UNIVERSITY of GUELPH

COLLEGE of BIOLOGICAL SCIENCE

DEPARTMENT OF MOLECULAR AND CELLULAR BIOLOGY

DEPARTMENTAL SEMINAR

AUG 02 FRI 11:00 AM

Summerlee Science Complex

SSC 3317

DR. CARLEEN KLUGER

CHAIR, APPLIED PHYSICS AND CENTRE FOR NANOSCIENCE

LUDWIG-MAXIMILIANS-UNIVERSITÄT

"Thinking beyond affinities - mechanical aspects of receptor-ligand interactions between Vinculin and its binding sites"

In contrast to freely moving cytoplasmic proteins, the components of cytoskeletal and adhesion structures show a nano-scale spatial organization, which enables them to transduce mechanical forces across multiple protein linkages. Single Molecule Force Spectroscopy using the AFM in combination with steered Molecular Dynamics simulations enabled us to reveal mechanisms that determine the strength of these receptor-ligand interactions under mechanical force. During the last years we studied how the Focal Adhesion protein Vinculin binds to a whole set of different proteins with the same structural mechanism. The mechanical strength of this interaction is independent of affinity but sensitive to force loading direction. By preferentially stabilizing certain relative pulling directions, Vinculin might thus contribute to cytoskeletal organization. On the other hand, Vinculin binding sites are also relevant for entry of pathogenic bacteria like *Shigella*, *Chlamydia* or *Rickettsia* into the cell.

BIOGRAPHY

I received my undergraduate training in Physics with a focus on Biophysics and Computational Neuroscience from Ludwig-Maximilians-Universität in Munich (Germany) and Università degli Studi di Pisa (Italy). During my Phd at the Max-Planck-Institute of Biochemistry in Martinsried (Germany) I had the chance to work on the development of novel FRET based genetically encoded tension sensors that can measure forces acting across proteins inside living cells. Ever since I have been interested in Mechanobiology, especially of adhesion proteins. To learn more about single molecule mechanics of these proteins as a PostDoc I joined the lab of Prof. Hermann Gaub, a pioneer of AFM based single molecule force spectroscopy. Over the last years we investigated the focal adhesion protein Vinculin but also the force dependence of Biotin/Streptavidin, an interaction with high importance for biotechnological application. My most recent project tries to understand the role of mechanical forces during gamete fusion by studying the Juno/Izumo complex, which is the first receptor-ligand pair that has shown to be essential for mammalian fertilization.

All welcome to attend

Light refreshments will be served

Hosted by Dr. Jennifer Geddes-McAlister

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