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Dental Stem Cells: Current research and future applications

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editorial

The literature on “dental stem cells” from 2002 to 2009 is composed of 936 works, mainly basic research articles, 159 reviews, 1 clinical study and only 6 case reports concerning endodontics and periodontology. After the year 2009 (1) the interest on this research topic has increased leading to 5177 new articles, including 757 reviews on different stem cell types, biomaterials and the possibility of “banking”.

The 46 clinical trials published in the last 9 years are clinical applications in periodontics and endodontics. However, still no definitive clinical guidelines are available (2,3).

Regenerative therapy in endodontics, through the use of dental stem cells, is still an open question (4). The idea of healing the pulp instead of treating it by means of a conventional endodontic therapy is fascinating, but the current experimental protocol is limited to immature permanent teeth with pulp necrosis, which are a minority of endodontic treatments.

Since 2005, with the first stem cell bank (Hiroshima University “Three Brackets”) (5), attention has also been paid to the creation of private or university centres where it is possible to preserve autologous dental stem cells. In particular, due to the ease and natural availability, the interest is directed to SHED, Stem cells from Human Exfoliated Deciduous teeth (6). SHED are easy to collect, have excellent differentiation potential and, most importantly, are more cost-effective if compared with umbilical cord cells (5). For these reasons in 2008 the Norwegian Institute of Public Health and the University of Bergen started to collect and store the exfoliated teeth of 100,000 children. To date there are several collection centres in the northern hemisphere: USA (Bioeden, Stem Save, Store a Tooth), Europe (Bergen, Future Health), India (Stemade biotech), Japan (Teeth Bank, Advanced Center of Tissue Engineering, Hiroshima University and Nogoya University), Taipei (Taipei Medical University), and recently China (National Dental Stem Cells Bank) (7).

Dental stem cells are readily and easily available and are a promising resource not just in dentistry but for regenerative medicine in general (8). This is confirmed by the literature, since 25% of papers on stem cells involve the study and dissemination of research on dental tissues-derived stem cells.

Currently there are only a few registered clinical trials for stem cell applications in dentistry and the results are still unavailable. To date, there are no dental treatments involving harvested stem cells but this is definitely an emerging science that might lead to important outcomes in the future.

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