EDITORIAL

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Cryopreservation of dental tissue and subsequent isolation of mesenchymal stem cells

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Mesenchymal stem cells (MSCs) are characterized as plate-adherent cells that demonstrate a fibroblast-like growth pattern, express specific cell surface markers (CD13, CD29, CD44, CD73, CD90, CD105, and CD166), and differentiate into mesenchymal lineage cells *in vitro* (osteocytes, chonrocytes, and adipocytes)[1]. They were first isolated from bone marrow, but have since been isolated from various tissues, including skin, fat, cartilage, blood, umbilical cord, and dental tissue[1-3]. Recently, dental tissue has emerged as a potential source of autologous MSCs that can be used for tissue regeneration via tissue engineering. Precursor cells in dental tissue were first isolated and characterized from dental pulp, after which cells showing the characteristics of MSCs were isolated from immature wisdom teeth, periodontal ligament, and exfoliated deciduous teeth[3-6]. In particular, the dental pulp, follicle, and root apical papilla of immature wisdom teeth have been reported to possess abundant undifferentiated primitive cells[2,3,6]. Interestingly, stem cells from different dental tissues show similar MSC characteristics, but varying *in vitro* and *in vivo* differentiation properties[2,3,6]. Stem cells from the dental follicle of extracted wisdom teeth exhibit superior osteogenic differentiation potential compared to those from the dental pulp or root apical papilla[3,6]. In addition, one of the advantages of using dental stem cells from extracted wisdom teeth is that they can be obtained from patients at a relatively late age—from the late teens to mid-twenties. Moreover, recently, a new method for long-term cryopreservation of dental tissue from extracted wisdom teeth has been developed, and its efficacy was confirmed by the >70% cell survival rate of long-term preserved dental tissue[7].

MSCs have potential clinical applications in the treatment of autoimmune diseases or reduction of immune responses after allotransplantation, as well as in tissue regeneration[8]. Many researchers have shown that MSCs exert immune suppression and anti-inflammatory activity by dominantly inhibiting T-helper cells while activating regulatory T-cells and suppressing B-lymphocytes[8,9]. This immunomodulatory effect of MSCs makes them suitable for treatment of severe autoimmune diseases and graft-versus-host disease[8]. However, most trials for the clinical application of MSCs have used bone marrow-derived MSCs (BMSCs). As mentioned previously, MSCs from dental tissue (DMSCs) exhibit similar characteristics to BMSCs, but have superior osteogenic differentiation potential[3,6]. Therefore, DMSCs could possibly replace BMSCs in cell therapy and tissue regeneration applications. The new cryopreservation method for dental tissue enables the use of autologous MSCs from preserved dental tissue of extracted wisdom teeth[7]. These autologous MSCs could reduce unexpected side effects during clinical use, while maintaining similar immunomodulatory efficacy.

In conclusion, dental tissue from immature wisdom teeth, including that from the dental follicle, pulp, and root apical papilla, possesses abundant multipotent stem cells that could be useful in both cell therapy and tissue regeneration. Traditionally, these dental tissues have been discarded after extraction. In the future, dental tissue obtained via extraction of impacted teeth should be cryopreserved for use as an autologous stem cell source. The long-term preservation of dental tissue after tooth extraction could thus create a new business model in dentistry, as well as provide greater access to autologous MSCs for patients in need.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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