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The role of the mesenchymal stem cells on breast cancer: friends or foes?

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Mesenchymal stem cells (MSCs) have been the subject of an increased interest. Because of their ability to give rise to bone, cartilage, fat and muscle, their role in regenerative medicine has been extensively studied and the fact that they can be recruited at sites of inflammation and tissue repair

has prompted their potential use as tissue regenerative cells. Contextually there has been a growing interest in the role of MSCs in cancer progression. The nature of the relationship between MSCs and tumor cells appears dual, with effects pro- as well as anti-tumorigenic. This paradox depends on the source and the degree of differentiation of MSCs and the tumor model used. Moreover, with the large range of cytokines and growth factors they produce, MSCs exert regulatory function on apoptosis, angiogenesis and an immunomodulatory role.

Here we evaluate the interaction between MSCs derived from the periprosthetic capsule of mastectomyzed women and the breast cancer cell line MCF-7.

Capsular tissue around breast implants is a normal inflammatory reaction versus a foreign body and it is rich of MSCs. To asses how MSCs interact with tumor cells, MCF-7 cells were incubated with medium previously conditioned by MSCs or directly co-coltured with MSCs; subsequently, we evaluated the proliferation and the expression of genes implicated in different pathways (angiogenesis, proliferation, anti-apoptosis, EMT transition). Our results showed that MCF-7 cells cultured together MSCs or using their conditioned medium have a more elevated proliferation rate but tumour cells seem less aggressive, like attested by a reduction of the expression of selected genes. The understanding of the mechanisms that control the interaction between MSCs and tumor cells is still at an early stage but recent literature confirm that MSCs and their progeny are not innocent bystanders in the tumor microenvironment.

The study of these interactions is a critical area of future investigation that is needed to better define their role in cancer progression and their potential as therapeutic agents or targets.

Keywords: Mesenchymal stem cells, breast cancer, tumor microenvironment, paracrine effect.