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Characterization of a Mesenchymal Stem Cells Pool in Killian Nasal Polyp

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Abstract : Killian's Antrochoanal Polyp is a benign lesion of the maxillary sinus characterized by unilateral nasal obstruction, pus discharge, and headache. It affects, more commonly children and young adults. Although its etiology still remains unclear, chronic inflammation, autoreactivity, allergies, and viral infections are strongly associated with its formation and development, resulting in nasal tissue remodeling. We aimed to investigate the stem cells components which reside in this pathological tissue. In particular, we adopted a protocol for the isolation and culturing of mesenchymal stem cells from surgical biopsies of three Killian nasal polyp patients (KNP-MSCs) as well as from their healthy nasal tissue (HNT-MSCs) that were used as controls. The immunophenotype profile of HNT-MSCs and KNP-MSCs was more similar, with a marked positivity for CD73, CD90, and CD105 expression, while being negative for CD34 and CD14 haematopoietic genes. Cell proliferation assay showed that KNP-MSCs had a replicative disadvantage compared to HNT-MSCs, as evidenced by the significantly lower number of cells in the S-phase of the cell cycle. KNP-MSCs also took longer to close a wound than HNT-MSCs, indicating a partial epithelial phenotype in which low levels of ICAM-1 mRNA and a significant increase in E-CAD transcript were detectable. Subsequently, the differentiation potential of both MSCs populations was analyzed by inducing osteoblastic or adipocyte differentiation for up to 20 days. KNP-MSCs showed the ability to differentiate into osteoblasts, although ALP activity as well as the number and size of calcium deposits were lower than osteogenic induced-HNT-MSCs. Also, mRNA levels of osteoblastic marker genes (OCN, OPN, OSX, RUNX2) resulted lower compared to control cell population. Instead, the analysis of the adipogenic differentiation potential showed a similar behavior between KNP-MSCs and HNT-MSCs considering that the amount of lipid droplets, the expression of adipocyte-specific genes (FABP4, AdipoQ, PPARγ2, LPL) and the content of triacylglycerols were almost overlapping. Taken together, these results first demonstrated that Killian's nasal polyp is a source of mesenchymal stem cells with self-renewal and multi-differentiative capabilities.

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