Yongmin Cho, Ph.D.

Postdoctoral Fellow, Department of Systems Biology
Harvard Medical School

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EDUCATION

2012 – 2017 **Georgia Institute of Technology**, Atlanta, GA, USA
Ph.D. in School of Chemical & Biomolecular Engineering (Advisor: Dr. Hang Lu)

2005 – 2012 **Seoul National University**, Seoul, South Korea
B.S. in Department of Chemical and Biological Engineering (cum laude)
Discontinued Attendance: 2-year mandatory military service in South Korea (2007 – 2009)

POSITIONS AND EMPLOYMENT

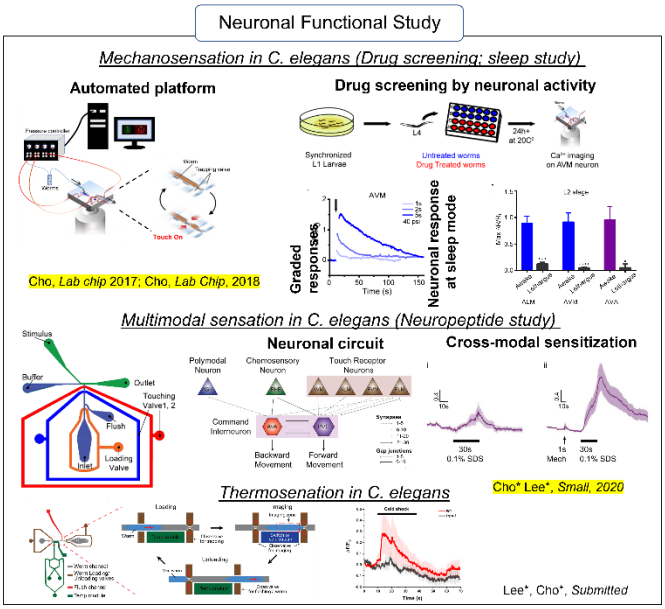
2018 – Present **Postdoctoral Fellow**, Department of Systems Biology
Harvard Medical School (Advisor: Dr. Marc W. Kirschner)

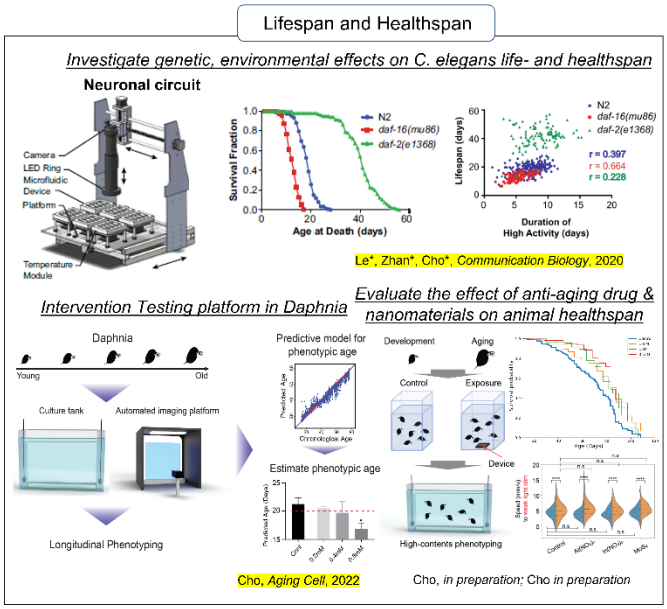
2017 – 2018 **Postdoctoral Fellow**, School of Chemical and Biomolecular Engineering
Georgia Institute of Technology (Advisor: Dr. Hang Lu)

2011 – 2012 **Trader**, GS Caltex (Petroleum refining company), South Korea

RESEARCH SUMMARY

High-throughput platforms for quantitative measurements of various biological events using microfluidics, automation, image process and machine learning





TEACHING EXPERIENCE

June 2016 **Instructor,** *Microfluidic workshop***,** Georgia Institute of Technology, Atlanta, Georgia
Designed and leaded several sessions to

2015 Summer **Teaching assistant,** *Transport Phenomena I*, Georgia Institute of Technology, Atlanta, Georgia.

2014 Spring **Teaching assistant,** *Biodesign Lab*, Georgia Institute of Technology, Atlanta, Georgia

2013 Fall **Teaching assistant**, *Transport Phenomena II*, Georgia Institute of Technology, Atlanta, Georgia

2011 Fall **Undergraduate Teaching assistant**, *Engineering Mathematics*, Seoul National University, South Korea

2009 Fall **Undergraduate Teaching assistant**, *Chemistry* and *Calculus*, Seoul National University, South Korea

RESEARCH EXPERIENCE

2018 – Present **Postdoctoral fellow** with Dr. **Marc W. Kirschner** – Harvard Medical School, Boston, MA

- *Develop novel technologies (an image-based single-cell sorter for single-cell transcriptomics and an electrophoresis-based rapid multiplexed immunostaining platform) for the characterization of senescent cells in vivo*
- *Develop new automated phenotyping platform and analysis pipeline using video tracking and machine learning to discover anti-aging drugs with Daphnia magna (called "water flea")*
- *Study the mechanisms of aging processes from phenotype to genotype with Daphnia magna using Systems Biology approach (single-cell RNA-seq, proteomics, behavior phenotyping, and deep learning)*

2017 – 2018 **Postdoctoral fellow** with Dr. **Hang Lu** – Georgia Institute of Technology, Atlanta, GA

- *Develop and apply microfluidic sensory-stimulation platforms to understanding multimodal sensory integration in C. elegans nervous system from a single neuron to whole-brain level*

2012 – 2017 **Ph.D. Research** with Dr. **Hang Lu** – Georgia Institute of Technology, Atlanta, GA

- *Develop new platform for high-throughput controlled mechanical stimulation and functional neuroimaging in C. elegans from larvae to adults worms*
- *Develop an automated high-throughput microfluidic platform and an analysis tool for the assessment of health and longevity of C. elegans*

2011 – 2012 **Research Assistant** with Dr. **Byung-Soo Kim –** Seoul National University, Seoul, South Korea

- *Conduct research comparing heparin-conjugated fibrin and a collagen sponge as a BMP-2 delivery system for bone regeneration*
- *Conduct research on spatio-temporally concerting gold nanoparticle conjugates for synergistic cancer therapy*

June 2010 **Field Applications of Engineering Knowledge Program** – LG Chemical Research Park, Daejeon, Korea

- *Conduct a project on Pressure Sensitive Adhesives (PSA)*

2010 Spring **Undergraduate Researcher** with Dr. Kookheon Char – Seoul National University, Seoul, South Korea

- *Synthesize CdSe quantum dots and designed a new hetero-junction structure concept by cross-linking methods through a liquid colloidal method*

INDUSTRY EXPERIENCE

2011 – 2012 **Trader** – GS Caltex, Seoul, South Korea

- *Analyze and monitor Asia Petrochemical product markets (BTX products – Benzene, Toluene, Xylene)*

June 2010 **Field Applications of Engineering Knowledge Program** – LG Chemical Research Park, Daejeon, Korea

- *Conduct a project on Pressure Sensitive Adhesives (PSA)*

AWARDS/FELLOWSHIPS

2015 **CBMS Student/Young Researcher Grant,** MicroTAS International Conference

2011 **Best Student Research Paper Awards,** Seoul National University

2005 – 2011 **National Scholarship For Science and Engineering,** Korea Student Aid Foundation

Covered the entire 4-year university tuitions

TECHNICAL SKILLS

- Computational skills: MATLAB, Python, and R for image processing, data mining, and machine (deep) learning
- Microsystem: Design and fabrication of microfluidic platform, Cleanroom fabrication techniques
- Imaging: Fluorescence-based functional imaging under epi, spinning disk confocal, and light-sheet microscopy
- Cell & molecular biology: cell culture, PCR, Western Blot, Histology analysis, ELISA, Biomaterial synthesis
- Animal experiments: Neuronal functional imaging in the nematode (*C. elegans*), Behavior and drug screening in water flea (*Daphnia*), Created mouse disease models (breast cancer, calvarial defects, ischemic hindlimb mouse models)

PUBLICATIONS

1. S. A. Lee*, **Y. Cho***, H. J. Lee, and H. Lu, "Automated microfluidic device for the study of multimodal sensory integration in C. elegans", *Submitted*

2. S. A. Lee*, Y. Cho*, and H. Lu, "High-Throughput Microfluidic Platform for the Study of Thermosensation in Caenorhabditis elegans", Submitted

3. A. V. Shindyapina, **Y. Cho**, A. Kaya, A. Tyshkovskiy, J. P. Castro, J. Gordevicius, J. R. Poganik, S. Horvath, L. Peshkin, V. N. Gladyshev, "Rapamycin treatment during development extends lifespan and healthspan". BioRxiv, DOI: 10.1101/2022.02.18.481092 (*Under review in Advanced Science*)

4. C. E. Anderson, M. C. Malek, R. A. Jonas-Closs, **Y. Cho**, L. Peshkin, M. W. Kirschner, and L. Y. Yampolsky, "Inverse Lansing effect: maternal age and provisioning affecting daughters' longevity and male offspring production". (*Under revision in American Naturalist*)

5. **Y. Cho**, R. A. Jonas-Closs, Lev. Y. Yampolsky, M. W. Kirschner, and L. Peshkin, "Intelligent high-throughput intervention testing platform in Daphnia", *Aging Cell*, 2022, DOI: 10.1111/acel.13571

6. C. E. Anderson, M. N. Ekwudo, R. A. Jonas-Closs, **Y. Cho**, L. M. Peshkin, M. W. Kirschner, and L. Y. Yampolsky, "Lack of Age-related Respiratory Changes in Daphnia", *Biogerontology*, 2022, DOI: 10.1007/s10522-021-09947-6

7. D. W. Choi, Y. J. Roh, S. Kim, H. M. Lee, M. Kim, D. Shin, J. H. Park, **Y. Cho**, H. H. Park, Y. S. Ok, D. Kang, J. H. Kim, L. Tarrago, N. N. Danial, V. N. Gladyshev, P. K. Min, B. C. Lee, "Development of a novel fluorescent biosensor for dynamic monitoring of metabolic methionine redox status in cells and tissues", *Biosensors and Bioelectronics*, 2021, DOI: 10.1016/j.bios.2021.113031

8. K. N. Le*, M. Zhan*, **Y. Cho***, J. Wan, D. S. Patel, and H. Lu, "An automated platform to monitor long-term behavior and healthspan in *Caenorhabditis elegans* under precise environmental control", *Communications Biology*, 2020, DOI: 10.1038/s42003-020-1013-2

9. **Y. Cho***, S. A. Lee*, Y. L. Chew, K. Broderick, W. R. Schafer, and H. Lu, "Multimodal Stimulation in a Microfluidic Device Facilitates Studies of Interneurons in Sensory Integration in *C. elegans*", *Small*, 2020, DOI: 10.1002/smll.201905852 *(This paper was selected as a cover article)*

10. Y. L. Chew, Y. Tanizawa, **Y. Cho**, B. Zhao, A. J. Yu, S. Ahn, C. Rankin, Y. J. You, H. Lu, I. Beets, and W. R. Schafer, "An Afferent Neuropeptide System Transmits Mechanosensory Signals Triggering Sensitization and Arousal in *C. elegans*", *Neuron*, 2018, 99 (6), 1233-1246. e6, DOI: 10.1016/j.neuron.2018.08.003

11. **Y. Cho**, D. N. Oakland, S. A. Lee, W. R. Schafer, and H. Lu, "On-chip functional neuroimaging to mechanical stimulation in *Caenorhabditis elegans* larvae for studying functional role of neural circuits" *Lab on a chip*, 2018, 18, 601-609, DOI: 10.1039/C7LC01201B

12. T. Rouse, G. Aubry, **Y. Cho**, M. Zimmer and H. Lu, "A programmable platform for sub-second multichemical dynamic stimulation and neuronal functional imaging in *C. elegans*" *Lab on a chip*, 2018, 18, 505-513, DOI: 10.1039/C7LC01116D

13. **Y. Cho***, D. A. Porto*, H. Hwang, L. J. Grundy, W. R. Schafer, and H. Lu, "Automated and controlled mechanical stimulation and functional imaging in vivo in *C. elegans*", *Lab on a chip*, 2017, 17, 2609-2618, DOI: 10.1039/C7LC00465F

14. **Y. Cho**, C. Zhao, and H. Lu. "Trends in High-throughput and Functional Neuroimaging in *C. elegans*", *WIREs Systems Biology and Medicine*, 2017, e01376, DOI: 10.1002/wsbm.1376

15. D. A. F. de Abreu, A. Caballero, P. Fardel, N. Stroustrup, Z. Chen, K. Lee, W. D. Keyes, Z. M. Nash, I. F. Lo´ pez-Moyado, F. Vaggi, A. Cornils, M. Regenass, A. Neagu, I. Ostojic, C. Liu, **Y. Cho**, D. Sifoglu, Y. Shen, W. Fontana, H. Lu, A. Csikasz-Nagy, C. T. Murphy, A. Antebi, E. Blanc, J. Apfeld, Y. Zhang, J. Alcedo, Q. Ch'ng, "An Insulin-to-Insulin Regulatory Network Orchestrates Phenotypic Specificity in Development and Physiology", *PLOS Genetics*, 2014, 10(3), e1004225, DOI: 10.1371/journal.pgen.1004225

16. J. Nam, W. La, S. Hwang, Y. S. Ha, N. Park, N. Won, S. Jung, S. H. Bhang, Y. Ma, **Y. Cho**, M. Jin, J. Han, J. Shin, E. KyungWang, S. G. Kim, S. Cho, J. Yoo, B. Kim, S. Kim, "pH-Responsive Assembly of Gold Nanoparticles and "Spatiotemporally Concerted" Drug Release for Synergistic Cancer Therapy", *ACS Nano*, 2013, 7 (4), 3388–3402, DOI: 10.1021/nn400223a

17. H. S. Yang*, W. La*, **Y. Cho**, W. Shin, G. Yeo, B. Kim, "Comparison between heparin-conjugated fibrin and collagen sponge as bone morphogenetic protein-2 carrier for bone regeneration", *Experimental and Molecular Medicine*, 2012, 44, 350-355, DOI: 10.3858/emm.2012.44.5.039

*equally contribute

PRESENTATIONS

"An engineering approach to Systems biology - microfluidics, automation, and machine learning", Seminar for Energy and Environmental Process, Oral presentation, Sogang University, South Korea, December 2020, (Online seminar).

"Microfluidic-based imaging platforms for mechanosensation in *C. elegans* larvae", 21st International Conference on Miniaturized Systems for Chemistry and Life Sciences, Oral presentation, Savannah, GA, Oct. 2017.

"Microfluidic devices for high-throughput *in vivo* imaging of neuronal responses to mechanical stimulation in *C. elegans* from larvae to adults", Gordon Research Conference, Physics and Chemistry of Microfluidics, Poster presentation, Barga, Italy, June 2017.

"Microfluidics for neuronal functional imaging of multi-modal stimulation.", *C. elegans* Neuro meeting, Oral presentation, Nagoya, Japan, 2016

"Microfluidic Systems for High-Throughput Functional Imaging of Mechanosensing Neurons in *Caenorhabitis Elegans*.", Neuro Student Seminar, Oral presentation, Georgia Tech, Atlanta, 2016

"Microfluidic Systems for High-Throughput Functional Imaging of Mechanosensing Neurons in *Caenorhabitis Elegans*.", Worm Club, Oral presentation, Emory University, Atlanta, 2016

"Microfluidic Systems for High-Throughput Functional Imaging of Mechanosensing Neurons in *Caenorhabitis Elegans*.", AIChE annual meeting, Oral presentation, Salt Lake City, 2015.

"Automatic long-term individual tracking microfluidic platform for healthspan and longevity in *Caenorhabditis elegans.",* AIChE annual meeting, Oral presentation, Salt Lake City, 2015.

"Can you use a microfluidic system for long-term observation of behavior?", Oral presentation, International *C. elegans* meeting, Los Angeles, 2015

"Microfluidic Systems for High-Throughput Functional Imaging of Mechanosensing Neurons in *Caenorhabitis Elegans*." Oral presentation. MicroTAS, South Korea, 2015

"Automatic long-term microfluidic platform for individual tracking of healthspan and longevity of *Caenorhabditis elegans*." Poster presentation, MicroTAS, South Korea, 2015

"Automated Microfluidic Platforms for Individually Cultured Nematodes and Neuronal Activity Measurement." Oral presentation, AIChEAnuualMeeting, Atlanta, 2014