

Masterarbeit/Masterproject

am Institut für Molekulare Zellbiologie
AG Bioenergetik und Mitochondriale Dynamik
Prof. Dr. Karin Busch – MSc. Tasnim Arroum

Westfälische Wilhelms-Universität Münster
Schloßplatz 5
48149 Münster



Intercellular communication in tumor biology

Communication between cells is possible not only via gap junctions but also via tunneling nanotubes (TNTs).¹ These represent a subset of transient tubular connections with a diameter ranging from 20 to 500 nm lasting for minutes or hours. The TNTs not only enable long range electrical coupling but also mediate the intercellular transfer of various cargos, such as organelles, prions, plasma membrane components, pathogens and Ca^{2+} . They have been proposed to participate in the rescue mechanism of injured cardiomyoblasts or endothelial cells by mesenchymal stem cells (MSCs) through transferred mitochondria. A recent study suggested that in cancer cells, the intercellular mitochondrial transfer plays an important role². In the master project this shall be tested: 1) Do true cytosolic connections exist between cells in culture, 2) can those connections be induced and 3) are organelles like mitochondria be transported through TNTs?

Your task will be to express different fluorescence-labelled constructs in sibling cell, co-seed them and test for exchange of compounds. Cells and intercellular connections will be investigated by high resolution fluorescence microscopy, 3D-cell tomography and FACS analysis. In this master project you will learn the maintenance and differentiation of different cancer cells neuron-like cells, advanced high resolution microscopy of living cells, physiological measurements *in situ* and qualitative and quantitative data analysis.

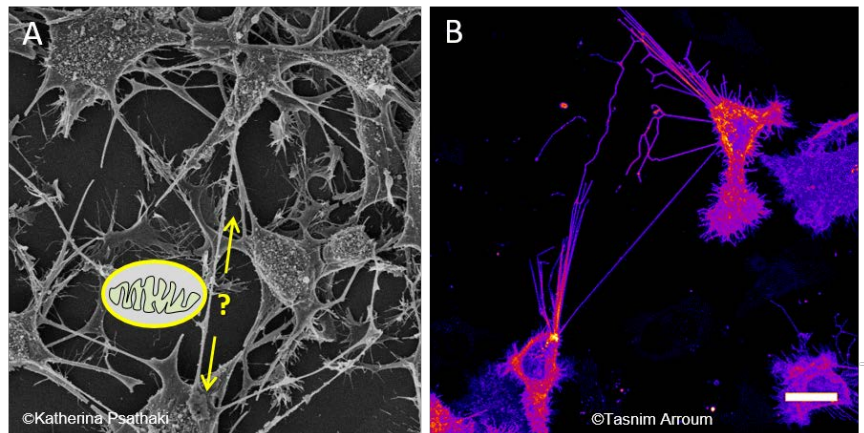


Figure 1: Nanotubule formation between cancer cells. (A) Hypothesis of intercellular mitochondrial transfer via nanotubes. Scanning electron microscopy image of rat cancer cell line superimposed with mitochondrial scheme. (B) Lst1-induced nanotube formation between adjacent cervix cancer cells. Scale bar: 30 µm.

Contact

Prof. Dr. Karin Busch, e-mail: buschkar@uni-muenster.de | phone: +49-241-83-21560

- 1 MARZO, L., GOUSSET, K. & ZURZOLO, C. MULTIFACETED ROLES OF TUNNELING NANOTUBES IN INTERCELLULAR COMMUNICATION. FRONT PHYSIOL 3, 72, DOI:10.3389/FPHYS.2012.00072 (2012).
- 2 HERST, P. M., DAWSON, R. H. & BERRIDGE, M. V. INTERCELLULAR COMMUNICATION IN TUMOR BIOLOGY: A ROLE FOR MITOCHONDRIAL TRANSFER. FRONT ONCOL 8, 344, DOI:10.3389/FONC.2018.00344 (2018).