



Danny Hung-Chieh Chou

Associate Professor of Pediatrics (Endocrinology) and, by courtesy, of Chemical and Systems Biology

Pediatrics - Endocrinology and Diabetes

CONTACT INFORMATION

- **Administrative Associate**

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Bio

BIO

Danny Chou is an Associate Professor of Pediatrics (Endocrinology and Diabetes) at Stanford University. He received his PhD from Harvard University, working in the lab of Prof. Stuart Schreiber. His Ph.D. research involved the identification of suppressors of cytokine-induced apoptosis in pancreatic beta cells. He then moved to MIT, where he was a JDRF Postdoctoral Fellow in Department of Chemical Engineering. He worked under the guidance of Profs. Robert Langer and Daniel Anderson, focusing on the development of glucose-responsive insulin derivatives. Danny started his independent career in Department of Biochemistry at University of Utah in August, 2014. At Utah, Danny's research focused on protein and peptide therapeutics for the treatment in Type 1 Diabetes and other human diseases. In 2020, Danny moved his research lab to Stanford University to continue their efforts in developing novel insulin therapeutics. His laboratory has received funding support from NIH, DoD, JDRF and American Diabetes Association. Danny has received recognitions including an American Peptide Society Early Career Lectureship, Boulder Peptide Society Young Investigator Award, JDRF Career Development Award, Vertex Scholar, JDRF Postdoctoral Fellow and ADA Junior Faculty Award.

ACADEMIC APPOINTMENTS

- Associate Professor, Pediatrics - Endocrinology and Diabetes
- Associate Professor (By courtesy), Chemical and Systems Biology
- Member, Bio-X
- Member, Cardiovascular Institute
- Member, Maternal & Child Health Research Institute (MCHRI)
- Faculty Fellow, Sarafan ChEM-H

ADMINISTRATIVE APPOINTMENTS

- Affinity Group Leader, Stanford Diabetes Research Center, (2020- present)

HONORS AND AWARDS

- Early Career Lectureship, American Peptide Society (2022)
- Young Investigator Award, Boulder Peptide Society (2021)
- Career Development Award, JDRF (2018)

- Junior Faculty Development Award, American Diabetes Association (2016)
- Postdoctoral Fellowship, JDRF (2013)
- Vertex Scholar Fellowship, Harvard University (2010)

PROFESSIONAL EDUCATION

- Postdoc, Massachusetts Institute of Technology , Chemical Engineering (2014)
- PhD, Harvard University , Chemistry and Chemical Biology (2011)
- BS, National Taiwan University , Chemistry (2006)

LINKS

- Chou Lab website: <https://www.dannychoulab.com>

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

Our research program integrates concepts of chemical biology, protein engineering and structure biology to design new therapeutic leads and generate probes to study biological processes. A key focus of our lab is insulin, an essential hormone in our body to reduce blood glucose levels. We generate synthetic libraries of insulin analogs to select for chemical probes, and investigate natural insulin molecules (e.g. from the venom of fish-hunting cone snails!) to develop novel therapeutic candidates. We are especially interested in using chemical and enzymatic synthesis to create novel chemical entities with enhanced properties, and leverage the strong expertise of our collaborators to apply our skill sets in the fields of cancer biology, immunology and pain research. Our ultimate goal is to translate our discovery into therapeutic interventions in human diseases.

Teaching

COURSES

2021-22

- Peds Endo Journal Club Course: BIOS 260 (Aut)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Amanda Wiggenhorn

Postdoctoral Faculty Sponsor

Yuankun Dao, Shay Laps, Wenchao Li, Yanxian Zhang

Doctoral Dissertation Advisor (AC)

Maxwell Austin

Publications

PUBLICATIONS

- **Advanced gel preserves therapeutic proteins** *NATURE*
Zhang, Y., Chou, D.
2024; 631 (8021): 507-508
- **A cysteine-specific solubilizing tag strategy enables efficient chemical protein synthesis of difficult targets.** *Chemical science*
Li, W., Jacobsen, M. T., Park, C., Jung, J. U., Lin, N. P., Huang, P. S., Lal, R. A., Chou, D. H.
2024; 15 (9): 3214-3222

- **Omniligase-1-Mediated Phage-Peptide Library Modification and Insulin Engineering.** *ACS chemical biology*
Zhang, Y. W., Lin, N. P., Guo, X., Szabo-Fresnais, N., Ortoleva, P. J., Chou, D. H.
2024
- **Serine-mediated hydrazone ligation displaying insulin-like peptides on M13 phage pIII.** *Organic & biomolecular chemistry*
Zhang, Y. W., Zheng, N., Chou, D. H.
2023
- **From Natural Insulin to Designed Analogs: A Chemical Biology Exploration.** *Chembiochem : a European journal of chemical biology*
Zhang, Y., Hung-Chieh Chou, D.
2023: e202300470
- **Antagonistic Insulin Derivative Suppresses Insulin-Induced Hypoglycemia.** *Journal of medicinal chemistry*
Park, C., Zhang, Y., Jung, J. U., Buron, L. D., Lin, N. P., Hoeg-Jensen, T., Chou, D. H.
2023
- **Supramolecular approaches for insulin stabilization without prolonged duration of action.** *Acta pharmaceutica Sinica. B*
Meudom, R., Zhang, Y., VandenBerg, M. A., Zou, L., Zhang, Y. W., Webber, M. J., Chou, D. H.
2023; 13 (5): 2281-2290
- **Supramolecular Protein Stabilization with Zwitterionic Polypeptide-Cucurbit[7]uril Conjugates.** *Biomacromolecules*
Claus, Z. S., Meudom, R., Su, B., VandenBerg, M. A., Saini, S. S., Webber, M. J., Chou, D. H., Kramer, J. R.
2022
- **Unconventional insulins from predators and pathogens.** *Nature chemical biology*
Laugesen, S. H., Chou, D. H., Safavi-Hemami, H.
2022; 18 (7): 688-697
- **Improved Handling of Peptide Segments Using Side Chain-Based "Helping Hand" Solubilizing Tools.** *Methods in molecular biology (Clifton, N.J.)*
Jacobsen, M. T., Spaltenstein, P., Giesler, R. J., Chou, D. H., Kay, M. S.
2022; 2530: 81-107
- **Modifying insulin to improve performance.** *Science (New York, N.Y.)*
Lin, N. P., Chou, D. H.
2022; 376 (6599): 1270-1271
- **Symmetric and asymmetric receptor conformation continuum induced by a new insulin.** *Nature chemical biology*
Xiong, X., Blakely, A., Kim, J. H., Menting, J. G., Schafer, I. B., Schubert, H. L., Agrawal, R., Gutmann, T., Delaine, C., Zhang, Y. W., Artik, G. O., Merriman, A., Eckert, et al
2022
- **Synthesis and Characterization of Phenylboronic Acid-Modified Insulin With Glucose-Dependent Solubility.** *Frontiers in chemistry*
Lin, N., Zheng, N., Purushottam, L., Zhang, Y. W., Chou, D. H.
2022; 10: 859133
- **Expanding peptide-cucurbit [7] uril interactions through selective N-terminal reductive alkylation** *Current Research in Chemical Biology*
Meudom, R., Zheng, N., Zhu, S., Jacobsen, M. T., Cao, L., Chou, D. H.
2022; 2: 100013
- **Facile synthesis of insulin fusion derivatives through sortase A ligation.** *Acta pharmaceutica Sinica. B*
Disotuar, M. M., Smith, J. A., Li, J., Alam, S., Lin, N., Chou, D. H.
2021; 11 (9): 2719-2725
- **Discovery of Methylene Thioacetal-Incorporated alpha-RgIA Analogues as Potent and Stable Antagonists of the Human alpha9alpha10 Nicotinic Acetylcholine Receptor for the Treatment of Neuropathic Pain.** *Journal of medicinal chemistry*
Zheng, N., Christensen, S. B., Dowell, C., Purushottam, L., Skalicky, J. J., McIntosh, J. M., Chou, D. H.
2021
- **Targeting transcriptional coregulator OCA-B/Pou2af1 blocks activated autoreactive T cells in the pancreas and type 1 diabetes.** *The Journal of experimental medicine*

- Kim, H., Perovanovic, J., Shakya, A., Shen, Z., German, C. N., Ibarra, A., Jafek, J. L., Lin, N., Evavold, B. D., Chou, D. H., Jensen, P. E., He, X., Tantin, et al
2021; 218 (3)
- **Development of Conformationally Constrained alpha-RgIA Analogues as Stable Peptide Antagonists of Human alpha9alpha10 Nicotinic Acetylcholine Receptors.** *Journal of medicinal chemistry*
Zheng, N., Christensen, S. B., Blakely, A., Dowell, C., Purushottam, L., McIntosh, J. M., Chou, D. H.
2020
 - **A structurally minimized yet fully active insulin based on cone-snail venom insulin principles.** *Nature structural & molecular biology*
Xiong, X., Menting, J. G., Disotuar, M. M., Smith, N. A., Delaine, C. A., Ghabash, G., Agrawal, R., Wang, X., He, X., Fisher, S. J., MacRaid, C. A., Norton, R. S., Gajewiak, et al
2020
 - **Glucose-Responsive Insulin Through Bioconjugation Approaches.** *Journal of diabetes science and technology*
Disotuar, M. M., Chen, D., Lin, N., Chou, D. H.
2020; 14 (2): 198–203
 - **Novel four-disulfide insulin analog with high aggregation stability and potency** *CHEMICAL SCIENCE*
Xiong, X., Blakely, A., Karra, P., VandenBerg, M., Ghabash, G., Whitby, F. G., Zhang, Y., Webber, M., Holland, W. L., Hill, C. P., Chou, D.
2020; 11 (1): 195–200
 - **Synthesis and Characterization of an A6-A11 Methylene Thioacetal Human Insulin Analogue with Enhanced Stability** *JOURNAL OF MEDICINAL CHEMISTRY*
Zheng, N., Karra, P., VandenBerg, M. A., Kim, J., Webber, M. J., Holland, W. L., Chou, D.
2019; 62 (24): 11437–43
 - **Long-Lasting Designer Insulin with Glucose-Dependent Solubility Markedly Reduces Risk of Hypoglycemia** *ADVANCED THERAPEUTICS*
Qiu, Y., Agrawal, R., Chen, D., Zheng, N., Durupt, G., Kim, J., Fisher, S. J., Chou, D.
2019; 2 (11)
 - **Synthesis of hydrophobic insulin-based peptides using a helping hand strategy** *ORGANIC & BIOMOLECULAR CHEMISTRY*
Disotuar, M. M., Petersen, M. E., Nogueira, J. M., Kay, M. S., Chou, D.
2019; 17 (7): 1703–8
 - **Fish-hunting cone snail venoms are a rich source of minimized ligands of the vertebrate insulin receptor** *ELIFE*
Ahorukomeye, P., Disotuar, M. M., Gajewiak, J., Karanth, S., Watkins, M., Robinson, S. D., Salcedo, P., Smith, N. A., Smith, B. J., Schlegel, A., Forbes, B. E., Olivera, B., Chou, et al
2019; 8
 - **Display of Single-Chain Insulin-like Peptides on a Yeast Surface** *BIOCHEMISTRY*
Jeong, M., Rutter, J., Chou, D.
2019; 58 (3): 182–88
 - **The immunoproteasome is induced by cytokines and regulates apoptosis in human islets** *JOURNAL OF ENDOCRINOLOGY*
Lundh, M., Bugliani, M., Dahlby, T., Chou, D., Wagner, B., Ghiasi, S., De Tata, V., Chen, Z., Lund, M., Davies, M. J., Marchetti, P., Mandrup-Poulsen, T.
2017; 233 (3): 369–79
 - **Application of Thiol-yne/Thiol-ene Reactions for Peptide and Protein Macrocyclizations** *CHEMISTRY-A EUROPEAN JOURNAL*
Wang, Y., Bruno, B. J., Cornillie, S., Nogueira, J. M., Chen, D., Cheatham, T. E., Lim, C. S., Chou, D.
2017; 23 (29): 7087–92
 - **Selective N-terminal functionalization of native peptides and proteins** *CHEMICAL SCIENCE*
Chen, D., Disotuar, M. M., Xiong, X., Wang, Y., Chou, D.
2017; 8 (4): 2717–22
 - **A minimized human insulin-receptor-binding motif revealed in a Conus geographus venom insulin** *NATURE STRUCTURAL & MOLECULAR BIOLOGY*
Menting, J. G., Gajewiak, J., MacRaid, C. A., Chou, D., Disotuar, M. M., Smith, N. A., Miller, C., Erchegeyi, J., Rivier, J. E., Olivera, B. M., Forbes, B. E., Smith, B. J., Norton, et al
2016; 23 (10): 916–20
 - **A Thiol-Ene Coupling Approach to Native Peptide Stapling and Macrocyclization** *ANGEWANDTE CHEMIE-INTERNATIONAL EDITION*

Wang, Y., Chou, D.

2015; 54 (37): 10931–34

- **Kinase-Independent Small-Molecule Inhibition of JAK-STAT Signaling** *JOURNAL OF THE AMERICAN CHEMICAL SOCIETY*
Chou, D., Vetere, A., Choudhary, A., Scully, S. S., Schenone, M., Tang, A., Gomez, R., Burns, S. M., Lundh, M., Vital, T., Comer, E., Faloon, P. W., Dancik, et al
2015; 137 (24): 7929–34
- **Glucose-responsive insulin activity by covalent modification with aliphatic phenylboronic acid conjugates** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Chou, D., Webber, M. J., Tang, B. C., Lin, A. B., Thapa, L. S., Deng, D., Truong, J. V., Cortinas, A. B., Langer, R., Anderson, D. G.
2015; 112 (8): 2401–6
- **Inhibition of Histone Deacetylase 3 Protects Beta Cells from Cytokine-Induced Apoptosis** *CHEMISTRY & BIOLOGY*
Chou, D., Holson, E. B., Wagner, F. F., Tang, A. J., Maglathlin, R. L., Lewis, T. A., Schreiber, S. L., Wagner, B. K.
2012; 19 (6): 669–73
- **Synthesis of a Novel Suppressor of beta-Cell Apoptosis via Diversity-Oriented Synthesis** *ACS MEDICINAL CHEMISTRY LETTERS*
Chou, D., Duvall, J. R., Gerard, B., Liu, H., Pandya, B. A., Suh, B., Forbeck, E. M., Faloon, P., Wagner, B. K., Marcaurelle, L. A.
2011; 2 (9): 698–702
- **Small-Molecule Suppressors of Cytokine-Induced beta-Cell Apoptosis** *ACS CHEMICAL BIOLOGY*
Chou, D., Bodycombe, N. E., Carrinski, H. A., Lewis, T. A., Clemons, P. A., Schreiber, S. L., Wagner, B. K.
2010; 5 (8): 729–34
- **Highly efficient UV organic light-emitting devices based on bi(9,9-diarylfuorene)s** *ADVANCED MATERIALS*
Chao, T. C., Lin, Y. T., Yang, C. Y., Hung, T. S., Chou, H. C., Wu, C. C., Wong, K. T.
2005; 17 (8): 992–+