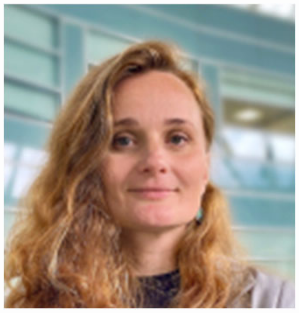
SCIENTIFIC SEMINAR



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CIC biomaGUNE

A cross-talk between FtsZ peptidoglycan synthesis and treadmilling dynamics

The breakthrough in vivo studies revealed that treadmilling cytoskeleton protein FtsZ could actively move transmembrane peptidoglycan synthases, and such dynamic coupling is critical for bacterial division. However, the underlying molecular mechanisms behind the coordination are still incomplete, even for a model organism such as E.coli. In our previous work, we reconstituted a part of bacterial division machinery from purified components and found that membrane-bound proteins can self-organize with the FtsZ filaments into chiral rotating rings using a supported lipid membrane bottom-up reconstitution approach. By employing single-molecule tracking and advanced image analysis, we also identified a molecular component in E.coli that can directionally move with treadmilling FtsZ filaments. By selectively tuning the parameters in the biochemical system, we aim to construct a biophysical model to explain the mechanism behind such “transport”. Considering that the bacterial life cycle relies on two dynamic and mechanically active assemblies, cytoskeleton and peptidoglycan, another focus of our work was to understand the mechanism of peptidoglycan synthesis using real-time microscopy. We developed a novel reconstitution, where a transmembrane cell wall synthase (PBP1b) was inserted in polymer-supported lipid membranes, allowing us to track the 2D dynamics of the enzyme during peptidoglycan synthesis. Using real-time FRET assay, we could monitor glycosyltransferase and transpeptidase activities of Class A PBPs from Escherichia coli, Pseudomonas aeruginosa, and Acinetobacter baumannii. By combining the two reconstituted systems with the recent advances in microfluidic assisted droplet supported lipid membranes, we aim to investigate further the cross-talk between two mechanically active assemblies on free-standing lipid membranes.

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Thursday
May 8
Atrio 800
12.00H

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