SYSTEM FOR TARGETING CELLS TO INTERNAL REGIONS OF AN ANIMAL OR HUMAN BODY

DESCRIPTION OF THE TECHNOLOGY

There are several studies related to mobilization of labeled cells SPIOs (superparamagnetic iron oxide nanoparticles) by applying a magnetic field. In all of them, a stationary magnet is only used, generally with a magnitude of high field. In addition, a delicate surgery is necessary and also, in most cases, intra-arterial route is needed, which has a high risk to produce thromboembolism and brain microinfarcts.

A high magnetic field causes the cells to be attracted abruptly and unspecific, without getting achieve focus of injury, since only access to upper layers of the cortical regions. However, the focus of ischemic injury is in deeper areas surrounding the middle cerebral artery. It would be necessary to provide more effective methods for targeting cells and using less magnetic fields.

Researchers from UV, VHIR and IISLaFE have developed a novel system for target stem cells to internal regions of a target human or animal body, adapted to attract magnetically labeled cells with superparamagnetic nanoparticles and injected intravenously.

The device modulates the magnetic force of extraction of the cells in the bloodstream and thus the target, and improves the accuracy in targeting, once the cells are closer to their final objective.

The invention allows to increase up to ten times the graft performance, achieving damaged regions with high accuracy, allowing potentiate the therapeutic effect of stem cells MSCs

MARKET APPLICATION SECTORS

The invention applies the field of cell therapy, focusing on systems for precision of the targeting of the graft of mesenchymal stem cells (MSCs) in the repair after injury, of multiple organ and systems, including the central nervous system (CNS).

TECHNICAL ADVANTAGES AND BUSINESS BENEFITS

The main advantages provided by the invention are:

- Accuracy in three dimensions in the direction of labeled cells to the target regions.
- Easier and flexibility of position of the magnet or magnets with respect to the target area, in fixed or adjustable positions. It does not require glue or adhesive on the skull of the animal, due to the use of a support.
- It allows the use of different mediums types (helmets, belts, belts, corsets, etc.) for different animals and humans.
- Less applied magnetic power, of the order of 150 mT at zero distance.
- Reduced exposure time, of about 1 to 60 minutes.

CURRENT STATE OF DEVELOPMENT

The technology has been validated at the level of laboratory, and in the present the research group is working on its development and scaling.

INTELLECTUAL PROPERTY RIGHTS

The technology is protected through the following Patent ES2635311, entitled “Sistema para el direccionamiento de células hacia regiones internas objetivo de un cuerpo humano o animal, y programa de ordenador”

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COLABORATION SOUGHT

- License agreement of use or commercialization
- R & D project to complete development or apply to other sectors
- Subcontracting agreement with another company

RELATED IMAGES

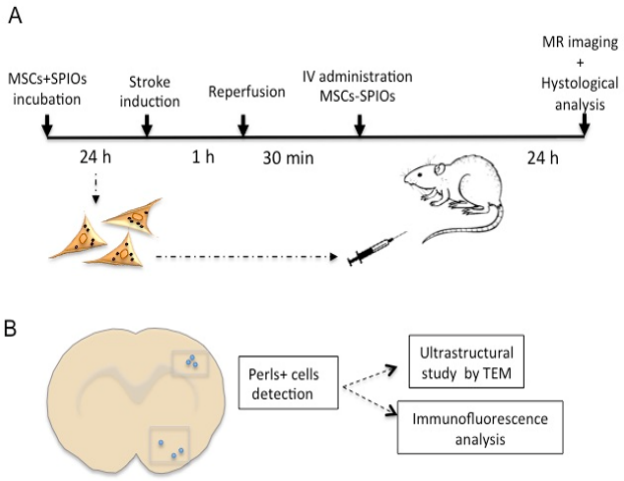

Image 1: Chronological diagram of the experimental procedure to study the grafting of mesenchymal cells marked with magnetic nanoparticles administered intravenously

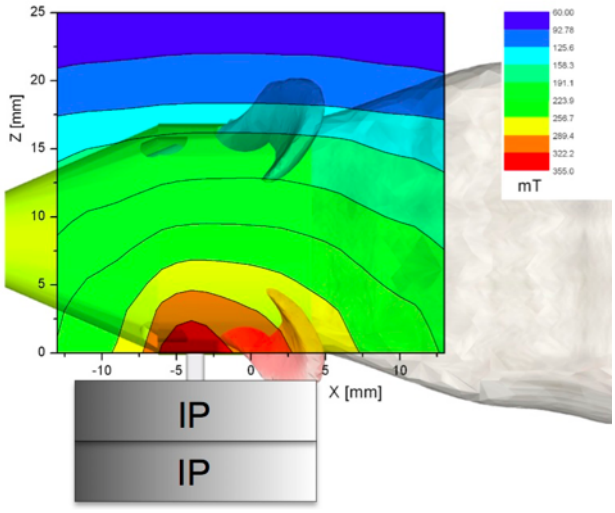

Image 2: Magnetic flux gradients generated by two permanent magnets in combination with the permanent magnet on the hull. Dorsal view (X and Z axes) of the magnetic gradient (colored zone in warm tones) generated by the permanent magnets (IP) inside the cerebral hemisphere where the cylindrical permanent magnet located in the hull is located. The approximate magnetic field strength is 350 mT at the base of the magnet.

CONTACT

Research and Innovation Service
Universitat de València
Avda. Blasco Ibáñez, 13, level 2
46010, Valencia
Tel: 96 386 40 44
Email: otri@uv.es
Web: http://www.uv.es/serinves