

Geun-Woo D. Kim

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Education

- 2021 – Present **Ph.D. Candidate**, Nano-Bio-Information Technology Convergence, KU-KIST Graduate School of Converging Science and Technology, **Korea University** (*Advisor: Prof. Sung Wook Chi*)
- 2021 **M.S.**, Department of Life Sciences, **Korea University** (completed in 3 semesters; *Advisor: Prof. Sung Wook Chi*)
- 2020 **B.S.**, Division of Life Sciences, College of Life Sciences and Biotechnology, **Korea University**
Undergraduate Researcher in the laboratory of Prof. Sung Wook Chi (Jan 2018 – Feb 2020) and Prof. Bong-June Yoon (Dec 2015 – Feb 2016)

Publications

>First-Author Publications

Kim GW. D.*, Choi D.*, Kim S.-Y.*, Jeong H., Kang G., Eom S. J., Eom S., Lee H.-S., Yang I., Sung J. K., Nam K. T., Park Y. N., Chi S. W.#, and Koo S.-H.# Dysregulated m6A deposition via compensatory arginine methylation primes premalignancy in metabolic dysfunction-associated steatotic liver disease. *Science Advances* (2026). [in press]

Gu D.*, **Kim GW. D.***, Park M., Park A. D., Lee H.-S., Eom S., Weon H., Park J., Lee J., Ahn S. H., Oh H., Kim J., Kim S. H., Seong N., Hur J. K., Jang E.-S., and Chi S. W. Abasic CRISPR RNAs inherently harness fidelity of SpCas9 for genome editing. *Nature Chemical Biology* (2026). [<https://doi.org/10.1038/s41589-026-02139-8>]

Kim GW. D., Gu D., Park M. and Chi S. W. abCRISPR: deep learning-based design of abasic gRNA sequences for specific CRISPR-Cas genome editing. *Bioinformatics* (2026). [<https://doi.org/10.1093/bioinformatics/btag568>]

>Co-Authored Publications

Kim M. J., Noh J. H., Lee H. Y., Lee B., Park A. D., Oh H., **Kim GW. D.**, Lee H., Oh Y., Hwang H., Kim C., Lee H., Li X., Oh M. M., Lim D., Abraham S. N., Cho Y., Chi S. W., and Choi H. W. Excessive epithelial mechanosensation drives nociceptive innervation and chronic bladder pain via the PIEZO1-SLC7A11-glutamate axis. *Cell* (2026). [<https://doi.org/10.1016/j.cell.2026.05.049>]

Eom S. *, Peak J. *, Park J. *, Ahn S. H. *, Cho Y. K., Jeong Y., Lee H.-S., Lee J., Ignatova E., Lee S. E., Hong Y., Gu D., **Kim GW. D.**, Lee D. C., Hahm J. Y., Jeong J., Choi D., Jang E.-S. and Chi S. W. Widespread 8-oxoguanine modifications of miRNA seeds differentially regulate redox-dependent cancer development. *Nature Cell Biology* 25, 1369–1383 (2023). [<https://doi.org/10.1038/s41556-023-01209-6>]

Seok H., Lee H., Lee S., Ahn S. H., Lee H.-S., **Kim GW. D.**, Peak J., Park J., Cho Y. K., Jeong Y., Gu D., Jeong Y., Eom S., Jang E.-S., and Chi S. W. Position-specific oxidation of miR-1 encodes cardiac hypertrophy. *Nature* 584, 279–285 (2020). [<https://doi.org/10.1038/s41586-020-2586-0>]

* These authors contributed equally as co-first authors.

These authors contributed equally as co-corresponding authors.

Research Resources

abCRISPR : deep learning-based design resource for abasic gRNAs, providing genome-wide off-target predictions across the human genome. Web server: <http://clip.korea.ac.kr/abCRISPR/>

Honors & Awards

Gold Prize, The 32nd Samsung HumanTech Paper Awards (Bio Engineering & Life Science, 1st Place), Samsung Advanced Institute of Technology (SAIT), 2026.

Basic Science Research Program (Fellowship for Ph.D. Program), National Research Foundation (NRF) of Korea 2022-2024.

JW Lee Jong-Ho Foundation Scholarship for Basic Scientists, JW Foundation, 2023-2025.

Best Paper Award, KU-KIST Graduate School of Converging Science and Technology, 2025.

Graduate Students Fellowship, KU-KIST Graduate School of Converging Science and Technology, 2021-2023.

Outstanding Graduate Students Fellowship, Korea University, 2021-2022.

Brain Korea 21 Scholarship, The Ministry of Education (MOE) of Korea and National Research Foundation (NRF) of Korea, 2020-2021.

Special Scholarship (merit-based), Korea University, 2018-2019.

Academic Excellence Award, Korea University, 2018-2019.

Dream-challenger Scholarship (Creative contest scholarship), Korea Student Aid Foundation, 2014.

Oral Presentations

Geun-Woo D. Kim. Deep-learning based design of abasic gRNAs for specific CRISPR-Cas9 genome editing. *BIOINFO 2025: Annual Conference of the Korean Society for Bioinformatics* (2025).

Poster Presentations

Geun-Woo D. Kim*, Dowoon Gu*, Alexander Doh Park, Mingyo Park, Hye-Sook Lee, Haban Weon, Jongyeun Park, and Sung Wook Chi. Deep Learning-Based Design of Bio-Inspired Abasic gRNAs for Specific CRISPR-Cas9 Genome Editing. *KEYSTONE SYMPOSIA 2026: Precision Genome Engineering: From Basic Mechanisms to Application* (2026).

Haban Weon*, **Geun-Woo D. Kim***, Hye-Sook Lee, and Sung Wook Chi. Hypoxic preconditioning-induced cardiac miRNA protects against asphyxia. *KSMCB 2025: International Conference of the Korean Society for Molecular and Cellular Biology* (2025).

- Awarded Best Poster Presentation

Geun-Woo D. Kim*, Dowoon Gu*, Alexander Doh Park, Hye-Sook Lee, Haban Weon, Jongyeun Park, Jung Lee, Junho K. Hur, and Sung Wook Chi. Abasic CRISPR RNAs inherently harness fidelity of SpCas9 for genome editing. *BIOINFO 2024: Annual Conference of the Korean Society for Bioinformatics* (2024).

- Awarded Excellent Poster Presentation

Dong Chan Lee, Hye-Sook Lee, **Geun-Woo D. Kim**, Seung Hyun Ahn and Sung Wook Chi. Widespread expression of tRNA-derived small RNAs regulate gene silencing in cancer. The 31st International KOGO Annual Conference (2022).

Heeyoung Seok, Haejeong Lee, Sohyun Lee, Seung Hyun Ahn, Hye-Sook Lee, **Geun-Woo D. Kim**, Jongjin Peak, Jongyeun Park, You Kyung Cho, Yeojin Jeong, Dowoon Gu, Yeahji Jeong, Sangkyeong Eom, Eun-Sook Jang, Sung Wook Chi. Redox-mediated redirection of miRNA target recognition in cardiac hypertrophy. *Korea Society for Molecular and Cellular Biology Winter Conference* (2020).

Kim GW. D., Park S, Chi SW. Function of miRNA-induced cardiac remodeling for asphyxial death. *Undergraduate poster session 2019-fall (Division of Life Sciences, Korea University)*

Kim GW. D., Park S, Chi SW. Function of miRNA-induced cardiac remodeling for asphyxial death. *Undergraduate poster session 2019-spring (Division of Life Sciences, Korea University)*

Lee S, Seok HY, Ahn SH, Lee H, Jeong Y, **Kim GW,** Chi SW. Ectopic induction of noncanonical target repression of miR-1 in mouse heart develops cardiac hypertrophy. *RNA biology, Cold Spring Harbor Asia Conference* (2018).

* These authors contributed equally as co-first authors.

Research Skills

Molecular Biology

Advanced RNA biology techniques, including comprehensive RNA sequencing workflows (RNA-seq, small RNA-seq, targeted sequencing, and scRNA-seq wet-lab workflows), and independent establishment and optimization of RIP-seq or CLIP-seq protocols, with hands-on experience in profiling diverse RNA modifications (o⁸G, abasic sites, m⁶A, inosine) and RNA-binding proteins.

Computational Biology

Integrated analysis of in-house-generated sequencing datasets (small RNA-seq, RNA-seq, RIP-seq, CLIP-seq, scRNA-seq) using Python and R, development of automated image analysis pipelines for biological experiments, and development of task-specific deep learning models trained on these datasets (AUC 0.98 versus 0.45–0.68 for existing predictors evaluated on the same benchmark).

Experimental Design from Molecular to Organismal Levels, for Machine-Learnable Data

Design and establishment of cell-level and organism-level experimental models in microbial and mammalian systems under physiological and disease-relevant conditions, including high-throughput assays, custom sequencing libraries, and behavioral analysis — in each case designed for comprehensive rather than selective data acquisition, yielding datasets that serve directly as training data for machine learning.

Extracurricular Activities

2015	President, <i>Student Club-Union Government</i> , Korea University
2014	Representative, Korea University Fall-Festival Task Force
2016-2018	Military Service (Combat Medic), Republic of Korea Army