

Thesis Project Offer

Joint Research and Education Programme "Palestinian-German Science Bridge PGSB"
Forschungszentrum Jülich GmbH & Palestine Academy for Science and Technology

Thesis type*

<input type="checkbox"/> BSc	<input checked="" type="checkbox"/> MSc	<input type="checkbox"/> PhD	Intended starting date (approx.): 2023
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Project description*

Delivery of markers as well as diagnostic and therapeutic agents to biological cells is an important step for both, basic research and medical applications. One approach to achieve successful delivery is the use of small unilamellar vesicles that fuse with the cell's plasma membrane and thereby deliver their cargo to the cytosol. However, the physico-chemical mechanisms that control fusion are not well understood. Besides the desired fusion, potential outcomes of fusion experiments can be that the vesicles do not bind to the plasma membrane, that the vesicles remain attached to the membrane but do not fuse, and that the vesicles are enveloped by the cell membrane and therefore endocytosed and degraded in lysosomes. Furthermore, plasma membranes are often decorated with a glycan layer that interacts with the vesicles before a direct contact between the lipid membranes.

Using a combination of analytical calculations employing a continuum membrane model and lipid-based computer simulations, the student will investigate the importance of several aspects on the fusion efficiency, including curvature-elasticity of the lipid bilayer membrane, asymmetry of the two monolayers, shapes of lipids, membrane curvature prior to fusion, and possibly a glycan layer.

Date*	Signature*
31.01.2023	-

* required field