

# 분자통합생물학 연구실

Molecular and  
Integrative Biology (MIB)  
Lab.



**류동렬**  
교수

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## Education

- 2010** Ph.D. in Molecular Cell Biology, SKKU School of Medicine, Korea
- 2006** M.S. in Molecular Biology, Pusan National University, Korea
- 2004** B.S. in Molecular Biology, Pusan National University, Korea

## Experience

- 2023 ~** Associate Professor, Department of Biomedical Science and Engineering, GIST, Korea
- 2019 ~ 2023** Assistant Professor, SKKU School of Medicine
- 2017 ~ 2019** Assistant Professor, Pusan National University
- 2016 ~ 2017** Senior Scientist, Amazentis SA, EPFL Innovation Park, Switzerland
- 2010 ~ 2016** Post-doc fellow, EPFL, Switzerland

## Fact Sheet

- 2022** Highly Cited Researcher 2022 (World Top 1% Researcher, Crossed filed)
- 2022 ~** Scientific Committee, Korean Endocrine Society
- 2021 ~** Scientific Committee, Korean Diabetes Association
- 2021 ~** Direct, Scientific Committee, Korean Society of Sarcopenia
- 2021 ~** Scientific & Research Committee, Korean Society for Bone and Mineral Research
- 2020 ~** Scientific Committee, Korean Society for Gerontology
- 2020 ~ 2023** Steering Committee, Korean Association for Laboratory Animal Science
- 2022** Steering Committee for BOMUN Excellent Science and Technology, Korean Society for Biochemistry and Molecular Biology
- 2008 ~** Member, Korean Society for Molecular and Cellular Biology
- 2019 ~** Member, Korean Society of Ginseng
- 2017** The Commendation of the Korean Prime Minister (National Science Day)

## 연구실 소개

### Vision

The vision of my lab is to fulfill our curiosity and promote healthy aging and life for all. The Molecular and Integrative Biology (MIB) lab has been using integrative biology approaches to understand molecular signaling pathways underpinning aging, metabolism, mitochondrial homeostasis, and their related diseases, and to innovate our society by developing novel technology for anti-aging, regenerative medicine, and therapeutics.

### Main Research Area

- Aging and reverse aging technology
- Mitochondria biology and mitohormesis
- Muscle biology and its related diseases
- Energy metabolism and metabolic disorders
- Regenerative medicine and therapeutics

## 연구 성과

### 수행중인 주요 연구과제 (주요과제경력)

- Development of first-in-class diagnostics and therapeutics for muscle diseases through the reconstruction of the myokine's endo/paracrine network
- Study defining a novel post-translational modification by SIRT7 in metabolic diseases
- RLRC – Sarcopenia Total Solution Center
- Collaborations with AMORE PACIFIC Inc.

### 주요논문 (대표실적)

- Inhibition of SIRT7 overcomes sorafenib acquired resistance by suppressing ERK1/2 phosphorylation via the DDX3X-mediated NLRP3 inflammasome in hepatocellular carcinoma. *Drug Resist. Update* 2024
- L-threonine promotes healthspan by expediting ferritin-dependent ferroptosis inhibition in *C. elegans*. *Nat Commun* 2022
- Machine learning-derived gut microbiome signature predicts fatty liver disease in the presence of insulin resistance. *Sci Rep* 2022
- Machine learning-featured Secretogranin V is a circulating diagnostic biomarker for pancreatic adenocarcinomas associated with adipopenia. *Front Oncol* 2022
- A Microfluidic Device to Fabricate One-Step Cell Bead-Laden Hydrogel Struts for Tissue Engineering. *Small* 2022
- Bio-printing of aligned GelMa-based cell-laden structure for muscle tissue regeneration. *Bioact Mater*, 2022
- Growth differentiation factor 15 protects against the aging-mediated systemic inflammatory response in humans and mice. *Aging Cell* 2020
- NAD+ repletion improves muscle function in muscular dystrophy and counters global PARylation. *Sci Transl Med* 2016
- Urolithin A induces mitophagy and prolongs lifespan in *C. elegans* and increases muscle function in rodents. *Nat Med* 2016

### 특허등록 및 출원

- Enhancing autophagy or increasing longevity by administration of Urolithins or precursors thereof, 등록번호 US11020373B2
- Agents and methods using thereof for the prevention and treatment of stem cell muscle disorders. 등록번호 US10905704B2
- 혈중 SCG5를 이용한 체지방 진단방법 및 진단용 조성물, 출원번호: 10-2021-0177105
- 바이오마커 ENPP7의 당뇨병의 진단 및 치료 용도, 출원번호: 10-2022-0088696

### 주요활동

- 다양한 국제학술대회에서 초청강연
- 다양한 국내외 학회에서 정회원 및 운영위원으로 활동중
- 근감소증 3단계 토달솔루션 선도연구센터 사업 참여중
- 개방형 유전체 빅데이터 전문인력 양성 사업 참여 (2017-2018)
- 바이오 데이터 엔지니어 인력양성 거점기관 사업 참여 (2020)
- 국무총리 표창 수상, 과학기술 발전공로, 2017년 과학의 날
- 스위스 제네바대학병원, 스위스 로잔연방공대(EPFL), 미국 에모리 의대, 캐나다 오타와대학, 브라질 캄피나스대학, 중국 중산의대, 산동의대, 길림의대 등과 공동연구 수행중

## 융합연구 및 비전

My laboratory conducts research that combines traditional molecular and cellular biology technologies with bioinformatics-based wet lab technologies, as the name "Molecular and Integrative Biology (MIB)" lab. The MIB lab's ultimate objective is to create technologies that can be directly applied to anti-aging, regenerative medicine, and personalized medicine. In addition to the traditional bench-to-bedside methodology, convergence research technology and artificial intelligence technology are used to develop and apply the bedside-to-bench methodology, as well as 3D bioprinting through research collaborations with chemists, material engineers, and pharmacists. Research to optimize the effects of technology, targeted drugs, and slow-releasing drugs using nanoparticles is also being conducted in various animal models.

본 연구실은 분자통합생물학 연구실(Molecular and integrative biology lab)이라는 이름에서 알 수 있듯이 전통적인 분자세포생물학 기술과 생명정보학 기반 기술을 융합한 연구를 수행하고 있습니다. 항노화, 재생의학, 맞춤의학에 직접 적용 가능한 다양한 기술을 개발하는 것이 연구실의 최종 목적입니다. 이를 위해서 전통적인 Bench-to-bedside 방법론뿐만 아니라 융합연구 기술 및 인공지능 기술을 적용하여 Bedside-to-bench 방법론도 개발적용하고 있으며, 또한 화학자, 재료공학자, 약학자들과 공동연구를 통해서 3D 바이오프린팅 기술, 표적약물, 나노입자를 이용한 슬로우릴리징 약물 등의 효과를 최적화하기 위한 연구를 다양한 동물 모델에서도 수행하고 있습니다.