

MMI 291 Seminar Series

Current Theme: Interdisciplinary Research
Fall Quarter 2025 – CRN 38614

Friday Seminar at 12:10-1 p.m.
GBSF Auditorium, Room 1005

“Roles of BRCA1, BRCA2, and RAD51 Paralogs in Recombinational DNA Repair and Cancer Predisposition”

Research Bio

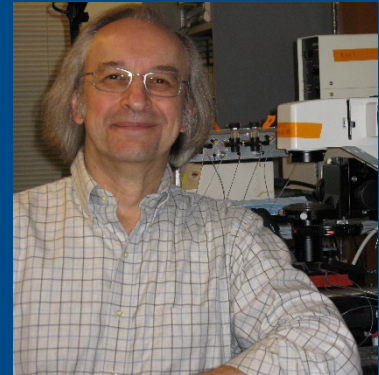
Professor Kowalczykowski's goals of the laboratory are to understand the molecular mechanisms of recombinational DNA repair and its role in the maintenance of genomic integrity. For over 3 decades, the lab has consistently made significant and impactful contributions towards the understanding of DNA recombination, using both ensemble and single molecule methods. As an independent investigator, my work has uniquely advanced the field of DNA recombination, and many of my lab's discoveries are now being described in textbooks. We continue to make seminal – and disruptive – scientific discoveries. Over my career, I have investigated the biochemistry of recombination proteins from bacteria (RecA, RecBCD, AddAB, RecF, RecO, RecR, RecJ, RecQ, TopIII, RecN, RecX and SSB), archaea (RadA, Rad54, SSB, and RPA), yeast (Rad51, Rad52, Rad54, Rad59, RPA, Sgs1, Top3, Rmi1, Dna2, Exo1, Sae2, and Mre11-Rad50-Xrs2), and humans (BRCA1, BRCA2, PALB2, RAD51, RAD51B, RAD51C, RAD51D, XRCC2, XRCC3, RAD52, BLM, RECQ1, RECQ4, RECQ5, WRN, DNA2, EXO1, TOP1IIa, RPA, CTIP, and MRE11-RAD50-NBS1). Our current work now includes chromatin-remodeling and DNA replication. The focus of my work has been to reconstitute recombination systems in vitro, and to define the mechanism by which the constituent parts function. It is fair to say that our work has been innovative: we developed unique single-molecule instrumentation and approaches that enable one to directly visualize, in real-time, individual protein molecules acting on single molecules of DNA. Together with other approaches developed by other labs, the single-molecule approach has been transformative.

Publications

Jensen, R.B., Carreira, A., and **Kowalczykowski**, S.C. (2010). “Purified human BRCA2 stimulates RAD51- mediated recombination”. *Nature*, 467(7316), 678-683. PMID: PMC2952063

Forget, A.L. and **Kowalczykowski**, S.C. (2012). “Single-molecule imaging of DNA pairing by RecA reveals a 3- dimensional homology search”. *Nature*, 482(7385), 423-427. PMID: PMC3288143

Dec.
5



Stephen Charles Kowalczykowski, Ph.D.
Distinguished Professor
Microbiology and Molecular Genetics
Molecular and Cellular Biology

University of California, Davis

Dec. 5, 2025
12:10 – 1 p.m.
GBSF Auditorium
Room 1005
In-person presentation

Medical Microbiology and
Immunology
School of Medicine

Seminar Contact:
Autumn Vega
advega@health.ucdavis.edu

We hope to see you there!