

Jong-Hyuk Lee, Ph.D.

National Institute on Aging
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Professional Summary

- Multi-disciplinary scientist with over 14 years of experience in dissecting epigenetic mechanisms
- Skilled in molecular and cellular biology techniques and assay development

Technical Skills, Software and Instrumentation

- **Epigenetics:** Expertise in Chromatin immunoprecipitation (ChIP) and Chromatin affinity purification of ADP-ribosylated chromatin (ChAP), analyzing whole genome epigenetic markers and transcription factor binding
- **Cell culture:** Mammalian, yeast, bacterial, stem cell culture
- **DNA and RNA:** cloning (from RNA or cDNA), mutagenesis, *in vitro* deamination assay, PCR, quantitative RT-PCR, miRNA, nascent RNA capture analysis.
- **Protein:** yeast two hybrid assay, western blot, immunoprecipitation (exogenous / endogenous), *in vitro* binding assay, ChIP-seq, ChAP-seq, protein purification (from mammalian cell / bacteria / stem cell), complex purification (from mammalian cell), etc.
- **Cellular Biology:** Confocal microscopy, FACS analysis, drug treatment, knockdown experiments (including lentivirus, retrovirus preparation), cell proliferation assay, etc.
- **Biochemical assays:** kinase assay, *in vitro* transcription/translation, etc.
- **Bioinformatic data analysis:** ChIP (ChAP)-sequencing (GALAXY, Nebula, GREAT, meme-ChIP, IGV, Seq-miner), Gene Ontology & expression – (DAVID, GSEA), RNA-sequencing – (TopHat, HISAT2), Re-analysis of public database (GEO datasets)

Work Experience

Aug 2016-Present

Postdoctoral Research Scientist

National Institute on Aging (NIA), Baltimore, MD,
Supervisor: Vilhelm A. Bohr, M.D., Ph.D.

- Investigate altered epigenetic hallmarks of aging in Cockayne syndrome
- Utilize expertise in epigenetic biology to design, execute and interpret innovative approaches to addressing premature aging disease
- Pioneer systematic approach of mitochondrial DNA poly ADP-ribosylation.
- Mentor post-baccalaureate students in the laboratory

- Author and Co-author several manuscripts to study cellular aging
- Present research results and methodologies at weekly meetings with supervisor and at meetings with the LMG team
- Ensure excellent record keeping of research data and results

Mar 2015-Aug 2016

Postdoctoral Research Scientist

Seoul National University, Seoul, Korea
Department of Biomedical Science, College of Medicine,
Supervisor: Hong-Duk Youn, Ph.D.

- Investigated the molecular mechanisms of novel post-translational modification of core histone H3 that regulates the transcription termination of DNA damage-inducible genes
- Proactively seek new information by conducting literature search to incorporate into projects
- Performed interacting partner proteomic analysis of Calcineurin-binding protein, Cabin-1

Jan 2016-Aug 2016

Advisory Senior Research Scientist

MGINBIO Co., LTD. (Research Institute) Seoul, Korea

- Studied the effect of purified ginsenoside component, compound K on vasodilation-related gene expression alteration in human umbilical vein endothelial cells (HUVEC)
- Conducted literature search and datamining to organize the publicizing booklet regarding the effect of compound K

Sep 2015-Feb 2016

Visiting lecturer

Korea University, Seoul, Korea
Department of Clinical Pathology, College of Health Science

- Lectured 15 junior and senior students in Molecular cell biology course

Education

2009-2014

Seoul National University, Seoul, Korea

Department of Biomedical Science
Ph.D. in Biomedical Science
Supervisor: Professor Hong- Duk Youn, Ph.D.

p53 and histone modification regulation on cellular metabolism and DNA damage

2006-2008

Seoul National University, Seoul, Korea

Department of Natural Science
M.S. in Genetic engineering
Supervisor: Professor Hong- Duk Youn, Ph.D.

Interaction between Ferritin & p53 and transcription regulation

1999-2005

Chungnam National University, Daejeon, Korea

College of Life Science

B.S. in Biology

Supervisor: Professor Heon-Man Lim. Ph.D.

In-vivo measurement of cnu binding to ori-C on the DNA of Escherichia coli

Honors and Awards

- 2019-NIH/NIA Inter-Laboratory Proposal - Dissecting novel geno-protective roles of CSB in the epigenome network (\$59,238)
- 2018-NIA IRP Retreat Scientific Director Award. NIA, Baltimore, MD
- 2018-Best poster Award, Baltimore Area Repair Symposium, Baltimore, MD
- 2018-NIH/NIA Inter-Laboratory Proposal - Dissecting novel genoprotective roles of CSB in the epigenome network (\$49,680)
- 2012-Presentation Award presented by Chromatin & Epigenetics Symposium, Hongchun, Korea
- 2011-BK21 Research Fellowship presented by Korean National Research Foundation, Seoul, Korea
- 2009-Seoul Science Fellowship presented by Seoul Metropolitan Government, Seoul, Korea
- 2009-Presentation Award presented by Korean Society of Medical Biochemistry and Molecular Biology, Seoul, Korea

Peer-Review Activities

- Sep 2018-Bosshard S and Mermoud N. A role for alternative end-joining factor in efficient homologous recombination-mediated genome editing. Submitted to *Nucleic Acids Res.*
- Jun 2017-Paccosi E, Costantino M, Monteonofrio L, Soddu S, Prantera G, Frontini M, Egly JM and Proietti De Santis L. CSA and CSB direct the degradation of the Protein Regulator of Cytokinesis PRC1 at the midbody to trigger abscission, an essential step of cell division. Submitted to *Nature Comm.*

Publications

- **Lee JH**, Demarest TG, Babbar M, Kim EW, Okur MN, De S, Croteau DL and Bohr VA. Cockayne syndrome group B deficiency reduces H3K9me3 chromatin remodeler SETDB1 and exacerbates cellular aging. *Nucleic Acids Res.* Accepted (**First Author**)
- Okur MN, Wasif O, **Lee JH**, Demarest TG, Croteau DL and Bohr VA. Convergence of Cockayne Syndrome Group A and B Proteins at rRNA Transcription through Nucleolin Regulation. *Nucleic Acids Res.* Under review
- Fang EF, Hou Y, Jensen MB, Yang B, Kassahun H, Caponio D, Khezri R, Demarest TG, Figueroa D, Morevati M, Lee HJ, Kato H, SenGupta T, **Lee JH**, Filippelli D, Okur MN, Mangerich A, Croteau DL, Maezawa Y, Lyssiotis CA, Tao J, Yokote K, Rusten TE, Mattson MP, Jasper H, Nilsen H and Bohr VA. NAD⁺ restoration enhances mitochondrial quality and mitophagy and inhibits accelerated aging in Werner syndrome. *Nature Comm.* Revision in progress
- Kwak S, Kim TW, Kang BH, Kim JH, Lee JS, Lee HT, Hwang IY, Shin J, **Lee JH**, Cho EJ and Youn HD. Zinc Finger Proteins Orchestrate Active Gene Silencing during Embryonic Stem Cell Differentiation. *Nucleic Acids Res.* 2018, May 28.
- Kim TW, Kwak S, Shin J, Kang BH, Lee SE, Suh MY, Kim JH, Hwang IY, **Lee JH**, Choi J, Cho EJ and Youn HD. Ctbp2-mediated β -catenin regulation is required for exit from pluripotency. *Exp Mol Med.* 2017, Oct 13.
- Shamanna RA, Croteau DL, **Lee JH** and Bohr VA. Recent Advances in Understanding Werner Syndrome. *F1000Research* 2017, Jun.

- Han J, **Lee JH**, Park S, Yoon S, Yoon A, Hwang DB, Lee HK, Kim MS, Lee Y, Yang WJ, Youn HD, Kim H and Chung J. A phosphorylation pattern-recognizing antibody specifically reacts to RNA polymerase II bound to exons. *Exp Mol Med*. 2016 Nov 18.
- Han J, Park SH, Kim DJ, Kim H, Choi YH, **Lee JH**, Park SC and Chung J. Antibodies to the DNA-directed RNA polymerase II subunit RPB1 occur with highest frequency in centenarians. *Immun Ageing*. 2016 Mar 22.
- Shin J, Kim TW, Kim H, Kim HJ, Suh MY, Lee S, Lee HT, Kwak S, Lee SE, **Lee JH**, Jang H, Cho EJ and Youn HD. Aurkb/PP1-Mediated Resetting of Oct4 During the Cell Cycle Determines the Identity of Embryonic Stem Cells. *Elife*. 2016 Feb 15.
- Kim TW, Kang BH, Jang H, Kwak S, Shin J, Kim H, Lee SE, Lee SM, **Lee JH**, Kim JH, Kim SY, Cho EJ, Kim JH, Park KS, Che JH, Han DW, Kang MJ, Yi EC and Youn HD. Ctbp2 Modulates NuRD-Mediated Deacetylation of H3K27 and Facilitates PRC2-Mediated H3K27me3 in Active Embryonic Stem Cell Genes During Exit from Pluripotency. *Stem Cells*. 2015 May 5.
- Kim JH, Lee SM, **Lee JH**, Chun S, Kang BH, Kwak S, Roe JS, Kim TW, Kim H, Kim WH, Cho EJ and Youn HD. OGFOD1 is required for breast cancer cell proliferation and is associated with poor prognosis in breast cancer. *Oncotarget*. 2015 Mar 29. **(Co-first Author)**
- **Lee JH**, Kang BH, Jang H, Kim TW, Choi J, Kwak S, Han J, Cho EJ and Youn HD. AKT phosphorylates H3-threonine 45 to facilitate termination of gene transcription in response to DNA damage. *Nucleic Acids Res*. 2015 May 19;43(9):4505-16. **(First Author)**
- **Lee JH**, Jang H, Lee SM, Lee JE, Choi J, Kim TW, Cho EJ and Youn HD. ATP-citrate lyase regulates cellular senescence via an AMPK- and p53-dependent pathway. *FEBS J*. 2015 Jan;282(2):361-71. **(First Author)**
- Choi J, Jang H, Kim H, **Lee JH**, Kim ST, Cho EJ and Youn HD. Modulation of lysine methylation in myocyte enhancer factor 2 during skeletal muscle cell differentiation. *Nucleic Acids Res*. 2014 Jan;42(1):224-34.
- **Lee JH**, Jang H, Cho EJ and Youn HD. Ferritin binds and activates p53 under oxidative stress. *Biochem. Biophys. Res. Commun*. 2009 Nov 20;389(3):399-404. **(First Author)**

Presentations and Invited Talks

- 2019-NIH DNA Repair Interest Group Seminar, Baltimore, MD – **Invited Talk** (CSB regulates chromatin density and PAR accumulation and exacerbates cellular aging)
- 2019-NIH/NIA Retreat, Baltimore, MD – **Poster Presentation** (Cockayne syndrome group B deficiency reduces H3K9me3 chromatin remodeler SETDB1 and exacerbates cellular aging)
- 2018-Baltimore Area Repair Symposium, Baltimore, MD – **Poster Presentation** (Dissecting novel genoprotective roles of CSB in the epigenome network)
- 2018-NIH/NIA Retreat, Baltimore, MD – **Poster Presentation** (Dissecting novel genoprotective roles of CSB in the epigenome network)
- 2016 -13th Korea - Japan Joint Symposium on Cancer and Ageing Research, Jeju, Korea – **Invited Talk** (AKT phosphorylates H3-threonine 45 to facilitate termination of gene transcription in response to DNA Damage)
- 2015 -Hamchoon Biochemistry Symposium – **Invited Talk** (AKT phosphorylates H3-threonine 45 to facilitate termination of gene transcription in response to DNA Damage)
- 2012-Chromatin & Epigenetics Symposium, Hongchun, Korea – **Invited Talk** (Phosphorylation of Histone H3-T45 during transcription)

- 2012-Korean Society of Medical Biochemistry and Molecular Biology, Seoul, Korea - **Poster Presentation** (Phosphorylation at Threonine 45 of Histone H3 by Akt1 (PKB) Links Transcriptional Elongation)
- 2009-Korean Society of Medical Biochemistry and Molecular Biology, Seoul, Korea - **Poster Presentation** (Ferritin binds and activates p53 under oxidative stress)