



# The Effectiveness and Security of Mesenchymal Stem Cell Transplantation Intracerebral for Ischemic Stroke

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## DESCRIPTION

When the blood supply to the part of brain is interrupted, it can cause an ischemic stroke, a common and severe neurological condition that leads in tissue damage and neuronal death. Despite improvements in acute stroke care, including thrombolysis and thrombectomy, many patients continue to experience severe impairment and a low quality of life after a stroke. Therefore, there is a critical need for innovative therapies that can aid in brain healing and functional recovery following stroke.

Cell therapy is one of the more potential methods since it includes introducing exogenous cells into the wounded brain in order to replace lost neurons, boost neurogenesis, control inflammation, and promote angiogenesis. Mesenchymal Stem Cells (MSCs) have garnered a lot of attention among different types of cells because of their distinctive qualities, including multipotency, immunomodulation, trophic support, and ease of accessibility. MSCs can be isolated from a number of different sources, including dental pulp, adipose tissue, umbilical cord blood, and bone marrow.

A number of preclinical studies have shown that MSC transplantation had positive effects on ischemic stroke models, including improved neurological outcomes, decreased infarct volume, enhanced neurogenesis, and decreased inflammation. The best route, time, dose, and source for MSC transplantation are just a few of the difficulties in translating these discoveries into practical practice.

The method of MSC transplantation is one of the important concerns. Intra-Venous (IV) and Intra-Arterial (IA) injections are the most popular routes since they are quick and minimally intrusive. The majority of the transplanted MSCs are caught in

the lungs or other organs, and only tiny portions make it to the brain. As a result, these pathways have low efficiency and specificity. Additionally, there may be an infection or embolism risk with these approaches.

The direct implantation of MSCs into the brain parenchyma utilizing stereotactic surgery is known as Intracerebral (IC) injection. Compared to IV or IA injection, this method provides a number of benefits, including greater efficiency and specificity, MSC survival and retention in the brain for a longer period of time, and better host tissue integration. The limited distribution of MSCs within the brain and the invasiveness of this approach are some of its disadvantages, along with the possibility for harm to brain tissue or blood vessels.

A number of clinical studies have been carried out to assess the effectiveness and security of MSC IC transplantation for ischemic stroke. The outcomes have demonstrated that IC transplantation of MSCs in ischemic stroke patients is both feasible and safe. There were no reported severe negative effects of MSC transplantation. According to certain investigations, IC transplantation of MSCs has beneficial effects on neurological function, infarct volume, cerebral perfusion, and quality of life. These studies do, however, have certain drawbacks, including a limited sample size, a brief follow-up period, the absence of a control group, and the heterogeneity of the MSC source, dose, timing, and transplantation site.

In order to validate the effectiveness and safety of IC transplantation of MSCs for ischemic stroke, more thorough and substantial randomized controlled trials are required. Additionally, more study is required to refine the conditions and workings of MSC IC transplantation for ischemic stroke. Patients with ischemic stroke who have few therapy choices may find new hope with IC transplantation of MSCs.

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