

Alan G. Raetz, PhD

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Education

Ph.D. Biochemistry & Molecular Biology, 3.7 GPA	University of California, Davis
M.S. Biology, 3.5 GPA	California State University, Chico
B.A. Psychology, 3.5 GPA	University of California, Santa Barbara
A.S. Electronic Engineering Technology, 3.8 GPA	Heald College, San Francisco, California

Work Experience

- May 2022 – Present Bioinformatics Scientist self-employed (independent science project)
- Develop/test cancer neoantigen vaccine software using mutational signatures with Python, Perl, Pandas, Git and Linux.
 - Python code sample: <https://github.com/alanraetz/signatureExomeScan/blob/main/parseSignatures.py>.
 - Filed US provisional patent under my name, full legal rights granted to me by University of California
- Dec 2019 – Mar 2022 Postdoctoral Researcher UC Davis Medical Center, Laboratory of Jeremy R. Chien
- Statistical analysis of RNASeq and single-cell high-content imaging data (ImageXpress) using R, Perl and Linux
- Dec 2016 – Nov 2019 Postdoctoral Researcher University of California, Davis, Laboratory of Sheila S. David
- Developed/funded a massively parallel method to measure cellular DNA repair using high throughput scanning mutagenesis
 - Determined how cancer-associated MUTYH potentiates alkylating agent cytotoxicity in mammalian cells
 - First author publication Journal of Biological Chemistry ([https://www.jbc.org/article/S0021-9258\(17\)48635-2/fulltext](https://www.jbc.org/article/S0021-9258(17)48635-2/fulltext))
- July 2014 – Nov 2016 Bioinformatics Developer Qiagen Bioinformatics, Redwood City, CA
- Automate data processing pipeline for HGVS mutation mapping for clinical genome sequencing using Perl, Python, Git, Linux
 - Developed Ensembl.org biological database import process automation using of Perl, Git, and Linux
- Jan 2014 – June 2014 Postdoctoral Researcher Lawrence Berkeley National Laboratory, Laboratory of Priscilla Cooper
- Investigate the role of the DNA repair enzyme XPG in premature aging syndromes and cancer
- Sept 2007 – Dec 2013 Graduate Student Researcher Department of Chemistry, University of California, Davis
- PhD in Biochemistry & Molecular Biology. Developed a flow cytometry-based reporter of DNA repair in human cells
- Oct 2005 – Aug 2007 Senior Software Engineer Walmart.com, Brisbane, California
- Developed Java and Perl-based systems for real-time inventory and financial transactions
 - Use of Perl, Java, SVN, Oracle SQL, PL/SQL, Linux
- July 2005 – Oct 2005 Bioinformatics Programmer Stanford University School of Medicine, Palo Alto, CA
- Created software tools for sequence and clinical data analysis for the HIV drug resistance database with MySQL, Perl, Linux.
- Aug 2001 – May 2005 Graduate Student Researcher California State University, Chico
- Master's program in Biology. Thesis: QTL genetic mapping of a complex behavioral trait in Drosophila
 - Coursework in biostatistics, calculus, chemistry, biochemistry, genetics, immunology, physiology, and neurophysiology
- Jan 2001 – Sept 2005 LAMP Web Developer Independent Contractor (Various Companies)
- Work directly with clients and end-users to develop web applications for business, academic, and open-source projects
 - Use of Linux, Apache, MySQL, Perl, Perl/CGI and PHP to create custom database-driven websites for boardreviews.com, steel-base.com, CSU Chico Greenhouse (many other clients and projects completed)
 - Bugzilla.org bug-tracking contributor and on-site Perl Developer contract for ZoneAlarm.com
- Sept 1996 – Oct 2000 Software Engineer SciTech Software, Inc., Chico, California
- Eight employee startup company
 - Created display drivers in C and Intel assembly language, software licensed to IBM

Software Skills Summary

Languages: Perl, Python, R, C, PHP, Java, Bash, Javascript/HTML, Intel Assembly Language

Databases: MySQL, Oracle SQL, PL/SQL

DevOps + Virtualization Tools: SVN, Git, Perforce, Snakemake, Jira, AWS, Docker, Kubernetes

Tools/Packages/Environments: Pandas, R Studio, VS Code, Jupyter, PyTorch (fast.ai), Statistical packages

Fellowships & Awards

Buck Institute / National Institute of Aging (NIA) Postdoctoral Fellowship 2013-2014

National Institute of Environmental Health Science (NIEHS) Predoctoral Fellowship 2010-2012

CSU Chico Outstanding Master's Thesis 2006

CSU Chico Biology Department Outstanding Student Researcher 2005

Grants & Patents

California Cancer Research Coordinating Committee "High-throughput analysis of DNA Repair Cancer Variants" Award Period: 2020-2021. Conceived and formulated research plan using multi-channel flow cytometry and wrote grant proposal.

US Provisional Patent "Using Mutational Signatures to Improve Cancer Neoantigen Prediction" recorded 6/24/2022

Publications

De Souza C, Madden J, Koestler DC, Minn D, Montoya DJ, Minn K, **Raetz AG**, Zhu Z, Xiao WW, Tahmassebi N, Reddy H, Nelson N, Karnezis AN, Chien J. Effect of the p53 P72R Polymorphism on Mutant TP53 Allele Selection in Human Cancer. *J Natl Cancer Inst.* 2021 Sep 4;113(9):1246-1257. doi: 10.1093/jnci/djab019.

Batra N, De Souza C, Batra J, **Raetz AG**, Yu AM. The HMOX1 Pathway as a Promising Target for the Treatment and Prevention of SARS-CoV-2 of 2019 (COVID-19). *Int J Mol Sci.* 2020 Sep 3;21(17):6412. doi: 10.3390/ijms21176412.

Tsutakawa SE, Sarker AH, Ng C, Arvai AS, Shin DS, Shih B, Jiang S, Thwin AC, Tsai MS, Willcox A, Her MZ, Trego KS, **Raetz AG**, Rosenberg D, Bacolla A, Hammel M, Griffith JD, Cooper PK, Tainer JA. Human XPG nuclease structure, assembly, and activities with insights for neurodegeneration and cancer from pathogenic mutations. *Proc Natl Acad Sci U S A.* 2020 Jun 23;117(25):14127-14138. doi: 10.1073/pnas.1921311117.

Raetz AG, Banda DM, Ma X, Xu G, Rajavel AN, McKibbin PL, Lebrilla CB, David SS. The DNA repair enzyme MUTYH potentiates cytotoxicity of the alkylating agent MNNG by interacting with abasic sites. *J Biol Chem.* 2020 Mar 13;295(11):3692-3707. doi: 10.1074/jbc.RA119.010497.

Raetz AG, David SS. When You're Strange: Unusual features of the MUTYH glycosylase and implications in cancer. *DNA Repair.* 2019 Jun 8; 80:16-25. doi: 10.1016/j.dnarep.2019.05.005.

Majumdar C, Nuñez NN, **Raetz AG**, Khuu C, David SS. Cellular Assays for Studying the Fe-S Cluster Containing Base Excision Repair Glycosylase MUTYH and Homologs. *Methods Enzymol.* 2018;599:69-99. doi: 10.1016/bs.mie.2017.12.006.

Shen Y, McMackin M, Shan Y, **Raetz A**, David SS, Cortopassi GA. Frataxin deficiency promotes microglial DNA damage and inflammation that is rescued by the PARP inhibitor PJ34. *PLOS ONE.* 2016 March 8; <http://dx.doi.org/10.1371/journal.pone.0151026>

Engstrom, L; Brinkmeyer, M; Ha, Y; **Raetz, AG**; Hedman, B; Hodgson, K; Solomon, E; David, S. A Zinc Linchpin Motif in the MUTYH Glycosylase Interdomain Connector is Required for Efficient Repair of DNA Damage. *J Am Chem Soc.* 2014 Jun 4;136(22):7829-32

Raetz AG, Xie Y, Kundu S, Brinkmeyer MK, Chang C, David SS. Cancer-associated variants and a common polymorphism of MUTYH exhibit reduced repair of oxidative DNA damage using a GFP-based assay in mammalian cells. *Carcinogenesis* 2012; 33(11):2301-9.

References

Jeremy Chien, Professor of Molecular Medicine, UC Davis Medical Center, jrchien@ucdavis.edu Sacramento, CA

Sheila S. David, Professor of Chemistry, UC Davis. ssdavid@ucdavis.edu Davis, CA

Kaushal Parekh, MS. Manager, Qiagen Bioinformatics. kaushal.d.parekh@gmail.com Redwood City, CA