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Differentially Expressed Protein Biomarkers in Early and Advanced Stage Young Triple-Negative Breast Cancer Patients

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Abstract : Breast cancer (BC) claims the lives of half a million women every year and is the most common cause of death in the developing world. In 2019, it was estimated that BC alone accounts for 15% of all cancer deaths in younger women (aged < 45 years old) with advanced-stage lung metastasis. According to the World Health Organization & International Union against Cancer, in Asia, a high number of cancer-related deaths will be observed in 2020, whereas the burden will be reduced in Western countries due to awareness about the disease, better health facilities and advanced treatments. In the last 15 years, it has been reported that the incidence of BC has increased by 1.1% among Asian compared to the US population from 2003 to 2012. To date, several BC biological subtypes have been reported so far, which are associated with different treatment responses. The heterogeneity and diversity of BC reflected these different subtypes, including Luminal A (23.7% prevalence) and B (38.8% prevalence) that have pathological estrogen receptor (ER+)-positive tumors, the human epidermal growth factor receptor 2 (HER2) (11.2% prevalence) and triple-negative breast cancer (TNBC) (25% prevalence). According to Shaukat Khanum Memorial Cancer Hospital and Research Centre – Pakistan, ten years of data showed that among 636 BC patients, 30.5% had TNBC who were <40 years of age, which is an extremely alarming situation. Therefore, there is a dire need to explore and develop therapeutic targets for the treatment of early TNBC. Since the last decade, unfortunately, there has been little success in understanding the complexity of TNBC and in discovering new biological therapeutic targets. However, conventional chemotherapy is the only choice of treatment for TNBC patients. Many investigators revealed advances in multi-omics (multiple "omes", e.g., genome, proteome, transcriptome, epigenome, and microbiome) which were later identified as actionable targets and increased prevalence in TNBC patients. However, various drugs have been identified so far which are related to a particular diagnostic and prognostic biomarker. For example, Epidermal growth factor receptor (EGFR or ErbB-1), HER-2/neu (ErbB-2), HER-3 (ErbB-3), and HER-4 (ErbB-4). Protein Transglin-2 (TAGLN 2) and Profilins-1 (Pfn-1) are the ubiquitously expressed large family of proteins present in all eukaryotes, enabling actin cytoskeletal reorganization. It is known that the oncogenic transformation of cells is accompanied by alteration in the actin cytoskeleton. There are causal connections between altered expression of actin cytoskeletal regulators and cancer progression. Our case-control study identified TAGLN-2 and Pfn-1 proteins in TNBC blood by mass spectrometry. Both TAGLN-2 and Pfn-1 proteins are differentially expressed in early and advanced stages of TNBS patients, which could be potential predictors or therapeutic targets for TNBC.

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