchial Epithelial Cells. *J. Virology*, 86, 1832-1843. PMCID: PMC3264380. http://jvi.asm.org/cgi/pmidlookup?view=long&pmid=22090136

Izu, Y., Sun, M., Zwolanek, D., Veit, G., Williams, V., **Cha, B.J**., Jepsen, K.J., Koch, M., and Birk, D.E. (2011). Type XII collagen regulates osteoblast polarity and communication during bone formation*. J. Cell Biology*, 193, 1115-1130. PMCID: PMC3115787. http://jcb.rupress.org/content/193/6/1115.short

Takada, S. and **Cha, B.J**. (2011). *In Vivo* Live-Analysis of Cell Cycle Checkpoints in *Drosophila* Early Embryos. *Methods in Molecular Biology, Volume 782, "Cell Cycle Checkpoints"* Editor: Willis Li, Humana Press. Pp 75-92. PMID: 21870286. http://link.springer.com/protocol/10.1007%2F978-1-61779-273-1_7

Smith, C. J., Watson, J. D., Spencer, W. C., O'Brien, T., **Cha, B.J**., Albeg, A., Treinin, M., and Miller, D. M., III. (2010). Time-lapse imaging and cell-specific expression profiling reveal dynamic branching and molecular determinants of a multi-dendritic nociceptor in *C. elegans*. *Developmental Biology* 345, 18-33. PMCID: PMC2919608. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC2919608/

Jessica R. Von Stetina, Susanne Tranguch, Sudhansu K. Dey, Laura A. Lee, **Byeong J. Cha**, and Daniela Drummond-Barbosa. (2008). α-Endosulfine is a conserved protein required for oocyte meiotic maturation in *Drosophila*. *Development* 135, 3697-3706. PMCID: PMC2654389. http://dev.biologists.org/content/135/22/3697.long