**Biotech/Pharma**

# Use of mesothelial cells in tissue bioengineering and artificial tissues

A research group from Andalusian Public Health System (APHS) has developed a technology that provides new uses for mesothelial cells to engineer artificial tissues and organs and to substitute endothelium, serous membranes and simple squamous epithelium, with the cells anchored to a support material as a basement membrane or not.

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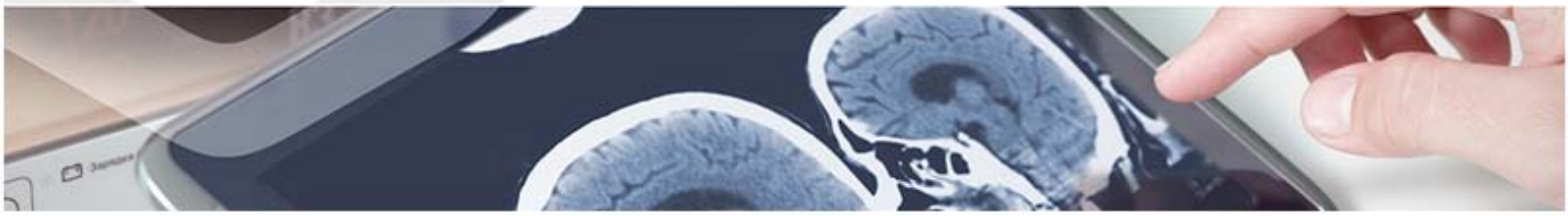

## Description

Engineering of a successful tissue biomimetic relies on the election of an adequate cellular phenotype displaying functions that can substitute that of damaged cells whilst keeping the ability to attach scaffolds and reproduce the biological and biophysical properties of the tissue.

In contrast with the amount of information available on skin tissue engineering, there is no information on the use of mesothelial cells regarding tissue engineering of ex vivo biological substitute mimicking serous membranes.

Although mesothelial cells display rather morphological and biochemical characteristics of epithelial cells, they however differ in their embryonic origin since mesothelial cells are derived from the mesoderm. This particularity confers to mesothelial cells a unique phenotype as evidenced by their coexpression of squamous epithelial markers as well as specific mesenchymal markers.

The assays carried out by the research group shows that culture of mesothelial cells under specific conditions, maintain their original mesothelial phenotype and inhibits their epithelial-mesenchymal transition in culture containing a low concentration of serum. Also shows that mesothelial cells can efficiently attach to different biomaterials, retaining both the capability to proliferate in a monolayer until fits the whole area and to display contact inhibition of proliferation.

Then, the research group shows that the adult visceral adipose tissue mesothelium represents a valuable source to isolate autologous cells with capacity to substitute structurally and biochemically: i) the serosal wall of many organs and tissues; ii) substitution of damaged corneal endothelium; iii) recovery of damaged cartilage and hyaluronan production; iv) substitution of both mesothelial and endothelial cells in artificial urethra, trachea and other tissues and organs; v) substitution of endothelial cells in artificial blood vessels, etc.

Also, the research group has developed a methodology to achieve a full mesothelialization of different biomaterials such as the decellularized basal membrane of anterior lens capsules, silk lamina, collagen, and other tissue from organs using mesothelial cells isolated from the visceral adipose tissue.

Currently, the research group is developing a biomimetic human corneal endothelial tissue from human mesothelial cells isolated from clinical specimens of greater omentum, using as matrix adhesion, the anterior capsule of the human lens.

## Advantanges

- The mesothelial cells have great structural and functional similarity to the corneal endothelium.
- The use of autologous cells avoids immune system rejection.
- The tissue source where the mesothelial cells are isolated is very accessible.
- The technology provides new uses for mesothelial cells to engineer artificial tissues and organs, and to replace endothelium, serous membranes and squamous cells, with the cells anchored to a support material such as a basement membrane or not.

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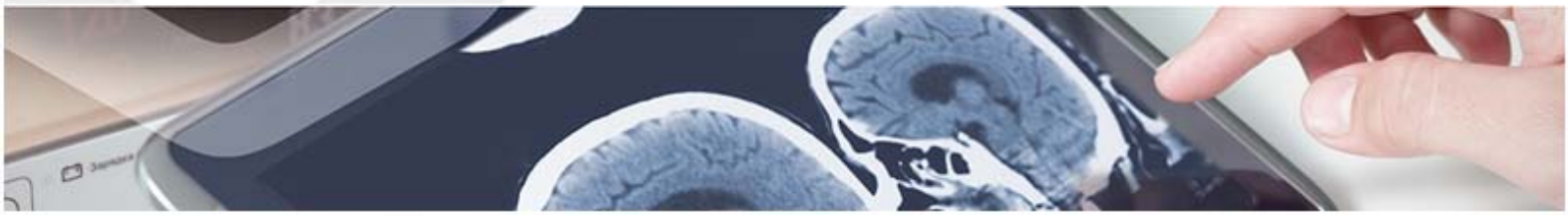

## Intellectual Property

The technology is protected by a PCT patent application.

## Aims

The research group is looking for a collaboration agreement for further development or a licence agreement.

## Classification

Area: Biotehc / Pharma
Technology: Tissue engineering
Pathology: Numerous

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