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Regenerative capacity of bone marrow stem cells with or without superparamagnetic iron oxide nanoparticles after facial nerve degeneration: a narrative review

DMD Noura Hasan

Mansoura University, Egypt

Facial palsy can be defined as a kind of paralysis affecting facial muscles. It may occur due to trauma to the facial nerve, infections as herpes zoster, neoplastic lesions, or unknown cause. It may be also associated with metabolic and systemic diseases as hypertension, toxicity, amyloidosis, alcoholism, auto-immune diseases and diabetes mellitus. Mesenchymal stem cells are multipotent adult stromal cells that have many benefits as an evolving treatment modality. Bone marrow stem cells divide progressively in culture, and differentiate into neurons exclusively with use of a simple protocol. Most ongoing preclinical and clinical cell treatment modalities composed of local or systemic transplantation of stem or progenitor cells. In addition, they depend on the migration and retention of transplanted cells at insult areas. Nevertheless, one of the main obstacles against this modality is how to detect the fate and exact location of these cells inside the body, and how to maintain the cells at this specific site. Magnetic targeting systems, which depends on cells labelled by magnetic carriers, have been assessed as a more efficient technique for stem cell delivery to target sites. These systems depend on loading stem cells with magnetic nanoparticles and attracting them to the exact intended area within the body by placing an external magnetic field. Superparamagnetic iron oxide nanoparticles (SPIONs) have been introduced into the last few years as a rising applicant of nanoparticles in a vast variety of medical fields as magnetic separation, drug delivery, magnetic resonance imaging and magnetic hyperthermia. In addition, applications of SPIONs, as a site-specific drug carrier, diagnostic agent and stem cell delivery agent, receive most attention of researchers in that field.

Conclusion & Significance: Up-to-date information about Magnetic targeting of degenerated facial nerve by BMSCs labelled with SPIONs may suggest its capacity of better regeneration than injection of BMSCs alone.

Biography

DMD Noura Hasan has her expertise in evaluation and passion in improving the health and wellbeing. Her open and contextual evaluation model based on responsive constructivists creates new pathways for improving healthcare. She has built this model after years of experience in research, evaluation, teaching and administration in Faculty of Dentistry, Mansoura University.

nhm_1989@hotmail.com