

# **Two complementary strategies to improve cell engraftment in mesenchymal stem cell-based therapy: Increasing transplanted cell resistance and increasing tissue receptivity.**

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## **Abstract**

Over the past 2 decades, therapies based on mesenchymal stem cells (MSC) have been tested to treat several types of diseases in clinical studies, due to their potential for tissue repair and regeneration. Currently, MSC-based therapy is considered a biologically safe procedure, with the therapeutic results being very promising. However, the benefits of these therapies are not stable in the long term, and the final outcomes manifest with high inter-patient variability. The major cause of these therapeutic limitations results from the poor engraftment of the transplanted cells. Researchers have developed separate strategies to improve MSC engraftment. One strategy aims at increasing the survival of the transplanted MSCs in the recipient tissue, rendering them more resistant to the hostile microenvironment (cell-preconditioning). Another strategy aims at making the damaged tissue more receptive to the transplanted cells, favoring their interactions (tissue-preconditioning). In this review, we summarize several approaches using these strategies, providing an integral and updated view of the recent developments in MSC-based therapies. In addition, we propose that the combined use of these different conditioning strategies could accelerate the process to translate experimental evidences from pre-clinic studies to the daily clinical practice.