Tumor Microenvironment Complexity and Therapeutic Implications

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Abstract

Cancer cells don't just exist in isolation. Their dynamic interactions with cells and non-cell components in the tumor microenvironment (TME) allow cancer cells to grow and evolve. A new review highlights the complexity of the TME, the implications for cancer therapy, and advances in TME research. Tumor cells control the function of their environment, co-opting complex signaling networks for their own benefit, resulting in multi-drug resistance, metastasis, and cancer progression. To fully understand this phenomenon, we must go beyond 2D systems, using novel technologies such as 3D platforms and lab-on-chip devices to better simulate TME biology and function. Researchers can replicate the behavior of cells in the TME, including tumor epithelial cells, pericytes, cancer-associated fibroblasts, and tumor-associated macrophages. Non-cellular factors, including extracellular matrix components, exosomes, circulating free DNA, and apoptotic bodies, are also more easily studied using 3D systems. The knowledge gained from these studies will help to identify targets to disrupt tumor cell interactions with the TME, guiding the development of efficient and safe therapeutic strategies to fight cancer.