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Advanced ERC Grant for Brenda Schulman

Brenda Schulman, head of the department „Molecular Machines and Signaling“ at the Max Planck Institute of Biochemistry in Martinsried receives the Advanced Grant of the European Research Council. It comes with a funding of 2.2 million Euros over five years. Together with her team, Schulman wants to find out the numerous ways the ubiquitin-like protein NEDD8 activates hundreds of distinct but related ubiquitin ligase machineries. The understanding of these protein machineries on structural, functional, and cellular levels will help to understand a large family of regulatory complexes that control a major part of eukaryotic biology, like immunity or cell division and thereby plays a central role in many diseases.

Proteins are the workhorses of cells. Different types of work are done by different types of proteins, ranging from enzymes that digest food to components of muscle. In order for proteins to work properly, they need to be switched on when needed and off when their jobs are done. A major way that proteins are switched off is by marking them with another small protein called “ubiquitin”. Just like there are many different proteins, there are also hundreds of different molecular machines called E3 ligases that execute tagging with ubiquitin. Therefore, it is essential that E3 ligases are themselves turned on and off at the right place and at the right time in cells.

The “on-switch” for about one-third of all E3 ligases is a small protein that looks like ubiquitin, but is called NEDD8. "Although we know the components of many E3 ligases, we don't know how NEDD8 causes them to assemble from all their parts at the right time and place in a cell, or how NEDD8 causes them to be able to transfer ubiquitin," says Schulman. Using a multidisciplinary approach, the researchers want to understand everything NEDD8 does to activate E3 ligases, the mode of operation of the activated ubiquitin ligase machineries, and how NEDD8 causes other molecular machines to turn off the ubiquitin-marked proteins.

"We know that without NEDD8, much of the whole machinery of ubiquitination comes to a standstill. Accordingly, it has to perform essential tasks alongside other components," says Schulman. "Ultimately we want to understand this in such detail like in a film, we want to visualize the single steps in individual electron microscopic images three-dimensional and put them in order to understand the dynamic step-by-step progression through the process" summarizes Schulman.





About Brenda Schulman

Schulman did her Bachelor's degree in Biology at the Johns Hopkins University, Baltimore, MD, USA. After her PhD at M.I.T. in 1996, Cambridge, MA, USA, she spent five years as a postdoc, at Massachusetts General Hospital Boston, MA, USA and at the Memorial Sloan-Kettering Cancer Center, New York, NY, USA. 2001, Schulman moved to the St. Jude Children's Research Hospital in Memphis, TN, USA. Here she worked from 2005 and 2017 as Howard Hughes Medical Institute Investigator. Since 2016, Brenda Schulman is head of the department "Molecular Machines and Signaling" at the Max Planck Institute of Biochemistry. She received various awards, among them the USA Presidential Early Career Award for Scientists and Engineers. She became a member of the American Academy of Arts and Sciences, and of the National Academy of Sciences.

About the ERC

The European Research Council, set up by the European Union in 2007, is the first European funding organisation for excellent frontier research. Every year, it selects and funds the very best, creative researchers of any nationality and age, to run projects based in Europe. The ERC has three core grant schemes: Starting Grants, Consolidator Grants and Advanced Grants. The Advanced Grant is for well-established top researchers, who are scientifically independent and with a recent high-level research track-record and profile which identifies them as leaders in their respective field(s). More information you find here.

About the Max Planck Institute of Biochemistry

The Max Planck Institute of Biochemistry (MPIB) belongs to the Max Planck Society, an independent, non-profit research organization dedicated to top level basic research. As one of the largest Institutes of the Max Planck Society, around 800 employees from 45 nations work here in the field of life sciences. In currently eight departments and about 25 research groups, the scientists contribute to the newest findings in the areas of biochemistry, cell biology, structural biology, biophysics and molecular science. The MPIB in Munich-Martinsried is part of the local life-science-campus where two Max Planck Institutes, a Helmholtz Center, the Gene-Center, several bio-medical faculties of two Munich universities and several biotech-companies are located in close proximity.

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Caption

Brenda Schulman, PhD
Photo: Peter Barta © BMC/STJUDE

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