

Investigating Subcellular Iron Fluxes in Cancer Cells by High-Resolution Fluorescence Microscopy

Summary

Gottfried Schatz Research Center (Molecular Biology and Biochemistry & Biophysics), Medical University of Graz

Supervisor: Prof. Dr. Roland Malli
Availability: This position is available.
Offered by: Medical University of Graz
Application deadline: Applications are accepted between August 03, 2022 00:00 and September 20, 2022 23:59 (Europe/Zurich)

Description

Background:

Cellular iron supply is required for various biochemical processes but in excess iron can become highly toxic causing severe oxidative damage¹. Iron is thus both vital and lethal to cells. Given this double-edged character, it is assumed that cancer cells have evolved particular strategies to maximally benefit from a cellular iron load thereby avoiding ferrotoxicity². However, due to the lack of suitable techniques³, little is known about cancer cell type-specific dynamics of iron uptake, biodegradation, storage, subcellular transport, and efflux.

Hypothesis and Objectives:

We hypothesize that novel biosensor-based strategies will allow the high-resolution investigation of subcellular iron dynamics in cancer cells. We anticipate that illuminating the cancer cell-specific iron metabolism and homeostasis will open new avenues in the diagnosis and therapy of cancer.

Methodology:

The Ph.D. candidate will design, develop, generate and optimize new as well as existing fluorescent protein-based biosensors⁴ to detect subcellular iron transport activities and biochemical consequences thereof in cultured cancer cells in vitro using high-resolution fluorescence microscopy techniques.

References:

1. Guo, Q. *et al.* The Role of Iron in Cancer Progression. *Front. Oncol.* **11**, 778492 (2021).
2. Torti, S. V. & Torti, F. M. Iron and Cancer: 2020 Vision. *Cancer Res.* **80**, 5435–5448 (2020).
3. Au-Yeung, H. Y., Chan, J., Chantarojsiri, T. & Chang, C. J. Molecular Imaging of Labile Iron(II) Pools in Living Cells with a Turn-On Fluorescent Probe. *J. Am. Chem. Soc.* **135**, 15165–15173 (2013).
4. Depaoli, M. R. *et al.* Live cell imaging of signaling and metabolic activities. *Pharmacol. Ther.* **202**, 98–119 (2019).



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