

# Originating at Teeth to Tranquility: The Application of Dental Stem Cells in the Treatment of Emotional Disturbance

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It is for centuries, mental illnesses have been shrouded in stigma and a frustrating lack of effective treatment options. While talk therapy and medication have provided relief for many, they often fall short of addressing the underlying biological mechanisms. But on the horizon, a groundbreaking therapy with the potential to revolutionize mental health care is emerging- brain stem cell therapy. The different sources of stem cells currently being explored for this therapy are embryonic stem cells, induced Pluripotent stem cells, neural stem cells, and mesenchymal stem cells <sup>1</sup>. The literature on dental stem cell application in mental health disorders is very scarce. This editorial aims to overview dental stem cells and their potential application in mood disorders. Unlike other stem cells, dental stem cells (DSCs) can be easily obtained with significantly fewer ethical concerns. These mesenchymal stem cells hold immense potential for regeneration, making them attractive candidates for various therapeutic applications.

Human dental pulp-derived stem cells have characteristics similar to mesenchymal stem cells. The main characteristics are- multipotency, higher proliferative capacity, and self-renewal ability. DPSCs primarily derive from cranial neural crest cells because they express neural crest-stem cell markers, such as glial fibrillary acidic protein, human natural killer-1, nestin, etc. <sup>2</sup>.

Beyond oral applications <sup>3</sup>, dental stem cells have neuro-

regenerative potential, particularly Dental Pulp Stem Cells (DPSCs). These cells have demonstrated the capacity to differentiate into neural cells and promote neurogenesis <sup>4</sup>. In addition, the notable capacity for sustained in vitro proliferation, coupled with the robust expression of neural crest identity and tau protein genes, positions dental stem cells as a highly efficacious source for neurons <sup>5</sup>. A recent study demonstrated that dental pulp stem cells-derived exosomes could alleviate cerebral ischemia-reperfusion-induced brain injury in mice due to their anti-inflammatory property <sup>6</sup>. Both

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neurogenesis and anti-inflammatory actions are crucial in the treatment of mood disorders. In addition, DPSC releases several important substances for neuronal survival, proliferation, and differentiation, including neurotrophin-3 and nerve growth factor, which leads to neuroprotective action against neurodegenerative disorders <sup>7</sup>.

Animal models in Rats have shown positive outcomes in alleviating anxiety-like behaviors in Alzheimer's disease following DPSC transplantation. This raises the tantalizing possibility of harnessing these readily available cells to treat human psychological and mood disorders <sup>8</sup>. Several studies suggest that DPSCs may hold promise for neurological repair in conditions like Parkinson's and Alzheimer's disease <sup>8,9</sup>. Thus, transplantation of this stem cell line seems promising for treating cognitive and psychological diseases.

However, transitioning from preclinical research to clinical applications is a critical step in validating the therapeutic potential of dental stem cells. Ongoing clinical trials are exploring the safety and efficacy of these cells in various applications, providing valuable insights into their translational prospects.

While the application of dental stem cells holds great promise, challenges such as standardization of protocols, ethical considerations, and long-term safety profiles must be addressed. Other concerns of stem cell research, such as tumor formation <sup>10</sup>, precise delivery of stem cells to required brain locations, complex cellular programming, and reprogramming of stem cells impacting functionality <sup>11</sup>, also need to be addressed. Concerns about altering neural circuits, which may lead to entirely different personalities by generating new neural pathways, have also been reported <sup>12</sup>. The high cost of stem cell therapy may limit its accessibility. Future research should focus on refining protocols and understanding the mechanisms underlying their therapeutic effects. The randomized placebo-controlled trials, standardized disease rating scales, and long-

term measurable outcomes are essential to establish treatment effectiveness.

Dental stem cells represent a valuable resource in mental health disorders, including mood disorders, offering a range of applications from oral tissue regeneration to neural regeneration. The evolving landscape of research and ongoing clinical trials underscore the potential transformative impact of dental stem cells on the future of mood disorder therapy.

## CONSENT FOR PUBLICATION

The author reviewed and approved the final version and has agreed to be accountable for all aspects of the work, including any accuracy or integrity issues.

## DISCLOSURE

The author declares that they do not have any financial involvement or affiliations with any organization, association, or entity directly or indirectly with the subject matter or materials presented in this editorial. This includes honoraria, expert testimony, employment, ownership of stocks or options, patents, or grants received or pending royalties.

## DATA AVAILABILITY

Information for this editorial is taken from freely available sources.

## AUTHORSHIP CONTRIBUTION

All authors contributed significantly to the work, whether in the conception, design, utilization, collection, analysis, and interpretation of data or all these areas. They also participated in the paper's drafting, revision, or critical review, gave their final approval for the version that would be published, decided on the journal to which the article would be submitted, and made the responsible decision to be held accountable for all aspects of the work.

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