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Proteomics for cancer biomarkers: From MALDI-TOF profiling to targeted proteogenomics

Sergei Moshkovskii, Maria Karpova, Dmitri Karpov, Mikhail Pyatnitsky, Andrei Lisitsa and Alexander Archakov
Orekhovich Institute of Biomedical Chemistry, Russia

Cancer biomarker discovery started to use proteomics a decade ago, when a mass-spectrometric top-down approach was developed specifically for that purpose, a time-of-flight mass-spectrometry with matrix-assisted laser desorption ionization (MALDI-TOF). The method could be used for direct profiling of biological fluids, for example, plasma or urine. Usually, the sample is subjected to fast separation or desalting and applied to the metallic chip. In this approach, proteins and peptides are recorded in its intact form, but remain unidentified unless downstream experiments are performed. Most candidates identified by MALDI-TOF profiling of human fluids represent highly abundant proteins and peptides, such as inflammatory acute-phase proteins (complement fragments, serum amyloid A), lipoproteins and protease inhibitors (inter-alpha trypsin inhibitor). Obviously, levels of these molecules in plasma change are due to the reaction to the presence of tumor, rather than being specific products expressed by cancer cells.

The cancer genome concept was recently developed. A lot of somatic mutations produced in cancer genome should lead to the cancer proteome with amino acid polymorphism. Targeted mass-spectrometric approach, such as selected reaction monitoring of peptide ions, may detect and quantify peptides with cancer-specific amino acid changes, which may potentially serve as biomarkers with absolute specificity.

Biography

Sergei Moshkovskii was born on June 12, 1976 in Moscow, Russia. He graduated from Pirogov Russian National Research Medical University in 1998. In 2001 he post graduated in Orekhovich Institute of Biomedical Chemistry of the Russian Academy of Medical Sciences with Ph.D. Degree and became a senior researcher of Proteome Department of this institute and later the Head of this department. In 2013 he got a Doctor of Sciences in biochemistry. From 2009 he took part in teaching students in Pirogov Russian National Research Medical University in Medico-Biological Faculty and in April 2013 he entered a chair of biochemistry at the same faculty as a Professor. Now he leads the Department of Personalized Medicine in Orekhovich Institute of Biomedical Chemistry. He has more than 45 peer-reviewed publications and 3 patents.

smosh@mail.ru