Cancer stem cells (CSCs) in the -Omics era.

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Despite many significant advances in the early detection and treatment of localized tumors, cancer still ranks as the second leading cause of death worldwide, due to the unavailability of efficacious treatments for metastatic diseases. Thus, there is an urgent need to develop new effective therapeutic strategies. In this regard, the improvement of “personalized” medicine is one of the primary goals of translational oncology. Compelling evidence showed that a small subset of cells with stem-like properties, named cancer stem cells (CSCs), is spared by standard therapies and ,thus, responsible for relapse and metastatic dissemination. CSC features are regulated by autocrine and paracrine interactions between tumor cells and their neighboring microenvironment (TME). Adipose tissue is a major component of TME, posing its targeting as an attractive therapeutic candidate to prevent metastatic outgrowth. In colorectal cancer, adipose tissue favors the transcriptomic reprogramming of epithelial CSCs (molecular subtype CMS2) into the more aggressive mixed immuno-mesenchymal phenotype (subtype CMS1 / CMS4). Likewise, adipose-derived stem cells (ADSCs) isolated from obese breast cancer patients secreted high levels of pro-tumorigenic factors as compared to ADSCs of normal weight patients. Thus, depicting the metabolic and transcriptomic profiles of breast CSCs co-cultured with obese ADSCs will identify biomarkers critical for breast cancer progression and chemoresistance. The possibility of carrying out a broad spectrum (comprehensive) diagnostic test will improve the prognosis and the quality of life of cancer patients, thanks to a personalized therapeutic approach.