PhD Program in Life Sciences

Seminar Notice

January 16th, 2026 12:00 CET

Aula Tecce - CU026 - Meet

Prof. Riccardo Miggiano

University of Piemonte Orientale, Novara (Italy)

Prof. David Jeruzalmi

City College of New York, New York (USA)

Mechanisms of Damaged DNA Processing by the Bacterial Nucleotide Excision Repair Pathway

Abstract. Nucleotide Excision Repair (NER) pathway represents one of the most important DNA repair systems in Bacteria. The UvrABC excinuclease complex, comprising the UvrA, UvrB and UvrC proteins, constitutes the pathway responsible for the detection and removal of lesions in the DNA. This multi-step mechanism necessitates the dynamic assembly of protein complexes and is dependent ATP binding and hydrolysis. Specifically, the UvrA and UvrB proteins perform the initial interrogation of DNA for lesions, while avoiding native DNA. Here we present a structural and biophysical investigation of the damage recognition process of NER, with a specific focus on the roles played by the UvrA protein in localizing to the lesion on dsDNA. Our structural analyses reveal new insights in the DNA binding mode of UvrA, with an alternative conformation of some crucial regions involved in DNA coordination. Additionally, we propose a model for how the lesion is transferred to UvrB, highlighting the molecular details of the transient steps that lead to the formation of the pre-incision complex, where UvrB is the sole protein bound to the damaged DNA. Our structural analysis lays the foundation for deeper analyses by single-molecule fluorescence imaging, together with optical tweezers to understand the dynamics and mechanistic details of DNA damage recognition and during bacterial NER.

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