Research in this laboratory focuses on problems where deep insights into enzymology and metabolism can be harnessed to improve human health.

For the past two decades, we have studied and engineered enzymatic assembly lines called polyketide synthases that catalyze the biosynthesis of structurally complex and medicinally fascinating antibiotics in bacteria. An example of such an assembly line is found in the erythromycin biosynthetic pathway. Our current focus is on understanding the structure and mechanism of this polyketide synthase. At the same time, we are developing methods to decode the vast and growing number of orphan polyketide assembly lines in the sequence databases.

For more than a decade, we have also investigated the pathogenesis of celiac disease, an autoimmune disorder of the small intestine, with the goal of discovering therapies and related management tools for this widespread but overlooked disease. Ongoing efforts focus on understanding the pivotal role of transglutaminase 2 in triggering the inflammatory response to dietary gluten in the celiac intestine.
CURRENT RESEARCH AND SCHOLARLY INTERESTS

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CLINICAL TRIALS

- COVID-19 Outpatient Pragmatic Platform Study (COPPS) - Camostat Sub-Protocol, Recruiting
- COVID-19 Outpatient Pragmatic Platform Study (COPPS) - Master Protocol, Recruiting
Teaching

COURSES

2020-21
• Graduate Practical Training: CHEMENG 299 (Sum)
• Special Topics in Biocatalysis: CHEMENG 503 (Aut, Win, Spr, Sum)

2019-20
• Graduate Practical Training: CHEMENG 299 (Sum)
• Special Topics in Biocatalysis: CHEMENG 503 (Aut, Win, Spr, Sum)

2018-19
• Graduate Practical Training: CHEMENG 299 (Sum)
• Interdisciplinary Approaches to Human Health Research: BIO 193, BIOE 193, CHEM 113, CHEMENG 193 (Win)
• Special Topics in Biocatalysis: CHEMENG 503 (Aut, Win, Spr, Sum)
• The Chemical Principles of Life II: CHEM 143 (Spr)

2017-18
• Introduction to Chemical Engineering: CHEMENG 20, ENGR 20 (Spr)
• Special Topics in Biocatalysis: CHEMENG 503 (Aut, Win, Spr, Sum)
• The Chemical Principles of Life I: CHEM 141 (Win)
• The Chemical Principles of Life II: CHEM 143 (Spr)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)
Xujun Cao, Jacqueline Carozza, Anna Elleman, Pablo Elvira, Kevin Erazo Castillo, Catherine Garrison, Stacie Kim, Catherine Liou, Rachel Mardjuki, Niraj Mehta, Prima Dewi Sinawang, Catherine Stark, Payton Weidenbacher, Brian Zhong

Postdoctoral Faculty Sponsor
Dillon Cogan, Maryline Dong, Aleks Nivina, Lee Stunkard

Doctoral Dissertation Advisor (AC)
Katarina Guzman, Jake Hsu, Elise Loppinet, Arak Melkonian, Thomas Privalsky, Alex Soohoo, Nielson Weng

Doctoral Dissertation Co-Advisor (AC)
Omokolade Adebowale, Katie Antilla, Kaustabh Basu, Julietta Gomez-Fritelli, Robert Lee

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS
• Biochemistry (Phd Program)
• Biophysics (Phd Program)

Publications

PUBLICATIONS
• 50 Years Ago in The Journal of Pediatrics: Association of Type 1 Diabetes Mellitus and Celiac Disease: Then and Now. The Journal of pediatrics
  Ni, J., Khosla, C., Maahs, D. M.
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• Association of Type 1 Diabetes Mellitus and Celiac Disease: Then and Now *JOURNAL OF PEDIATRICS*
  Ni, J., Khosla, C., Maahs, D. M.
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• Peginterferon Lambda-1a for treatment of outpatients with uncomplicated COVID-19: a randomized placebo-controlled trial. *Nature communications*

• Structure and Mechanism of the Ketosynthase-Chain Length Factor Didomain from a Prototypical Polyunsaturated Fatty Acid Synthase. *Biochemistry*
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• Antibody Probes of Module 1 of the 6-Deoxyerythronolide B Synthase Reveal an Extended Conformation During Ketoreduction. *Journal of the American Chemical Society*
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- **Generation of food-grade recombinant Lactobacillus casei delivering Myxococcus xanthus prolyl endopeptidase.** Applied microbiology and biotechnology
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- **Elucidation of the Cryptic Epimerase Activity of Redox-Inactive Ketoreductase Domains from Modular Polyketide Synthases by Tandem Equilibrium Isotope Exchange** JOURNAL OF THE AMERICAN CHEMICAL SOCIETY
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