

Modern application of stable isotope mass spectroscopy method to discover new therapeutic targets of breast cancer metabolism

Summary

Breast cancer is most diagnosed tumor and second cause of death among female worldwide. Remodeling of metabolism during malignant transformation of cancer cells is one of main hallmark of tumor. Thus, cancer metabolism is perspective therapeutic target of cancer treatment. ^{18}O stable isotope metabolomic method has successfully applied to study myocardial ischemia, heart failure, neurodegenerative disorders. Therefore, ^{18}O stable isotope metabolomic method will offer new perspectives to discover alterations in the dynamics of energetic and metabolomic signaling circuits in cancer cells. In current PhD project modern ^{18}O stable isotope mass spectroscopy method will be applied to discover new therapeutic targets of breast tumor by analyzing cancer cells metabolomic fingerprints.

Research field: Chemistry and Biotechnology
Supervisors: Tuuli Käämbre
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Availability: This position is available.
Offered by: School of Science
National Institute Of Chemical Physics And Biophysics
Application deadline: Applications are accepted between June 01, 2020 00:00 and July 03, 2020 23:59 (Europe/Zurich)

Description

We plan to characterize CK, AK and HK mediated energy transfer pathways responsible for the energy homeostasis in breast cancer cell culture models and clinical material, and define interplay between the HK, AK and CK-catalyzed processes in maintaining energy homeostasis in CRC cells and their role in the proliferative and invasive potency of these cancers. The studied cancer subtypes are Luminal A, Luminal B and Triple negative breast cancer. Firstly, comparative analysis of phosphotransfer network for different components was performed in all experimental groups (linear cell culture, 3D cell culture, clinical material). To determine roles of AK2, AK4 and AK 6 in regulating cellular AMP levels and AMPK metabolic signaling we will use AK2, AK4 and AK 6 deficient cell lines described in experimental design. HK and CK isoforms specificity is also studied.

^{18}O -based technology uniquely allows simultaneous measurements of metabolite levels and their turnover rates in cell by mass spectrometry (GC-MS and LC-qTOF-MS) and ^{31}P NMR.

Responsibilities and tasks

PhD student will be participate in protocol design for research of phosphotransfer network, carried out oxygraphic, HPLC and LC/MS measurements, cell culturing, human sample preparation and also participated in data analysis and writing the articles.

Qualifications

Master degree

The applicants should fulfill the following requirements:

- competence in areas of the biological sciences relevant to this research (such as biochemistry, bioenergetics, bio-analytical chemistry, biophysics)
- interest in cell metabolism

- fluency in English



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