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Pre-metastatic rearrangement of lungs function – proteomic characterization of metastatic niche formation

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Metastases are the major cause of high mortality in patients with cancer. Lung metastatic niche facilitate the process of cancer cells survival in a foreign microenvironment and enables their protection against immune defense. The study aimed at the proteomic profiling of the lung tissue in order to characterize the mechanisms underlying the pre-metastatic rearrangement of lung function, thus the pre-metastatic niche formation in the experimental model of tumor metastasis in murine 4T1 mammary adenocarcinoma. The 4T1 tumor cells were orthotopically inoculated into the mammary fat pad of the BALB/c female mice. Analysis was performed in lungs one and two weeks after cancer cells transplantation. 2-Dimensional Gel Electrophoresis (2DGE) was applied for the comparative analysis of protein expression patterns with nano LC-MS/MS technique for identification of differentially expressed proteins. The investigated weeks represented the metastatic niche formation period as the metastases appeared in the lungs after the second week after cancer cells inoculation. Slight but statistically significant changes were noted in structure, binding, transporter/receptor, catalytic and antioxidant activity. In context of further selection of early cancer-related biomarkers the most interesting were i.e. endoplasmin, serine protease inhibitor a3k, selenium binding protein, 14-3-3 protein zeta/delta, EF-hand domain-containing protein D2, Rho GDP-dissociation inhibitor 2 and calumenin. This approach enabled the characterization of the molecular changes and to analyze the adaptation mechanisms of the system, which gives great opportunities to understand the metastasis progression and identify potential biomarkers characteristic for the early stages of cancer metastasis, thus identification of the potential targets for therapies.

Biography

Anna Kurpinska has completed her PhD from West Pomeranian University in Szczecin, Poland. She is the Research Assistant in the field of Biomedical Analysis at Jagiellonian Centre for Experimental Therapeutics (JCET), Jagiellonian University, Poland. She has published more than 13 papers in reputed journals. Involved in non-targeted proteomics (nano LC-MS/MS) - screening of alterations of protein repertoire and targeted proteomic analysis (LC/MS-MRM) of the endothelium-related proteins in animal models of breast cancer, endotoxemia, obesity. She is the principal Investigator of the National Science Centre MINIATURA grant entitled: Analysis of the molecular mechanisms of metastasis in murine model of breast cancer with the aid of the comprehensive analysis of the changes in protein expression in lungs. She is a Co-executor of Polish Strategical Framework Program STRATEGMED entitled: Prostacyclin, nitric oxide and carbon monoxide-based pharmacotherapy of endothelial dysfunction and platelet activation-a novel strategy to inhibit cancer metastasis.

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