How chemical genetics can reveal new biology

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One of the goals of chemical genetics is to uncover new biology. My laboratory has developed a platform to profile huge libraries of \textit{S. aureus} mutants (≈500,000 different mutants) under different treatments (e.g., perturbations with antibiotics and other compounds). By probing enormous mutant collections with small molecules, we identify the genes (gene products) that are important for a given biological process. In this lecture, I will describe our platform and how we have used it, and will then describe our discovery of a \textit{S. aureus} enzyme that coordinates cell growth with cell division.

Suzanne Walker received a Bachelor of Arts in English literature at the University of Chicago and a doctorate in organic chemistry at Princeton University. She joined the faculty at Princeton as an instructor of chemistry in 1995 and was promoted to associate professor with tenure in 2001. Shortly thereafter (2003), she became the first woman to attain the rank of full professor of chemistry at Princeton. In 2004, she left Princeton to join the faculty at the Harvard Medical School. She helped build the Harvard University doctorate program in chemical biology, which was established in 2005, and has served as director of the program since 2011. She also serves as an associate editor for the \textit{Journal of the American Chemical Society}, handing papers in the areas of chemical biology and biochemistry.

Professor Walker is known for contributions in two major areas. One is the bacterial cell envelope. The Walker lab has developed methods to study the biosynthesis of peptidoglycan and other cell envelope pathways, and has developed novel approaches to discover and characterize new antibacterial targets and compounds. She has also made fundamental contributions to understanding O-GlcNAc transferase (OGT), an unusual glycosyltransferase that is essential for mammalian cell survival. Her laboratory has carried out the foundational biochemistry on OGT (mechanism and structure) and is developing methods to link in vitro mechanism with cellular function.

Walker has been recognized for her work through a number of awards, including a Camille Dreyfus Teacher-Scholar Award, an Alfred P. Sloan Foundation Fellowship, the Emil Thomas Kaiser Award in Protein Chemistry, an Arthur C. Cope Scholar Award, and most recently, election to the American Academy of Microbiology (2019). She has also been honored to be a W.S. Johnson Symposium speaker (Stanford 2011), the Ada Doisy Lecturer in Biochemistry (University of Illinois 2015), the Mary Sue Coleman Lecturer in the Life Sciences (University of Michigan 2015), a Frontiers in Chemistry Distinguished Lecturer (Scripps 2016), the T.Y. Shen Distinguished Lecturer in Biological Chemistry (MIT, 2016), the National Institutes of Health Director’s WALS Lecturer (Bethesda 2017), the Andrew Braisted Award Lecturer in Chemical Biology (Berkeley-UCSF 2017), and the Irwin Goldstein Lecturer in Glycobiology (University of Michigan 2019). She is especially pleased to honor the legacy of I.M. Kolthoff with a series of lectures at the University of Minnesota!

Additional information: https://z.umn.edu/WalkerSuzanne2