

Curriculum Vitae

Name: Kwak, Gijung
Date of Birth: December 10, 1990
Status: Ph. D. in Nano-Bio-Information Engineering
E-mail: Gkwak@som.umaryland.edu
ORCID: <https://orcid.org/0000-0001-6908-9638>
Work address: University of Maryland, Baltimore, School of Medicine
Health Sciences Research Facility III, Rm9110
670 W. Baltimore St, Baltimore, MD 21201

Education:

2009.03 - 2015.02 B.S., Department of Polymer Engineering, INHA University, Republic of Korea.
2015.03 - 2020.02 Ph. D., Department of Nano-Bio-Information Technology, KU-KIST Graduate School of Convergence Science and Technology, KOREA University, Republic of Korea (Prof. Ick Chan Kwon and Dr. Sun Hwa Kim).
2018.10 - 2019.01 Visiting Student Researcher, Department of Bioengineering, College of Engineering, University of California at Berkeley, CA, US (Prof. Phillip B Messersmith).
2020.09 - 2023.08 Postdoctoral Research Fellow, Center for Nanomedicine, Wilmer Eye Institute, Department of Ophthalmology, School of Medicine, Johns Hopkins University, MD, US (Prof. Jung Soo Suk).
2023.09 – Present Postdoctoral Research Fellow, Department of Neurosurgery, School of Medicine, University of Maryland, Baltimore, MD, US (Prof. Jung Soo Suk).

Research Area:

Non-viral drug delivery, polymeric nanoparticles, extracellular vesicles, brain/lung/eye drug delivery, pDNA/mRNA/RNAi based therapy, cancer gene therapy.

Grant as a primary investigator:

1. Postdoctoral Fellowship Program (Nurturing Next-generation Researchers) in 2022, "Bioreducible nanoparticle-based intravitreal gene delivery for treating retinal diseases", National Research Foundation (NRF) of Korea, 2022R1A6A3A03065712, 2022-09-01 - 2023-08-31

Awards:

1. Best Poster Award at 2nd International on Bio-Therapeutics Delivery Symposium (BTDS), June 8-9, 2017, Republic of Korea.
2. Best Poster Award at Korean Society for Nanomedicine Conference, November 17, 2017, Republic of Korea.
3. Best Poster Award at KIST research program conference, December 14, 2017, Republic of Korea.
4. KU Graduate School Achievement Award, February 27, 2018, Republic of Korea.
5. KIST School Idea Competition Award - Third Place, August 21, 2018, Republic of Korea.
6. Student Travel Award at 6th Nano Today Conference, June 20, 2019, Lisbon, Portugal.
7. Gene delivery and gene editing (GDGE) Focus Group Award at Controlled Release Society (CRS) Annual Meeting & Expo, July 14, 2022, Montreal, Canada.
8. Meritorious Abstract Travel Award at American Society of Gene & Cell Therapy (ASGCT) 26th

Annual Meeting, May 16, 2023, Los Angeles, CA, US.

Oral presentation:

1. 6th Nano Today Conference 2019, "PD-L1 silencing with melanoma-specific nanoparticle for cancer immunotherapy" June 16-20, 2019, Lisbon, Portugal.
2. 33rd Annual Wilmer Research Meeting (WRM) 2022, "Environmentally-sensitive polymer-based nanoparticles for intravitreal gene delivery" April 8, 2022, Baltimore, MD, US.
3. Controlled Release Society (CRS) 2022 Annual Meeting & Expo, "Environmentally-sensitive polymer-based nanoparticles for intravitreal gene delivery" July 14, 2022, Montreal, Canada.
4. NIH Extracellular RNA Communication Consortium (ERCC) Program Closeout Meeting, "Extracellular vesicle-associated adeno-associated virus for inhaled gene delivery" May 1-2, 2023, North Bethesda, MD, US.
5. American Society of Gene & Cell Therapy (ASGCT) 26th Annual Meeting "Environmentally-sensitive polymer-based nanoparticles for intravitreal gene delivery" May 16, 2023, Los Angeles, CA, US.
6. EV Club in International Society for Extracellular Vesicles (ISEV), "Extracellular vesicle-associated adeno-associated virus for inhaled gene delivery" Online.
<https://youtu.be/LfJDQmoRytI>

Patents:

1. Therapeutic agent for treating cancer comprising anti-miRNA-albumin composite.
Publication/Patent number: US11015197B2 (US), KR102267479B1 (KR)
2. Novel use of milk exosome.
Publication/Patent number: WO2021107706A1 (PCT), KR20210066750A (KR)
3. Extracellular vesicle-associated adeno-associated virus vectors for inhaled gene therapy.
In process with JHTV (Invention ID: D17310)
4. Novel bioreducible polymer for nucleic acid delivery to eyes and beyond.
In process with JHTV (Invention ID: D17375)

Publications as a first author (*co-first author):

1. **Gijung Kwak***, Sung Duk Jo*, Dongkyu Kim, Hyosuk Kim, Myung Goo Kim, Kwangmeyung Kim, Ick Chan Kwon, and Sun Hwa Kim "Synergistic antitumor effects of combination treatment with metronomic doxorubicin and VEGF-targeting RNAi nanoparticles" *Journal of Controlled Release*, **2017**, 267, 203-213. **IF: 11.47**. DOI: 10.1016/j.jconrel.2017.08.015.
2. **Gijung Kwak**, Dongkyu Kim, Gi-hoon Nam, Sun Young Wang, In-San Kim, Sun Hwa Kim, Ick-Chan Kwon, and Yoon Yeo "Programmed Cell Death Protein Ligand-1 Silencing with Polyethylenimine–Dermatan Sulfate Complex for Dual Inhibition of Melanoma Growth" *ACS Nano*, **2017**, 11 (10), 10135-10146. **IF: 18.03**. DOI: 10.1021/acsnano.7b04717
3. **Gijung Kwak***, Hyosuk Kim*, Jooho Park, Eun Hye Kim, Hochung Jang, Geonhee Han, Sun Young Wang, Yoosoo Yang, Ick Chan Kwon, and Sun Hwa Kim "A Trojan-Horse Strategy by In Situ Piggybacking onto Endogenous Albumin for Tumor-Specific Neutralization of Oncogenic MicroRNA" *ACS Nano*, **2021**, 15(7), 11369–11384. **IF: 18.03**. DOI: 10.1021/acsnano.1c00799
4. **Gijung Kwak**, Jing Cheng, Hyosuk Kim, Sukyung Song, Su Jin Lee, Yoosoo Yang, Ji Hoon Jeong, Ji Eun Lee, Phillip B. Messersmith, and Sun Hwa Kim "Sustained Exosome-Guided Macrophage Polarization Using Hydrolytically Degradable PEG Hydrogels for Cutaneous Wound Healing: Identification of Key Proteins and MiRNAs, and Sustained Release

- Formulation" *Small*, **2022**, 2200060. **IF: 15.15**. DOI: 10.1002/sml.202200060
5. Daiheon Lee*, **Gijung Kwak***, Thomas V Johnson, and Jung Soo Suk "Formulation and Evaluation of Polymer-Based Nanoparticles for Intravitreal Gene-Delivery Applications" *Current Protocols*, **2022**, 2(12), e607. **IF: 2.74**. DOI: 10.1002/cpz1.607
 6. Karina Negron*, **Gijung Kwak***, Heng Wang, Haolin Li, Yi-Ting Huang, Shun-Wen Chen, Betty Tyler, Charles G Eberhart, Justin Hanes, and Jung Soo Suk "A Highly Translatable Dual-arm Local Delivery Strategy to Achieve Widespread Therapeutic Coverage in Healthy and Tumor-bearing Brain Tissues" *Small*, **2023**, 2207278. **IF: 15.15**. DOI: 10.1002/sml.202207278
 7. **Gijung Kwak**, Olesia Gololobova, Neeraj Sharma, Colin Caine, Marina Mazur, Kathleen Mulka, Natalie E. West, George M. Solomon, Garry R. Cutting, Kenneth W. Witwer, Steven M. Rowe, Michael Paulaitis, George Aslanidi, and Jung Soo Suk "Extracellular vesicle enhances pulmonary transduction of stably associated adeno-associated virus following intratracheal administration" *Journal of Extracellular Vesicles*, **2023**, 12, e12324. **IF: 17.34**. DOI: 10.1002/jev2.12324
 8. Divya Rao*, **Gijung Kwak***, Heng Wang, Charles Eberhart, Justin Hanes, and Jung Soo Suk "Bioreducible gene delivery platform that promotes intracellular payload release and widespread brain dispersion" *ACS Biomaterials Science & Engineering*, **2023**. **IF: 5.80**. DOI: 10.1021/acsbomaterials.3c00799

Publications as a co-author:

1. Hyejin Kim, Jaepil Jeong, Dajeong Kim, **Gijung Kwak**, Sun Hwa Kim, and Jong Bum Lee "Bubbled RNA-Based Cargo for Boosting RNA Interference" *Advanced Science*, **2017**, 4, 1600523. **IF: 17.52**. DOI: 10.1002/advs.201600523
2. Bieong-Kil Kim, Dongkyu Kim, **Gijung Kwak**, Ji Young Yhee, Ick-Chan Kwon, Sun Hwa Kim, and Yoon Yeo "Polyethylenimine-Dermatan Sulfate Complex, a Bioactive Biomaterial with Unique Toxicity to CD146-Positive Cancer Cells" *ACS Biomaterials Science & Engineering*, **2017**, 3 (6), 990-999. **IF: 5.13**. DOI: 10.1021/acsbomaterials.7b00207
3. Sung Duk Jo, Gi-Hoon Nam, **Gijung Kwak**, Yoosoo Yang, and Ick Chan Kwon "Harnessing designed nanoparticles: Current strategies and future perspectives in cancer immunotherapy" *Nano Today*, **2017**, 17, 23-37. **IF: 20.72**. DOI: 10.1016/j.nantod.2017.10.008
4. Yoon Young Kang, Jihyeon Song, Hee Sun Jung, **Gijung Kwak**, Gyeonghui Yu, Joong-Hoon Ahn, Sun Hwa Kim, and Hyejung Mok "Implication of multivalent aptamers in DNA and DNA-RNA hybrid structures for efficient drug delivery in vitro and in vivo" *Journal of Industrial and Engineering Chemistry*, **2018**, 60, 250-258. **IF: 5.278**. DOI: 10.1016/j.jiec.2017.11.011
5. Sun Young Wang, Hyosuk Kim, **Gijung Kwak**, Hong Yeol Yoon, Sung Duk Jo, Ji Eun Lee, Daeho Cho, Ick Chan Kwon, and Sun Hwa Kim "Development of Biocompatible HA Hydrogels Embedded with a New Synthetic Peptide Promoting Cellular Migration for Advanced Wound Care Management" *Advanced Science*, **2018**, 5(11), 1800852. **IF: 17.52**. DOI: 10.1002/advs.201800852
6. Hyosuk Kim, **Gijung Kwak**, Kwangmeyung Kim, Hong Yeol Yoon, and Ick Chan Kwon "Theranostic designs of biomaterials for precision medicine in cancer therapy" *Biomaterials*, **2019**, 213, 119-207. **IF: 15.3**. DOI: 10.1016/j.biomaterials.2019.05.018
7. Hyosuk Kim, Sun Young Wang, **Gijung Kwak**, Yoosoo Yang, Ick Chan Kwon, and Sun Hwa Kim "Exosome-Guided Phenotypic Switch of M1 to M2 Macrophages for Cutaneous Wound Healing" *Advanced Science*, **2019**, 1900513. **IF: 17.52**. DOI: 10.1002/advs.201900513

8. Youngmin Jeong, Gi Beom Kim, Yuhyun Ji, **Gijung Kwak**, Gi-Hoon Nam, Yeonsun Hong, Seohyun Kim, Jinsu An, Sun Hwa Kim, Yoosoo Yang, Hak Suk Chung, and In-San Kim "Dendritic cell activation by an E. coli-derived monophosphoryl lipid A enhances the efficacy of PD-1 blockade" *Cancer Letters*, **2020**, 472, 19-28. **IF: 8.679**. DOI: 10.1016/j.canlet.2019.12.012
9. Sun Young Wang, Hyosuk Kim, **Gijung Kwak**, Sung Duk Jo, Daeho Cho, Yoosoo Yang, Ick Chan Kwon, Ji Hoon Jeong, and Sun Hwa Kim "Development of microRNA-21 mimic nanocarriers for the treatment of cutaneous wounds" *Theranostics*, **2020**, 10(7), 3240-3253. **IF: 11.56**. DOI: 10.7150/thno.39870
10. Wooram Um, Hyewon Ko, Dong Gil You, Seungho Lim, **Gijung Kwak**, Man Kyu Shim, Suah Yang, Jeongjin Lee, Yeari Song, Kwangmeyung Kim, and Jae Hyung Park "Necroptosis-Inducible Polymeric Nanobubbles for Enhanced Cancer Sonoimmunotherapy" *Advanced Materials*, **2020**, 1907953. **IF: 32.09**. DOI: 10.1002/adma.201907953
11. Hyosuk Kim, Eun Hye Kim, **Gijung Kwak**, Sung-Gil Chi, Sun Hwa Kim, and Yoosoo Yang "Exosomes: Cell-Derived Nanoplatforms for the Delivery of Cancer Therapeutics" *International Journal of Molecular Sciences*, **2021**, 22, 14. **IF: 6.208**. DOI: 10.3390/ijms22010014
12. Daiqin Chen, Shuai Liu, Dinghao Chen, Jinhao Liu, Jerry Wu, Han Wang, Yun Su, **Gijung Kwak**, Xinyuan Zuo, Divya Rao, Honggang Cui, Chunying Shu, and Jung Soo Suk "A Two-Pronged Pulmonary Gene Delivery Strategy: A Surface-Modified Fullerene Nanoparticle and a Hypotonic Vehicle" *Angewandte Chemie International Edition*, **2021**, 60, 15225–15229. **IF: 16.82**. DOI: 10.1002/anie.202101732
13. Eun Hye Kim, Jongwon Lee, **Gijung Kwak**, Hochung Jang, Hyosuk Kim, Haeun Cho, Yeongji Jang, Jiwoong Choi, Sung-Gil Chi, Kwangmeyung Kim, Ick Chan Kwon, Yoosoo Yang, and Sun Hwa Kim "PDL1-binding peptide/anti-miRNA21 conjugate as a therapeutic modality for PD-L1high tumors and TAMs" *Journal of Controlled Release*, **2022**, 345, 62-74. **IF: 11.47**. DOI: 10.1016/j.jconrel.2022.02.031
14. Namho Kim, **Gijung Kwak**, Jason Rodriguez, Alessandra Livraghi-Butrico, Xinyuan Zuo, Valentina Simon, Eric Han, Siddharth Shenoy, Nikhil Pandey, Marina Mazur, Susan E. Birket, Anthony Kim, Steven M. Rowe, Richard C. Boucher, Justin Hanes, and Jung Soo Suk "Inhaled gene therapy of preclinical muco-obstructive lung diseases by nanoparticles capable of breaching the airway mucus barrier" *Thorax*, **2022**, 77 (8), 812-820. **IF: 10.31**. DOI: 10.1136/thoraxjnl-2020-215185
15. Hyosuk Kim, Hyun-Ju Park, Hyo Won Chang, Ji Hyun Back, Su Jin Lee, Yae Eun Park, Eun Hye Kim, Yeonsun Hong, **Gijung Kwak**, Ick Chan Kwon, Ji Eun Lee, Yoon Se Lee, Sang Yoon Kim, Yoosoo Yang, and Sun Hwa Kim "Exosome-guided direct reprogramming of tumor-associated macrophages from protumorigenic to antitumorigenic to fight cancer" *Bioactive Materials*, **2022**. **IF: 16.87**. DOI: 10.1016/j.bioactmat.2022.07.021