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From: Soto, Lauran

KECK SCIENCE DEPARTMENT SEMINAR

"Single-Stranded DNA Binding Proteins in DNA Replication: One Size Doesn't Fit All"

Alex Pike

Visiting Assistant Professor of Biology

Oberlin College

Friday, November 17, 2023

12:15-1:15 PM

Burns Lecture Hall, Room B31

Abstract: Genome maintenance is crucial for cellular function. Failure to maintain genome integrity can cause cancer and age-related degenerative disease. Replication protein A (RPA), a eukaryotic protein that binds single-stranded DNA (ssDNA), regulates essential genome maintenance functions, including DNA replication, the DNA damage response, and DNA repair. To investigate the requirements for RPA during replication, we biochemically reconstituted eukaryotic DNA replication using budding yeast proteins. First, we investigated the requirement for RPA in replication origin unwinding by substituting viral and bacterial ssDNA-binding proteins into our eukaryotic system. We discovered that origin unwinding requires the specific ssDNA-binding properties of RPA, but not its protein-interaction domains. In contrast, we found that the RPA protein-interaction domains have distinct and opposing functions at the eukaryotic replication fork. Our results suggest that one domain positively regulates lagging-strand DNA synthesis while the other positively regulates this process. Currently, my research is using biochemical and genetic approaches to determine mechanism of how RPA regulates lagging-strand DNA polymerases. Finally, eukaryotic cells have a telomere-specific protein that resembles RPA in its structure and function that is essential for maintenance of chromosome ends. Some patients with short telomere syndromes, harbor mutations in this telomeric protein, so I will discuss future plans to investigate the role of ssDNA-binding proteins in telomere-length homeostasis.

Find additional seminar information here: <https://www.kecksci.claremont.edu/seminars/>

Best,
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