

DEVICE FOR MEASURING THE TRANS-LAYER ELECTRICAL IMPEDANCE IN AN *IN VITRO* MODEL OF A CELL BARRIER

ABSTRACT

The present invention relates to a device mountable in an *in vitro* model of a cell barrier, the model comprising a first chamber, a second chamber and at least one support for separating the first chamber and the second chamber, on which the cells are cultured.

The device comprises a set of electrodes on inner surfaces of the chambers, arranged in interlocking comb-shape, where each electrode comprises an array of parallel fingers.

The element for connecting electrically the device to an electrical apparatus comprises also elements for connecting electrically the device to an electrical impedance measuring apparatus and to an electroporation apparatus.

Further comprising the *in vitro* model of a cell barrier, in which the first chamber is the upper chamber and the second chamber is the lower chamber of the *in vitro* model of a cell barrier.

It was developed by researchers belonging to the Spanish National Research Council (CSIC), and the Biomedical Research Networking Center (CIBER).

DESCRIPTION

Cell barrier (epithelial and endothelial) dysfunction is a hallmark for a great variety of diseases. A common technique for quantitatively evaluate the cell barrier integrity without affecting cell physiology is based on the study of the passive electrical properties of cells. The trans-layer electrical impedance measure provides a quantifiable value of the state of the barrier.

One of the most common *in vitro* models to mimic cell barriers consists of two channels, chambers or receptacles separated by at least one support in where cells can be cultured to form the barrier.

The present invention provides devices mountable in an *in vitro* model of a cell barrier, as described in the abstract, capable of measuring the trans-layer electrical impedance of the cell barrier.

Chambers may be made of materials with the following features:

- Optically transparent material to visualize the culture of cells;
- Liquid impermeable material;
- Material resistant to culture incubation conditions
- Biocompatible or non-cytotoxic materials.

The cell barrier may be of different natures. For example:

- A blood_brain barrier
- Inner blood-retinal barrier
- Outer blood-retinal barrier.
- Blood-placental barrier

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APPLICATIONS

- Provide a quantifiable value of the state of the cell barrier.
- Evaluate the cell barrier integrity
- Measurement of the trans-layer electrical impedance in the *in vitro* model of a cell barrier
- Applying electroporation to the cell barrier

DEVELOPMENT STATUS

Developed

IP STATUS

Patent pending

AVAILABLE FOR

- Exclusive license agreement
- Non-exclusive license agreement
- Further research or development

INDUSTRIAL PROPERTY

European Patent Application
EP14170509.5 filed on May 29,
2014

International Patent Application
PCT/EP2015/061897, filed on May
28, 2015

TECHNOLOGICAL OFFER

INNOVATIVE ASPECTS AND ADVANTAGES

- Measurement of the trans-layer electrical impedance using the technique of four terminals
- Reducing the influence of electrode polarization impedance
- Set of electrodes as an optimal electrode configuration
- Allowing the optical visualization through the space between electrodes
- Homogeneous sensitivity along a defined cell culture area
- Entire surface of the barrier has a similar contribution to impedance measurement
- Easily adaptable to different chamber geometries
- Electrodes increase the effective area / geometric area ratio.
- It is possible to use, also, the technique of two terminals

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