Granton A. Jindal

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EDUCATION

Princeton University — Princeton, NJ
Ph.D., Chemical Engineering — Nov. 2017
Certificate, Bioengineering — Aug. 2017
M.A., Chemical Engineering — Apr. 2014
Research Title: "Analyzing pathogenic MEK variants in zebrafish"

California Institute of Technology — Pasadena, CA
B.S., Bioengineering, with Honor — Jun. 2012
Research Title: "Investigating AND gate topologies to aid in proteomic analysis"

RESEARCH EXPERIENCE

Department of Medicine, University of California San Diego — La Jolla, CA
Postdoctoral Researcher; Adviser: Prof. Emma K. Farley — Nov. 2017 – Present
Understanding how mutations in noncoding areas of the genome affect heart-specific gene expression using high-throughput assays in Ciona. Demonstrated that affinity-optimizing mutations within cardiac enhancers disrupt heart development.

Lewis-Sigler Institute, Princeton University — Princeton, NJ
Graduate Researcher; Advisers: Prof. Stanislav Y. Shvartsman, Prof. Rebecca D. Burdine — Jan. 2013 – Sep. 2017
Demonstrated a ranking of MEK1 mutations found in RASopathies, human developmental disorders, using functional assays in the embryonic zebrafish. Showed context-dependent ERK signaling with these MEK1 mutations in the embryonic zebrafish. Contributed data to help attain NIH grant R01 GM086537.

Kavli Institute for Theoretical Physics, University of California Santa Barbara — Goleta, CA
Santa Barbara Advanced School of Quantitative Biology 2016 Summer Research Course — Jul. 2016 – Aug. 2016
Quantifying BMP4 and Nodal signaling dynamics in human embryonic stem cells – Adviser: Prof. Aryeh Warmflash
Effects of mechanical forces on somite formation and gene oscillators in zebrafish – Adviser: Prof. Andrew C. Oates

California Institute of Technology — Pasadena, CA
Undergraduate Researcher; Adviser: Prof. David A. Tirrell — Jun. 2010 – Jun. 2012
Demonstrated split mutant Methionyl-tRNA Synthetase activity for split sites with in-gel fluorescence images using bacterial cell culture methods, molecular cloning, and Western blots. Showed that a HIS tag fused to an alkyne can be used to separate azide-labeled proteins using a Nickel-NTA column.

Louisiana State University — Baton Rouge, LA
Undergraduate Researcher; Adviser: Prof. Grover L. Waldrop — Jun. 2009 – Sep. 2009
Learned laboratory skills including polymerase chain reaction, molecular cloning, site-directed mutagenesis, and protein expression. Introduced specific mutations into the Biotin Carboxylase protein using these techniques.

AWARDS AND HONORS

Schulman Award for Cardiovascular Research, UCSD Division of Cardiovascular Medicine — Jun. 2022
Hartwell Postdoctoral Fellowship, The Hartwell Foundation — Nov. 2020 – Oct. 2022
Hilde Mangold Postdoctoral Symposium Participant, Society for Developmental Biology — Jul. 2020

AHA Postdoctoral Fellowship, American Heart Association Jan. 2019 – Oct. 2020
Chancellor's Research Excellence Scholarship, UC San Diego Jan. 2018 – Sep. 2019
Cardiology Postdoctoral Training Program Fellow, National Institutes of Health Jan. 2018 – Dec. 2018
Graduate Research Fellowship, National Science Foundation Jul. 2013 – Jun. 2015, Jul. 2016 – Jun. 2017
Poster Award, 11th Structural Birth Defects Meeting, Bethesda, MD Apr. 2017
DeLill Nasser Award for Professional Development in Genetics, Genetics Society of America May 2016
Schowalter Travel Award, Princeton University Chemical & Biological Engineering Mar. 2016
Amgen Scholars Research Fellowship, Amgen Foundation Jun. 2011
Summer Undergraduate Research Fellowship, Caltech Jun. 2010
Valedictorian of Class of 2008, Baton Rouge Magnet High School May 2008
Intel Science Talent Search Semifinalist, Society for Science and the Public Jan. 2008

PUBLICATIONS

Song BP, Ragsac MF, Tellez K, **Jindal GA**, Grudzien JL, Le SH, Farley EK. Diverse logics and grammar encode notochord enhancers. *bioRxiv* (2022).

Jindal GA, Bantle AT, Solvason JJ, Grudzien JL, D'Antonio-Chronowska A, Lim F, Le SH, Larsen RO, Klie A, Frazer KA, Farley EK. Affinity-optimizing mutations within cardiac enhancers disrupt heart development and contribute to cardiac traits. *bioRxiv* (2022).

Marmion RA, Yang L, Goyal Y, **Jindal GA**, Wetzel JL, Singh M, Schüpbach T, Shvartsman SY. Molecular mechanisms underlying cellular effects of human MEK1 mutations. *Mol. Biol. Cell.* 32:974-983 (2021).

Jindal GA and Farley EK. Enhancer grammar in development, evolution, and disease: dependencies and interplay. *Dev. Cell.* 56:575-587 (2021).

Pelliccia JL, **Jindal GA**, Burdine RD. Gdf3 is required for robust Nodal signaling during germ layer formation and left-right patterning. *eLife.* 6:e28635 (2017).

Jindal GA*, Goyal Y*, Humphreys JM, Yeung E, Tian K, Patterson VL, He H, Burdine RD, Goldsmith EJ#, Shvartsman SY#. How activating mutations affect MEK1 regulation and function. *J. Biol. Chem.* 292:18814-18820 (2017).

Goyal Y*, **Jindal GA***, Pelliccia JL, Yamaya K, Yeung E, Futran AS, Burdine RD, Schüpbach T, Shvartsman SY. Divergent effects of intrinsically active MEK variants on developmental Ras signaling. *Nat. Genet.* 49:465-469 (2017).

Jindal GA*, Goyal Y*, Yamaya K, Futran AS, Kountouridis I, Balgobin CA, Schüpbach T, Burdine RD, Shvartsman SY. In vivo severity ranking of Ras pathway mutations associated with developmental disorders. *Proc. Natl. Acad. Sci. U.S.A.* 114:510-515 (2017).

Mahdavi A, Hamblin GD, **Jindal GA**, Bagert JD, Dong C, Sweredoski MJ, Hess S, Schuman EM, Tirrell DA. An engineered aminoacyl-tRNA synthetase for cell-selective analysis of mammalian protein synthesis. *J. Am. Chem. Soc.* 138:4278-4281 (2016).

Jindal GA*, Goyal Y*, Burdine RD, Rauen KA, Shvartsman SY. RASopathies: unraveling mechanisms with animal models. *Dis. Model. Mech.* 8:769-782 (2015).

Mahdavi A, Segall-Shapiro TH, Kou S, **Jindal GA**, Hoff KG, Liu S, Chitsaz M, Ismagilov RF, Silberg JJ, Tirrell DA. A Genetically Encoded AND Gate for Cell-Targeted Metabolic Labeling of Proteins. *J. Am. Chem. Soc.* 135:2979-2982 (2013).

(*,# Equal contribution)

PRESENTATIONS

Jindal GA, Bantle AT, Solvason JJ, Grudzien JL, Ryan GE, Lim F, Le SH, Larsen RO, Klie A, Farley EK. Affinity-optimizing mutations within cardiac enhancers disrupt heart development. **Cardiology Fellows Research Day**; May 12, 2022; San Diego, CA. Oral Presentation.

Jindal GA, Bantle AT, Solvason JJ, Grudzien JL, Ryan GE, Lim F, Le SH, Larsen RO, Klie A, Farley EK. Affinity-optimizing mutations within cardiac enhancers disrupt heart development. Cold Spring Harbor Laboratory: **Systems Biology: Global Regulation of Gene Expression**; Mar 10, 2022; Laurel Hollow, NY. Poster Presentation.

Jindal GA, Solvason JJ, Klie A, Le SH, Farley EK**.** A single base pair change dramatically alters binding site affinity and enhancer activity. **Society for Developmental Biology,** Hilde Mangold Postdoctoral Symposium; July 10, 2020. Oral Presentation.

Jindal GA, Farley EF. Elucidating regulatory principles governing heart development in Ciona intestinalis. **Cardiology Fellows Research Day;** May 4, 2019; San Diego, CA. Poster Presentation.

Jindal GA, Farley EF. Elucidating regulatory principles governing heart development. **Chancellor's Research Excellence Scholarship Symposium;** Oct. 25, 2018; San Diego, CA. Oral Presentation.

Jindal GA, Farley EF. Discovery of notochord enhancers in Ciona intestinalis. **Society for Developmental Biology;** July 22, 2018; Portland, OR. Poster Presentation.

Jindal GA*, Goyal Y*, Yamaya K, Futran AS, Kountouridis I, Balgobin CA, Schüpbach T, Burdine RD, Shvartsman, SY. *In vivo* ranking of MEK1 mutations associated with developmental disorders. **11th Structural Birth Defects Meeting**; Apr. 03, 2017; Bethesda, MD. Poster.

Jindal GA*, Goyal Y*, Yamaya K, Futran AS, Kountouridis I, Balgobin CA, Schüpbach T, Burdine RD, Shvartsman, SY. *In vivo* ranking of MEK1 mutations associated with developmental disorders. **The Allied Genetics Conference**; Jul. 15, 2016; Orlando, FL. Oral presentation.

Jindal GA*, Goyal Y*, Yamaya K, Futran AS, Kountouridis I, Balgobin CA, Schüpbach T, Burdine RD, Shvartsman, SY. *In vivo* ranking of MEK1 mutations associated with developmental disorders. **Mid-Atlantic Society for Developmental Biology Meeting**; May 21, 2016; Washington, DC. Oral presentation.

Jindal GA*, Goyal Y*, Yamaya K, Futran AS, Kountouridis I, Balgobin CA, Schüpbach T, Burdine RD, Shvartsman, SY. *In vivo* ranking of MEK1 mutations associated with developmental disorders. **Icahn Seminar Series**; May 18, 2016; Princeton, NJ. Oral presentation.

Jindal GA*, Goyal Y*, Yamaya K, Futran AS, Kountouridis I, Balgobin CA, Schüpbach T, Burdine RD, Shvartsman, SY. *In vivo* ranking of MEK1 activating variants using functional assays in zebrafish and *Drosophila*. **Princeton University Developmental Colloquium**; Nov. 20, 2015; Princeton, NJ. Oral presentation.

Jindal GA*, Goyal Y*, Yamaya K, Balgobin CA, Kountouridis I, Schüpbach T, Burdine RD, Shvartsman SY. *In vivo* ranking of MEK1 activating variants using functional assays in zebrafish and *Drosophila*. **Princeton University CBE Graduate Student Symposium**; Oct. 16, 2015; Princeton, NJ. Oral presentation.

Jindal GA, Goyal Y, Balgobin CA, Shvartsman SY, Burdine RD. The Effects of MEK1 RASopathy Mutations on Zebrafish Morphological Phenotypes. **4th International RASopathies Symposium**; Jul. 17, 2015; Seattle, WA. Poster.

Jindal GA, Balgobin CA, Shvartsman SY, Burdine RD. The Effects of RASopathies on Zebrafish Heart Morphogenesis. **Princeton University Mol. Bio. Dept. Retreat**; Oct. 11, 2014; Princeton, NJ. Oral presentation.

Jindal GA, Mahdavi A, Tirrell DA. Using the H-tag to Standardize Purification of Azide-labeled Proteins. **Southern California Undergraduate Research Conference in Chemistry and Biochemistry**; Apr. 23, 2011; Santa Barbara, CA. Oral presentation.

(*Equal contribution)

LEADERSHIP EXPERIENCE AND SERVICE

Reviewer, The Catalyst @UCSD — Jan. 2022 - Present

AHA Reviewer in training

Peer reviewer for *Human Mutation, Biophysical Journal, Molecular Ecology Resources, Journal of Experimental Zoology Part B: Mol. and Dev. Evol.*

Moderator, The Annual Summer Research Conference UC San Diego — Aug. 2020

Alumni Volunteer Interviewer, Princeton University Alumni Schools Committee — Feb. 2017 – Mar. 2020

Member, Princeton University Graduate Engineering Council — Feb. 2016 – Jun. 2017

Caltech Upper Class Counselor — Sep. 2011 – May 2012

Co-Editor-in-Chief, Caltech Undergraduate Research Journal — Jun. 2011 – May 2012

Associate Editor, Caltech Undergraduate Research Journal Oct. 2008 – May 2011
Caltech RISE Tutoring Program, Tutored Pasadena High School Students Oct. 2010 – May 2012
Caltech Dean's Tutoring Program, General and Organic Chemistry Oct. 2009 – Mar. 2010, Jan. 2011 – Mar. 2011

TEACHING AND MENTORING EXPERIENCE

Discussion leader, Monthly journal club on evolutionary developmental biology Jan 2018 – Dec 2019
Completion of Pathways to Scientific Teaching course, taught by Diane Ebert-May Mar 2018
Assistant in Instruction, Introduction to Chemical Engineering Principles undergraduate course Fall 2015
Instructor, Introduction to Biotechnology intersession course Wintersession 2015
Research Mentor

- Alexis Bantle, Biological Sciences graduate rotation student Jan. 2021 – Feb. 2021
- Joe Solvason, Bioinformatics graduate rotation student
- Sally Lee, '19; Summer Molecular Biology undergraduate student Jun. 2017 – Aug. 2017
- Aleena L. Patel, Chemical Engineering graduate rotation student Dec. 2015 – Jun. 2016
- Iason Kountouridis, '17; Mathematics undergraduate student Jun. 2015 – Sep. 2016
- Ji-Sung Kim, '18; Spring term Computer Science undergraduate student Feb. 2015 – May 2015
- Courtney A. Balgobin, '15; Senior Thesis Molecular Biology undergraduate student Apr. 2014 – May 2015
- Hope Xu, '15; Summer Molecular Biology undergraduate student Jun. 2013 – Aug. 2013

PROFESSIONAL MEMBERSHIPS

American Heart Association Oct. 2017 - Present
American Association for the Advancement of Science Dec. 2015 - Present
Genetics Society of America Dec. 2015 - Present
Society for Developmental Biology Feb. 2015 - Present