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Editorial

Cell Therapy in Neonates

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Introduction

The term of neonatology was first coined in 1960, and the first sub board exam in neonatal-perinatal medicine was administered in the United States in 1975 (1). The use of cell therapy and stem cell therapy in newborns is also very new and evolving modality that faces many questions. Cell therapy refers to the administration of living biological cells (autologous or allogeneic) for medical purposes (2). Stem cell therapy is a type of cell therapy that specifically uses stem cells to treat diseases or repair damaged tissues.

The role of cell therapy in neonatal diseases such as bronchopulmonary dysplasia (BPD), cerebral palsy, necrotizing enterocolitis (NEC), perinatal asphyxia and hypoxic ischemic encephalopathy, and congenital heart disease is being investigated (3, 4).

Based on preclinical studies, the possible mechanisms of action of cell therapy include; Anti-inflammatory effects, anti-apoptotic effects, or modulation of angiogenesis. In some cases, stem cells may also replace damaged cells (3).

Cell therapy is generally classified as autologous (using one's own cells) or allogeneic (cells from others). The safety and efficacy of both types of cell therapy in neonates are ongoing. However, complicated or premature deliveries are not usually anticipated, and in some neonates, the required target cell dose (autologous) may not be achievable (5).

Umbilical cord blood (UCB) can be collected, and the mononuclear cell fraction contains a rich mix of stem and progenitor cells. Also, umbilical cord (UC) tissue can be collected, stored, and used as a source of cultured mesenchymal stem cells (UC-MSCs) (6).

However allogeneic cell therapy is also at risk of immune reactions such as graft-versus-host disease (GVHD) or clearance of the donor cells by the immune system. Hence, it is important to understand whether allogeneic cell therapy is safe, feasible, and effective in the neonatal period.

In a systematic review, evaluated the safety, feasibility, and efficacy of allogeneic cell therapy in 153 term and preterm infants. In addition, it details ongoing or planned studies using allogeneic cell therapy in 1020 infants. Most studies used mesenchymal stem cells (134 of 153 infants) derived from UCB, umbilical cord tissue, and bone marrow. The most common condition was bronchopulmonary dysplasia (113 infants). Nine of the 12 studies reported no serious treatment-related adverse effects and described the treatment as safe and feasible. Other studies reported serious adverse events, such as GVHD in 5 infants, cardiac dysfunction, and transient respiratory distress in 1 infant. Reduction of BPD severity with allogeneic cell therapy was reported in 2 studies (3).

Conclusion

Current evidence supports the safety, feasibility, and efficacy of cell therapy in neonates. But, data on short-term and long-term outcomes are very limited. However, the success of these therapies depends on overcoming several challenges, including immune rejection, high costs, Ethical Issues and approval processes.

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