1104-92-293 **Rossitza N. Irobalieva**, **Jonathan M. Fogg**, **Daniel J. Catanese, Jr.**, **Thana Sutthibutpong**, **Steven J. Ludtke**, **Sarah A. Harris**, **Michael F. Schmid**, **Wah Chiu** and **Lynn Zechiedrich*** (elz@bcm.edu), One Baylor Plaza, Mail-stop: BCM-280, Baylor College of Medicine, Houston, TX 77030. *Structural diversity of positively and negatively supercoiled DNA revealed by electron cryo-tomography.*

DNA supercoiling affects all aspects of DNA metabolism (Fogg et al. 2012 Q Rev Biophys 45:257). In most organisms DNA is maintained in a negatively supercoiled (underwound) state. Positively supercoiled (overwound) DNA is generated during DNA replication and transcription, and, if not promptly removed, inhibits these processes. DNA topological regulation is critical and is the target of drugs against cancer and bacterial infections. Together with two more authors that did not fit on the form, graduate students, Muyuan Chen and Anna K. Barker, both of Baylor College of Medicine, we determined the 3D structure of DNA with specific levels of supercoiling. DNA supercoiling facilitated a wide variety of conformations and there were profound differences between positively and negatively supercoiled DNA and exposed DNA bases that varied with the direction and degree of supercoiling. These findings demonstrate that DNA uses supercoiling to change its structure in ways that significantly influence interactions with proteins, other segments of DNA or RNA, as well as the drugs that target DNA metabolic processes. Supported by NIH grant RO1A1054830, a Human Frontier Science Program grant, and an award from the John S. Dunn Foundation. (Received September 03, 2014)