Measurement of Trans-Epithelial Electrical Resistance with EVOM2 and Chopstick Electrode

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Method Article

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Abstract

Trans-epithelial Electrical Resistance (TEER) can be used as a measure of cell monolayer confluence, health, and integrity. An Epithelial Voltohmmeter (EVOM) is used to take TEER measurements. This method details how to take TEER readings using an EVOM with chopstick electrode.

Please note that chopstick electrodes are only designed for use with 12 mm inserts.

Introduction

Reagents

Equipment

EVOM2 Epithelial Voltohmeter (World Precision Instruments Inc, Sarasota, FL, USA)

Procedure

Preparing Cells for TEER Readings

1. Sterilize and soak probe in cell culture medium of the same formulation being used in the cell cultures to be tested prior to reading.

2. Add cell culture medium to the apical side of each Transwell^{Ò}

a. 1 mL for 24 mm insert

b. 500µL for 12 mm insert

Taking TEER Readings

1. Connect the electrode to the meter. Insert the RJ plug at the end of the flexible electrode cable into the Input port on the meter.

2. Set the Function switch to Ohms. Disconnect the EVOM2 from the charger and turn the Power on (I).

3. To measure the blank resistance, place the electrode in a blank insert with cell media in the basal compartment and PBS in the apical compartment.

*When making measurements, the longer prong goes outside the insert in the media. The shorter prong goes over the Transwell^{Ò}. The probe should not be angled and should be slightly touching the bottom of the dish.

4. Insert the electrode into the blank cup. A steady reading of the solution resistance should result. The value of the blank always adds to the total resistance measured across a tissue culture membrane. NOTE: The blank resistance must be measured and then subtracted from the resistance reading across tissue in order to obtain the true tissue resistance.

5. Take three resistance readings per insert.

6. Make experimental resistance measurements. Subtract the blank resistance to obtain the resistance value of cultured cell monolayers.

7. When finished, clean and store the electrode dry.

Electrode Cleaning

1. Rinse with the electrode with distilled water and dry it.

2. Make a 1% solution of Tergazyme according to the manufacturer's instructions.

3. Suspend the tips of the electrodes in the Tergazyme solution, with the exposed electrode surfaces fully immersed. During soaking, the surfaces of the electrodes may be brushed with a soft brush (like a tooth brush), if desired.

4. Soak overnight if the electrodes have not been cleaned on a regular maintenance schedule.

5. Soak 30–60 minutes if on a weekly cleaning schedule or 5 minutes if on a daily schedule.

6. Rinse well with distilled or de-ionized water. Allow electrode to air dry and store dry away from exposure to sunlight.

Probe Maintenance

1. The probe may be occasionally resurfaced by lightly sanding with 600-grit ultra-fine sandpaper.

Troubleshooting

Time Taken

Anticipated Results

References

EVOM2 Instruction Manual:

https://www.wpiinc.com/clientuploads/pdf/EVOM2_IM.pdf

Acknowledgements

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- McCulloughMethodsMeasurementofTransEpithelialElectricalResistanceUsingChopstickElectrodes.docx