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Cancer Stem Cell-Associated Serum Proteins Obtained by Maldi TOF/TOF Mass Spectrometry in Women with Triple-Negative Breast Cancer

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Abstract : Background: The use of biomarkers in breast cancer diagnosis, therapy, and prognosis has gained increasing interest. Cancer stem cells (CSCs) are a subpopulation of tumor cells that can drive tumor initiation and may cause relapse. Therefore, due to the importance of diagnosis, therapy, and prognosis, several biomarkers that characterize CSCs have been identified; however, in treatment-naïve triple-negative breast tumors, there is an urgent need to identify new biomarkers and therapeutic targets. According to this, the aim of this study was to identify serum proteins associated with cancer stem cells and pluripotency in women with triple-negative breast tumors in order to subsequently identify a biomarker for this type of breast tumor. Material and Methods: Whole blood samples from 12 women with histopathologically diagnosed triple-negative breast tumors were used after obtaining informed consent from the patient. Blood serum was obtained by conventional procedure and frozen at -80ºC. Identification of cancer stem cell-associated proteins was performed by matrix-assisted laser desorption/ionisation-assisted laser desorption/ionisation mass spectrometry (MALDI-TOF MS), protein analysis was obtained using the AB Sciex TOF/TOF™ 5800 system (AB Sciex, USA). Sequences not aligned by ProteinPilot™ software were analyzed by Protein BLAST. Results: The following proteins related to pluripotency and cancer stem cells were identified by MALDI TOF/TOF mass spectrometry: A-chain, Serpin A12 [Homo sapiens], AIEBP [Homo sapiens], Alpha-one antitrypsin, AT {internal fragment} [human, partial peptide, 20 aa] [Homo sapiens], collagen alpha 1 chain precursor variant [Homo sapiens], retinoblastoma-associated protein variant [Homo sapiens], insulin receptor, CRA_c isoform [Homo sapiens], Hydroxyisourate hydrolase [Streptomyces scopuliridis], MUCIN-6 [Macaca mulatta], Alpha-actinin-3 [Chrysochloris asiatica], Polyprotein M, CRA_d isoform, partial [Homo sapiens], Transcription factor SOX-12 [Homo sapiens]. Recommendations: The serum proteins identified in this study should be investigated in the exosome of triple-negative breast cancer stem cells and in the blood serum of women without breast cancer. Subsequently, proteins found only in the blood serum of women with triple-negative breast cancer should be identified in situ in triple-negative breast cancer tissue in order to identify a biomarker to study the evolution of this type of cancer, or that could be a therapeutic target. Conclusions: Eleven cancer stem cell-related serum proteins were identified in 12 women with triple-negative breast cancer, of which MUCIN-6, retinoblastoma-associated protein variant, transcription factor SOX-12, and collagen alpha 1 chain are the most representative and have not been studied so far in this type of breast tumor. Acknowledgement: This work was supported by Proyecto CONCYTEC–Banco Mundial “Mejoramiento y Ampliacion de los Servicios del Sistema Nacional de Ciencia Tecnología e Innovacion Tecnologica” 8682-PE (104-2018-FONDECYT-BM-IADT-AV).

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