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Profiling of lipid mediators and fatty acids in metastatic breast cancer in mice

Statement of the Problem: Breast cancer is the most frequently diagnosed tumor in women worldwide and a leading cause of cancer death. Due to the high incidence rate of breast cancer, the development of screening method is urgently needed. Targeted lipidomic analysis has indicated the potential of using bioactive lipids and fatty acids as breast cancer biomarkers.

Methodology & Theoretical Orientation: Lipid profiling in plasma was analyzed using GC/MS/MS system based on targeted lipidomic platform with the assessment of lung metastases progression in mice model (4T1) of breast cancer. To characterize lipid profile in plasma in the early and late stage of metastasis we focus on bioactive lipids and saturated, monounsaturated and polyunsaturated fatty acids pathway.

Findings: Based on primary tumor growth and lung metastases, 1-2 weeks period after 4T1 cancer cells inoculation was defined as early metastatic stage, while 3-4 weeks period after 4T1 cancer cells inoculation as late metastatic stage. The early and late phase of metastasis was characterized by a different pattern of lipids profile in plasma. The main changes in plasma lipids profile were observed at the late phase of metastasis evidenced by the reduction of the ratio of polyunsaturated to saturated fatty acids. Decreased plasma concentration of free fatty acids has been found to be associated with tumor progression in mice.

Conclusion & Significance: The early and late phase of metastasis in murine 4T1 metastatic breast cancer was associated with plasma lipidome remodeling and activation of lipid signaling mediators coincided with metastasis progression. Identification of lipid targets that play a role in breast cancer invasion may advance our understanding of the rapid progression of cancer and may lead to the development of new biomarkers for the disease.

References

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Biography

Maria Walczak has completed her Graduation from the Faculty of Pharmacy Medical Academy in Krakow, Poland and PhD degree from the Faculty of Pharmacy, Jagiellonian University Medical College (UJ CM) and Habilitation thesis in Pharmacokinetics in 2014. Since 2001 she has been working at the Department of Pharmacokinetics and Physical Pharmacy UJ CM as a Lecturer, since 2010 at the Jagiellonian Centre for Experimental Therapeutics (JCET) as a Manager of the Laboratory of Analytics and Pharmacokinetics and since 2015 as a Head of Chair and Department of Toxicology, Faculty of Pharmacy UJ CM. Her scientific work refers to pharmacokinetic and toxico-kinetic profiling, metabolite screening, targeted lipidomics and proteomics and ligands binding to blood proteins.

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