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Public Abstract

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Graduation Term:WS 2007

Department:Biological Sciences

Degree:PhD

Title:QUANTITATIVE BIOLOGICAL STUDIES AT CELLULAR AND SUB-CELLULAR LEVEL

We developed a magnetic tweezers apparatus for quantitative measurements at cellular and sub-cellular level.

In the cellular studies, multiple membrane tethers were extracted simultaneously under constant force transduced to eukaryotic cells through magnetic beads attached to their membranes. The tethers were characterized in terms of viscoelastic parameters. The contribution of the cell cytoskeleton in the process of tether formation was investigated. The membrane tether system was used to test the applicability of the Crooks fluctuation theorem (a recent finding in non-equilibrium thermodynamics) at the cellular level.

In the sub-cellular studies, the cytoplasmic viscoelastic parameters of mouse oocytes were determined using magnetic beads trapped into their cytoskeletal mesh. We found that cryopreservation altered all the viscoelastic parameters. We demonstrated that the reversible disassembly of the actin cytoskeleton with latrunculin A before cryopreservation increased the number of survivors and preserved their viscoelastic parameters. This finding promoted latrunculin as a candidate cryoprotective agent.