

Young Woo Nam (Young), Ph.D.

Post-doctoral Fellow
Department of Biomedical and Pharmaceutical Sciences
Chapman University, School of Pharmacy
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Research Experience

2022.11 to Present

Position: Research associate
Chapman University, School of Pharmacy (CUSP), Irvine, CA

- Lab system setting and protocol optimization for the large-scale expression and purification system for membrane proteins.
- 3D structure determination of KCa_{2/3/4} channels. (Cryo-EM approaches)
- Prepare publication

2015. 11 to 2022. 11

Position: Post-doctoral Fellow
Chapman University, School of Pharmacy (CUSP), Irvine, CA

- Researching for structures of KCa_{2/3/4} channels in complex with their small modulators. (**Determined 3D structure in complexes with SKS-11 and SKS-14 modulators, published**)
- Identification of allosteric binding site in KCa_{2/3}.
- Screening and discovery of small molecules for KCa_{2/3/4} channels. (**Found one positive allosteric modulator, Patent-On process**)
- Study on biophysical function of KCa_{2/3/4} channels- Patch clamp.

2015. 04 to 2015. 10

Position: Researcher

Graduate school of Agriculture and Life Sciences, The University of Tokyo, Japan

- Researching for structures of novel UDP-glucose hexose 1-phosphate uridylyltransferase (GalE) in novel GNB/LNB pathway
- Co-crystals (UDP, UDP-glucose, UDP-galactose, and UDP-GlcNac)
- Determination of structures and refinement structures. (CCP4i, WinCoot, Phenix, Pymol, and Chimera)
- Prepare publication.

Education

2012 to 2015

Graduate school of Agriculture and Life Sciences, The University of Tokyo, Japan.

Ph.D. (Structural biology)

Thesis title: Studies on structures of novel sugar metabolic enzymes

Advisor: Shinya Fushinobu (Professor)

2010 to 2012

Graduate school of Agriculture and Life Sciences, The University of Tokyo, Japan.

M.S. (Structural biology)

Thesis title: Characterization of Sulerythrin from *sulfolobus tokodaii*

Advisor: Takayoshi Wakagi (Professor)

1999 to 2007

College of Biotechnology, Mokwon University, South Korea

B.S. (Microbiology)

Teaching Experience

2015 to Present

Chapman University, School of Pharmacy (CUSP)

Teaching assistance for Pharm.D. students, graduate students, and undergraduate students.

2010 to 2015

Graduate school of Agriculture and Life Sciences, The University of Tokyo, Japan.

Teaching assistance for graduate students, and undergraduate students.

Research techniques and Specialties

Structural biology:

Protein crystallization, X-ray data collection, Experimental phasing (SAD), Molecular replacement, Model building & refinement.

Pymol, Chimera, CCP4i, WinCoot, Phenix, HKL2000, Mosquito (sptlabtech), PROTEUM3 (Bruker AXs Inc.), Synchrotron, X-ray generator: **D8 Venture (Bruker)-single crystal diffraction- Home facility in Chapman University, School of Pharmacy.**

Biochemistry:

Protein expression: *E. coli*, Sf-9, mammalian cell (HEK293s GnTI⁻ and HEK293F GnTI⁻)

Protein purification: Various affinity chromatography- Ni-NTA, Strep II, Immunoaffinity (immunoprecipitation assay, CNbr-activation), ion-exchange chromatography, and gel-filtration (SEC)

SPR (Interaction between protein and small molecules), HPLC (ÄKTA pure), MALDI-TOF/MS, CD spectra, ICP-AES, UV-visible spectrum, Amino acid sequence, Western blot, and various enzyme activity assay.

Molecular biology:

Isolation genomic DNA, Gene cloning and recombinant DNA synthesis (in-fusion cloning, SLIC cloning, Gibson assembly, Gateway cloning and Site-directed mutagenesis), Transfection of cells, and generating baculovirus (BacMam system).

Cell Biology:

Mammalian cell culture- Endothelial cells, and HEK cells, cell transfection.

Pharmacology:

Patch clamp (Drug screening), Flow cytometer (BD FACSMelody), Confocal microscope

PDB Record with ligands

2013 -Synchrotron, Japan

- 4IIB:** Crystal structure of beta-glucosidase 1 from *Aspergillus aculeatus*
4IIC: Crystal structure of beta-glucosidase 1 from *Aspergillus aculeatus* in complex with isofagomine
4IID: Crystal structure of beta-glucosidase 1 from *Aspergillus aculeatus* in complex with 1-deoxynojirimycin
4IIE: Crystal structure of beta-glucosidase 1 from *Aspergillus aculeatus* in complex with calystegine B(2)
4IIF: Crystal structure of beta-glucosidase 1 from *Aspergillus aculeatus* in complex with castanospermine
4IIG: Crystal structure of beta-glucosidase 1 from *Aspergillus aculeatus* in complex with D-glucose
4IIH: Crystal structure of beta-glucosidase 1 from *Aspergillus aculeatus* in complex with thiocellobiose

2015 -Synchrotron, Japan

- 4WH1:** N-Acetylhexosamine 1-kinase (ligand free)
4WH2: N-acetylhexosamine 1-kinase in complex with ADP
4WH3: N-acetylhexosamine 1-kinase in complex with ATP
4ZLE: Cellobionic acid phosphorylase - ligand free structure
4ZLF: Cellobionic acid phosphorylase - cellobionic acid complex
4ZLG: Cellobionic acid phosphorylase - gluconic acid complex
4ZLI: Cellobionic acid phosphorylase - 3-O-beta-D-glucopyranosyl-alpha-D-glucopyranuronic acid complex

2017 -D8 Venture (Bruker)- in house, USA

- 5WBX:** Structural insights into the potency of SK/IK channel positive modulators (SKA-11, activator)
5WC5: Structural insights into the potency of SK/IK channel positive modulators (SKA-14, activator)

2018 -D8 Venture (Bruker)- in house, USA

6CZQ: A V-to-F substitution in SK2 channels causes Ca²⁺ hypersensitivity and improves locomotion in a *C. elegans* ALS model

6ALE: A V-to-F substitution in SK2 channels causes Ca²⁺ hypersensitivity and improves locomotion in a *C. elegans* ALS model (NS390, activator)

2019 -Synchrotron, Japan

6K0G: Crystal Structure of UDP-glucose 4-epimerase from *Bifidobacterium longum* in complex with NAD⁺ and UDP

6K0H: Crystal Structure of UDP-glucose 4-epimerase from *Bifidobacterium longum* in complex with NAD⁺ and UDP-GlcNAc

6K0I: Crystal Structure of UDP-glucose 4-epimerase from *Bifidobacterium longum* in complex with NAD⁺ and UDP-Glc

2021 -D8 Venture (Bruker)- in house, USA

7MCR: Human Apex/Ref1 homodimer formed under oxidative condition

7MEV: Human Apex/Ref1 monomer with C138A mutation

Review Paper

Bentham Science publishers

Publication (sort by newest to oldest)

1. **Nam YW**, Rahman MA, Yang G, Orfali R, Cui M, Zhang M. Loss-of-function $K_{Ca2.2}$ mutations abolish channel activity. *Am J Physiol Cell Physiol*. 2023 Jan 30. doi: 10.1152/ajpcell.00584.2022. Epub ahead of print. PMID: 36717104.
2. **Nam YW**, Pala R, El-Sayed NS, Larin-Henriquez D, Amirrad F, Yang G, Rahman MA, Orfali R, Downey M, Parang K, Nauli SM, Zhang M. Subtype-Selective Positive Modulation of $K_{Ca2.3}$ Channels Increases Cilia Length. *ACS Chem Biol*. 2022 Aug 10. doi: 10.1021/acscchembio.2c00469. Epub ahead of print. PMID: 35947779.
3. **Nam YW**, Downey M, Rahman MA, Cui M, Zhang M. Channelopathy of small- and intermediate-conductance Ca^{2+} -activated K^{+} channels. *Acta Pharmacol Sin*. 2022 Jun 17. doi: 10.1038/s41401-022-00935-1. Epub ahead of print. PMID: 35715699.
4. **Nam YW**, Sharifi B, Fong S, Chawla S, Rahighi S, Ibrahim N, Parang K, Zhang M, and Yang S. The Development of Novel Apurinic/Aprymidinic Endonuclease/Redox-factor 1 Inhibitors for the Treatment of Human Melanoma (2022). - Manuscripts in preparation.
5. **Nam YW**, Cui M, El-Sayed NS, Orfali R, Nguyen M, Yang G, Rahman MA, Lee J, Zhang M. Subtype-selective positive modulation of K_{Ca2} channels depends on the HA/HB helices. *Br J Pharmacol*. 2022 Feb;179(3):460-472. doi: 10.1111/bph.15676. Epub 2021 Oct 1. PMID: 34458981; PMCID: PMC8799485.
* N.S.E., **Y.W.N.**, and P.A.E. contributed equally to this work.
6. El-Sayed NS, **Nam YW**, Egorova PA, Nguyen HM, Orfali R, Rahman MA, Yang G, Wulff H, Bezprozvanny I, Parang K, Zhang M. Structure-Activity Relationship Study of Subtype-Selective Positive Modulators of K_{Ca2} Channels. *J Med Chem*. 2022 Jan 13;65(1):303-322. doi: 10.1021/acscimedchem.1c01473. Epub 2021 Dec 28. PMID: 34962403; PMCID: PMC8758555.
* N.S.E., **Y.W.N.**, and P.A.E. contributed equally to this work.
7. Orfali R, **Nam YW**, Nguyen HM, Rahman MA, Yang G, Cui M, Wulff H, Zhang M. Channelopathy-causing mutations in the S_{45A}/S_{45B} and HA/HB helices of $K_{Ca2.3}$ and $K_{Ca3.1}$ channels alter their apparent Ca^{2+} sensitivity. *Cell Calcium*. 2022 Jan 8;102:102538. doi: 10.1016/j.ceca.2022.102538. Epub ahead of print. PMID: 35030515.
* Razan Orfali and **Young-Woo Nam** contributed equally to this work.

8. **Nam YW**, Kong D, Wang D, Orfali R, Sherpa RT, Totonchy J, Nauli SM, Zhang M. Differential modulation of SK channel subtypes by phosphorylation. *Cell Calcium*. 2021 Mar;94:102346. doi: 10.1016/j.ceca.2020.102346. Epub 2021 Jan 6. PMID: 33422768.
9. **Nam YW**, Cui M, Orfali R, Viegas A, Nguyen M, Mohammed EHM, Zoghebi KA, Rahighi S, Parang K, Zhang M. Hydrophobic interactions between the HA helix and S4-S5 linker modulate apparent Ca²⁺ sensitivity of SK2 channels. *Acta Physiol (Oxf)*. 2021 Jan;231(1):e13552. doi: 10.1111/apha.13552. Epub 2020 Sep 10. PMID: 32865319; PMCID: PMC7736289.
10. **Nam YW**, Nishimoto M, Arakawa T, Kitaoka M, Fushinobu S. Structural basis for broad substrate specificity of UDP-glucose 4-epimerase in the human milk oligosaccharide catabolic pathway of *Bifidobacterium longum*. *Sci Rep*. 2019 Jul 31;9(1):11081. doi: 10.1038/s41598-019-47591-w. PMID: 31366978; PMCID: PMC6668579.
11. **Nam YW**, Baskoylu SN, Gazgalis D, Orfali R, Cui M, Hart AC, Zhang M. A V-to-F substitution in SK2 channels causes Ca²⁺ hypersensitivity and improves locomotion in a *C. elegans* ALS model. *Sci Rep*. 2018 Jul 16;8(1):10749. doi: 10.1038/s41598-018-28783-2. PMID: 30013223; PMCID: PMC6048120.
12. **Nam YW**, Orfali R, Liu T, Yu K, Cui M, Wulff H, Zhang M. Structural insights into the potency of SK channel positive modulators. *Sci Rep*. 2017 Dec 7;7(1):17178. doi: 10.1038/s41598-017-16607-8. PMID: 29214998; PMCID: PMC5719431.
13. **Nam YW**, Nihira T, Arakawa T, Saito Y, Kitaoka M, Nakai H, Fushinobu S. Crystal Structure and Substrate Recognition of Cellobionic Acid Phosphorylase, Which Plays a Key Role in Oxidative Cellulose Degradation by Microbes. *J Biol Chem*. 2015 Jul 24;290(30):18281-92. doi: 10.1074/jbc.M115.664664. Epub 2015 Jun 3. PMID: 26041776; PMCID: PMC4513089.
14. Sato M, Arakawa T, **Nam YW**, Nishimoto M, Kitaoka M, Fushinobu S. Open-close structural change upon ligand binding and two magnesium ions required for the catalysis of N-acetylhexosamine 1-kinase. *Biochim Biophys Acta*. 2015 May;1854(5):333-40. doi: 10.1016/j.bbapap.2015.01.011. Epub 2015 Jan 30. PMID: 25644306.
15. Yan Z, **Nam YW**, Fushinobu S, Wakagi T. *Sulfolobus tokodaii* ST2133 is characterized as a thioredoxin reductase-like ferredoxin:NADP⁺ oxidoreductase. *Extremophiles*. 2014 Jan;18(1):99-110. doi: 10.1007/s00792-013-0601-1. Epub 2013 Dec 1. PMID: 24292509.

16. Suzuki K, Sumitani J, **Nam YW**, Nishimaki T, Tani S, Wakagi T, Kawaguchi T, Fushinobu S. Crystal structures of glycoside hydrolase family 3 β -glucosidase 1 from *Aspergillus aculeatus*. *Biochem J*. 2013 Jun 1;452(2):211-21. doi: 10.1042/BJ20130054. PMID: 23537284.

Others

1. **Nam YW**, Arakawa T, and Fushinobu S. A key enzyme for biofuel production: “Missing link” between oxidative cellulose degradation and ethanol fermentation by microbes. *Photon Factory Activity Report #33 2015 Part A, Highlights and Facility Report [Life Science]-Japan synchrotron magazine*

Conference Abstracts (sort by newest to oldest)

1. **Nam YW**, Aldakhil T, Wang D, Viegas A, Zhang M*. Differential roles of SK channel subtypes in vascular endothelial cells. **Biophysical Society 64rd Annual Meeting**, February 2020. San Diego, MD.
2. Sharifi B, Rahighi S, **Nam YW**, Fong S, Zhang M, Yang S. Development of novel Apurinic/Apyrimidinic endonuclease/redox-factor 1 inhibitors for human melanoma. **8th International Congress on Cancer Metastasis**, October 2019. San Francisco, CA.
3. Vu H, Lee R, Wong P, **Nam YW**, Aldakhil T, Viegas A, Zhang M*. Different roles of SK channel subtypes in endothelial cell function. **American Heart Association Scientific Session**, November 2019. Philadelphia, PA.
4. **Nam YW**, Vu H, Lee R, Wong P, Aldakhil T, Viegas A, Zhang M*. SK channel in the vascular endothelial cells. **American Heart Association BCVS Conference**, July 2019. Boston, MA.
5. **Nam YW**, Baskoylu SN, Vu H, Lee R, Wong P, Hart AC, Zhang M*. A mutation SK channel rescued locomotion defects *C. elegans* ALS model. **Biophysical Society 63rd Annual Meeting**, March 2019. Baltimore, MD.

6. Viegas A, **Nam YW**, Baskoylu SN, Orfali R, Hart AC, Zhang M*. A mutant SK channel that is hypersensitive to Ca²⁺. **Society for Neuroscience Annual Meeting**, November 6th, 2018. San Diego, CA.
7. Orfali R, **Nam YW**, Viegas A, Zhang M*. Structure-activity relationship studies of SK channel modulation. **Experimental Biology Meeting**, April 2018. San Diego, CA.
8. **Nam YW**, Baskoylu SN, Cui M, Orfali R, Hart AC, Zhang M*. A Mutant SK2 Channel Hypersensitive to Ca²⁺. **Ataxia Investigators Meeting**, April 2018. Philadelphia, PA.
9. **Nam YW**, Baskoylu SN, Cui M, Orfali R, Hart AC, Zhang M*. A mutation in the intrinsically disordered fragment of SK2 channel confers Ca²⁺ hypersensitivity. **Biophysical Society 62nd Annual Meeting**, February 2018. San Francisco, CA.
10. **Nam YW**, Orfali R, Viegas A, Zhang M*. Structure-activity relationship studies of SK channel positive allosteric modulators. **Society for Neuroscience Annual Meeting**, November 2017. Washington, DC.
11. Siwiecki S, **Nam YW**, Whitmore BJ, Orfali R, Zhang M*. Mutagenesis study on the Ca²⁺ sensitivity of SK2 channels. **Experimental Biology 2017**, April 25th. 2017. Chicago, IL.
12. **Nam YW**, Whitmore BJ, Orfali R, Zhang M*. Mutagenesis study on the Ca²⁺ sensitivity of SK2 channels. **Biophysical Society 61th Annual Meeting**, February 12th. 2017. New Orleans, LA.
13. Whitmore BJ, **Nam YW**, Orfali R, Zhang M*. Allosteric Modulation of SK Channels. **Society for Neuroscience Annual Meeting**, November 2016, San Diego, CA.
14. **Nam YW**, Sara Ali, Chiang S, Alexander T, Zhang M*. The interactions between Riluzole and SK2 channel. **Experimental Biology 2016**, April 5th, 2016. San Diego
15. **Nam YW**, Sara Ali, Chiang S, Alexander T, Zhang M*. Positive Allosteric Modulation of SK Channels by Riluzole. **Biophysical Society 60th Annual Meeting**, February 2016. Los Angeles, CA.

Patent (on progress)- Chapman University

“SK CHANNEL POSITIVE ALLOSTERIC MODULATORS”

Miao Zhang, Keykavous Parang, Naglaa Ibrahim, and **Young-Woo Nam**

Complete List of Published work in My Bibliography:

<https://www.ncbi.nlm.nih.gov/myncbi/collections/mybibliography/>