RESEARCH HIGHLIGHTS

The Electron Microscopy Unit is a research facility that supports biological scientific projects ranging from the cellular to the macromolecular level. The EM Unit performs sample preparation protocols, negative staining, cryo-EM, and data collection methods, as well as 2D and 3D data processing.

In collaboration with CNIO’s Telomeres and Telomerase Group (Molecular Oncology Programme) and the Crystallography and Protein Engineering Unit (Structural Biology and Biocomputing Programme), we used the single-particle electron microscopy technique to obtain the first low resolution structures of full-length TRF1 dimer (shelterin component) and its structure in complex with telomeric DNA. We contributed to the understanding of the molecular mechanism that protects the ends of chromosomes: our results demonstrate that full-length TRF1 presents a molecular architecture that assists its interaction with telomeric DNA and at the same time makes TRFH domains accessible to other TRF1 binding partners. Furthermore, our studies suggest hypothetical models on how other proteins such as TIN2 and tankyrase contribute to regulate TRF1 function.

In collaboration with Iván Ventoso, from the Centro de Biología Molecular Severo Ochoa (CSIC-UAM) and the Departamento de Biología Molecular, Universidad Autónoma de Madrid (UAM), the EM Unit participated in the novel findings that illustrate how viral mRNA is threaded into the 40S subunit during the scanning process. Based on structural and functional data, we generated new insights into the scanning process, describing how a stem-loop in the proximal region of viral mRNA can promote a Eukaryotic Initiation Factor 2 (eIF2)-less translation initiation by trapping in RNA extensions of the ribosomal 40S subunit.

We continued our collaboration with the CNIO Cell Signalling and Adhesion Group (Structural Biology and Biocomputing Programme) on PI(4,5)P2-mediated induction of Focal Adhesion Kinase (FAK) clustering at the cell membrane, applying 2D electron crystallography.

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