THERAPEUTIC EFFICACY OF HUMAN UMBILICAL CORD MESENCHYMAL STEM CELLS IN THE TREATMENT OF EXPERIMENTAL ISCHEMIC STROKE IN RATS

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Introduction: Engineered, autologous nasal cartilage grafts have been used recently in a first-in-human clinical trial (ClinicalTrials.gov: NCT01605201) Feasibility and safety were demonstrated, and the first promising clinical and radiological results were recorded up to two years postoperatively (1). We here report on clinical and radiological outcomes five years after implantation.Methods: 10 patients of phase I clinical trial were examined clinically and radiologically after a minimum of 5 years postoperative. Adverse events (AE) were collected. Clinical assessment was made using the KOOS questionnaire, and radiological results were evaluated using the MOCART scoring system. Results: Mean follow up was 63 months postoperatively. Mean age at implantation was 38.8 years, total size of treated cartilage lesions was in average 3.6 cm2. There were no serious adverse reactions 5 years postoperatively.Improvements of KOOS scores from preoperative (66.1) to 2 years (88.5) remained stable at 5 years (90.6). Subscales for Sports and QoL further improved from 2 years (78.00 and 68.13) to 5 years (84.50 and 79.38). Radiological analyzes showed improvements of joint effusion and bone marrow edema, but with overall slightly reduced MOCART scores from 58.8 (2 years) to 51.3 (5 years).-Conclusion: This study confirms the safety and feasibility of treating focal cartilage lesions of the knee joint with tissue engineered, autologous nasal cartilage grafts at midterm. Patients benefit at 2 years is maintained over 5 years. Comparative studies with bigger cohort are required to better assess efficacy in comparison to standard therapies.

Keywords: Cartilage repair; Nasal chondrocytes; Clinical trial

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Abstract 1813

THERAPEUTIC EFFICACY OF HUMAN UMBILICAL CORD MESENCHYMAL STEM CELLS IN THE TREATMENT OF EXPERIMENTAL ISCHEMIC STROKE IN RATS

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There are currently no sufficiently effective treatments for ischemic stroke, that leads to the development of innovative approaches such as cell therapy. The aim of the research was to study therapeutic effects of mesenchymal stem cells (MSCs) transplantation on stroke model in rats.

The studies were performed in male rats, which underwent a transient bilateral 20min. ischemia-reperfusion of internal carotid arteries. After modeling the pathology animals were injected with human UC-MSCs (1x106cells) into the femoral vein. Control animals received 0.2 ml of saline. The neurological status of the animals was assessed before ischemia induction and after cell transplantation on days 7 and 14.

Stem cell transplantation in experimental group promoted mortality reduction and animals life prolongation. At the 12th hour of observation (critical period in the development of experimental pathology) mortality in experimental group was 10% vs. 45% in control group ($p<0.05$). On the 7th day, the average score according to the Stroke-index McGrow scale was 7.14 ± 0.19 points in experimental animals vs 11.79 ± 0.48 in control group; on the 14th-4.86 ± 0.15 vs 9.14 ± 0.30($p<0.05$). MSC transplantation achieved active orientation restoration and research behavior indicators of animals. Cytofluorimetric study showed that experimental cell therapy reduced the intensity of nuclear DNA fragmentation in sensorimotor cortex neurons.

Thus, human umbilical cord MSC transplantation lowered mortality, alleviated neurological symptoms and normalized behavioral responses, ie, led to a significant regression of neurological deficits in rats with experimental ischemic stroke.

Keywords: ischemic stroke model ; UC-MSCs; cell therapy

Abstract 1814

BIOLOGICAL ASSESSMENT OF PROTEIN-BASED BIOMATERIALS AS POTENTIAL CANDIDATES FOR CORNEAL BIOENGINEERING

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Corneal transplantation continues to be one of the leading treatments against vision impairments that affect million people worldwide. However, the shortage of donors shows the need of substitutes that mimic the native tissue to promote cell growth and the subsequent tissue regeneration. The current study has focused on the in vitro assessment of protein-based biomaterials that could be a potential source for corneal scaffolds. Collagen and soy protein isolate (SPI) were used to prepare films by compression molding, while solution casting was employed to prepare gelatin films crosslinked with lactose or citric acid. The physical characterization of the films showed transmittance values that met the light transmission needs of the cornea and the in vitro degradation profile revealed a progressive decomposition of the biomaterials in enzymatic and hydrolytic solutions, which could promote the simultaneous integration with the native tissue. Cell viability of human corneal epithelial cells (HCE) and 3T3 fibroblasts was above 70% when exposed to SPI and gelatin films, even after 72 h. Live/dead assays and SEM analysis demonstrated the adhesion of both cell types to the matrixes, with a very similar morphology and arrangement to that observed in controls. Besides, both cell lines were able to proliferate and migrate over the films to a cell-free area, simulating the cell repopulation that would happen in a wound. These results demonstrated that the studied biomaterials could be potential alternatives applicable in corneal bioengineering. Research study supported by grants from the Basque Government (RIS3, 2020333027) and UPV/EHU - ICQO (US19/18).

Abstract 1815

NEOVASCULARIZATION STIMULATING HYDROGELS FOR REGENERATIVE MEDICINE

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