

Regulation of the calcium pump, SERCA1a ATPase, by transmembrane peptides.
Analysis by molecular dynamics simulation

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SERCA1a, the Sarco/Endoplasmic Reticulum Calcium ATPase is a membrane protein which transports calcium from the cytosol of the cell to the lumen of the Sarco Reticulum at the expense of ATP hydrolysis during muscle relaxation. The catalytic cycle of the enzyme is well characterized and many high-resolution X-ray structures are available which illustrate the different states of SERCA1a over the cycle.

More recently, different membrane peptides have been discovered and their role as regulator of SERCA1a activity demonstrated. Nonetheless, the exact mechanism of regulation is not fully understood.

In that context, we are interested in two different regulators, Sarcolipin (SLN) and DWORF. Different approaches are performed within the laboratory: biochemical, biophysical studies and molecular dynamics simulation. During the internship, we propose to study the interaction of SERCA1a with these peptides by molecular dynamics simulations. Indeed, molecular dynamics simulations allow a description of the systems at atomic level and thus a detailed analysis of the interactions.

The interaction of SERCA1a with SLN has been already performed during a previous thesis work in the lab and will be carried on. The new system SERCA1a-DWORF will have to be constructed and simulated, the data obtained will then be compared to the system SERCA1A-SLN.

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