Tenogenic differentiation of tonsil-derived mesenchymal stem cells
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Introduction/Purpose: Human palatine tonsil-derived mesenchymal stem cells (T-MSCs) are known to be a new source of progenitor cells. Using waste tissue after tonsillectomy as a cell provider can be the biggest benefit of T-MSCs, compared with other stem cells. The purpose of this study was to investigate tenogenic differentiation of T-MSCs and to access the differential effects of TGF-β3 on the tenogenesis of T-MSCs.

Methods: Human tonsil was obtained after tonsillectomy. Using a cytometric analysis, we were able to find that the T-MSCs had typical mesenchymal stem cell markers: positive for CD73, CD90 and CD105, and negative for CD14, CD34 and CD45. Using a Transforming growth factor beta 3 (TGF-β3), the expressions of tenocyte-specific genes and proteins, such as Collagen type I (COL1), Tenomodulin (TNMD), and Scleraxis (SCX), were measured by a quantitative polymerase chain reaction (PCR) assay, immunofluorescence staining, immunohistochemistry and Western blot analysis.

Results: Quantitative PCR assay showed that TGF-β3 significantly increased the expressions of tenocyte lineage marker genes, including Collagen type I (COL1), Tenomodulin (TNMD), and Scleraxis (SCX), at a 3-day treatment, compared with control. However, these increases were not found at long-term exposures (7 or 10 days), except that TNMD expression was maintained at 50 ng/ml at 7-day exposure to TGF-β3 (Fig). Like genes, the protein expression levels of COL1, TNMD, and SCX were also induced in TGF-β3-treated T-MSCs in 3-day treatments. Moreover, the protein levels were maintained for 10 days, as evidenced by immunofluorescence staining, immunohistochemistry and Western blot analyses.

Conclusion: This study demonstrated that T-MSCs in tenogenic stimulation with TGF-β3 have high tenogenic differentiation potential.