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Yan Gao Man

International Union for Difficult-to-treat Diseases, USA

The most updated theory with supporting data for cancer invasion and metastasis

There are two major hypotheses that explain the mechanism of tumor progression from in situ to stromal tumor invasion. One is proteolytic enzymes theory which is based on the overproduction of MMPs by the myoepithelial cells and surrounding tumor cells and the other theory is known as focal myoepithelial cell layer disruption (FMCLD theory). Proteolytic enzymes theory—In order to invade the stroma and metastasize, tumor cells have to cross several barriers like BM, myoepithelial cell layer, interstitial tissues and extracellular matrices, which are composed primarily of collagen, proteoglycans, laminin, elastin, and other glycoproteins. Tumor cells over- express and secrete proteases which are capable of degrading the components of these barriers and thus facilitate their migration. According to the proteolytic enzyme theory, the progression from the in situ to invasive stage is believed to be triggered by the overproduction of various proteolytic enzymes by the tumor cells, such as MMPs, serine proteases and cathepsins resulting in the degradation of the BM. Focal myoepithelial cell layer disruption (FMCLD) theory—recently, a new model of tumor invasion of stroma by the epithelial cells was proposed by Yan Man. According to this model, tumor invasion is triggered by a series of events which begin when the myoepithelial cells are damaged by any genetic abnormalities, inflammation, mutations, localized trauma or other physical/chemical injuries which result in the disruption of the myoepithelial cell layer or impairs the normal replacement process. In fact, it is now known that disruption in the myoepithelial cell layer is the most distinct sign of tumor invasion in breast cancer. FMCLD theory has some advantages over proteolytic theory because it focuses on the interaction of the different types of cells present in the tumor microenvironment. Focal breakdown of myoepithelial cell layer and BM at sites of white blood cell infiltration have also been observed in DCIS. Emphasizing the necessity of changes in both in "seed" and "soil" for progression, epithelial cell clusters overlying the disrupted myoepithelial layers were different from adjacent cells within the same duct with respect of ER (estrogen receptor) status, frequency or pattern of LOH and/or MSI, and expression of tumor progression related genes, normal stem cell and proliferation markers, and showed invasion into the stroma and blood vessels-like structures. Since tumor-stromal interactions are bi-directional, identification of the initiating events requires further study.

Biography

Yan-Gao Man is the Co-Editor-in-chief of Onco-Medicine and also working as Publisher & editor-in-chief in the Journal New Approaches combating Cancer & Aging. He is also serving as Vice President of South Hospital of Nanjing, China and he worked as Consultant in The Health System of the Hunan Province, China.

anmann@aol.com

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