Cardiosphere derived cell

Cardiosphere-derived cells (CDCs). CDCs can be extracted and isolated from the patient's myocardium and then administered by intramyocardial injection or intracoronary infusion. After early success in the animal model, multiple clinical trials have demonstrated the safety and efficacy of autologous CDC therapy in humans. Clinical trials with allogeneic CDCs showed early promising results and pose a potential “off-the-shelf” therapy for patients in the acute setting after a myocardial infarction. The mechanism responsible for CDC-induced cardiac regeneration seems to be a combination of triggering native cardiomyocyte proliferation and recruitment of endogenous progenitor cells, which most prominently occurs via paracrine effects. A further understanding of the mediators involved in paracrine signaling can help with the development of a stem cell-free therapy, with all the benefits and none of the associated complications [1)].

Recent breakthroughs in biotechnology have resulted in a reproducible patented process for the purification of extracellular vesicles (EVs) from human cardiosphere-derived cells (CDCs). Because CDC-EVs have many features potentially beneficial to treat acute ischemic stroke, CDC-EVs were evaluated in an established small-clot rabbit embolic stroke model, where clinically relevant end points were used to assess recovery in a more translational large animal model. Biodistribution studies with fluorescent DiD-labeled CDC-EVs showed intense uptake in the ischemic region of the brain.

In a report, Lapchak et al., show that intravenous (IV) CDC-EVs (0.75 mg/kg) administered 1-hour post-embolization significantly attenuate behavioral deficits following an embolic stroke in rabbits. In CDC-EV-treated rabbits, P50 (3.63 ± 1.27 mg, $n = 24$) was increased by 245% over vehicle control (1.05 ± 0.15 mg, $n = 24$); by comparison, rt-PA increased P50 by 91% (2.01 ± 0.24 mg, $n = 23$). Importantly, the therapy was also without adverse effects on intracerebral hemorrhage or survival rate of embolized rabbits. Thus, as a first step toward widespread use, CDC-EVs, given adjunctively to routine reperfusion therapy, merit further investigation as a therapeutic candidate for stroke [2)].

1)
Ashur C, Frishman WH. Cardiosphere-Derived Cells and Ischemic Heart Failure. Cardiol Rev. 2018 Jan/Feb;26(1):8-21. doi: 10.1097/CRD.0000000000000173. PubMed PMID: 29206745.
2)
Lapchak PA, Boitano PD, de Couto G, Marbán E. Intravenous xenogeneic human cardiosphere-derived cell extracellular vesicles (exosomes) improves behavioral function in small-clot embolized rabbits. Exp Neurol. 2018 Jun 13. pii: S0014-4886(18)30195-X. doi: 10.1016/j.expneurol.2018.06.007. [Epub ahead of print] PubMed PMID: 29908146.