

# Testing Cell Monolayer Integrity on Corning® Transwell™ Permeable Supports



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## Introduction

Testing cell monolayer integrity on Transwell inserts is most often done by measuring transepithelial electrical resistance (TEER) across the cell monolayer or by measuring the amount of a nontransportable fluorescent compound, such as Lucifer Yellow, that leaks from the apical chamber between the cells down into the basolateral chamber. The following is a list of references for doing TEER or Lucifer Yellow leakage measurements. For additional information on equipment for performing TEER measurements visit World Precision Instruments at: <http://www.wpiinc.com/products/cell-tissue/EVOM/>.

## References for TEER and Lucifer Yellow leakage measurements

1. Foster KA, et al.  
**Characterization of the Calu-3 cell line as a tool to screen pulmonary drug delivery.**  
(2000) Int J Pharm. Nov 4; 208(1-2):1-11.
2. Hidalgo IJ, et al.  
**Characterization of the human colon carcinoma cell line (Caco-2) as a model system for intestinal epithelial permeability.**  
(1989) Gastroenterology. Mar; 96(3):736-49.

3. Watanabe H, et al.  
**Purification and cDNA cloning of a protein derived from *Flammulina velutipes* that increases the permeability of the intestinal Caco-2 cell monolayer.**  
(1999) Eur J Biochem. Jun; 262(3):850-7.
4. Kasuga F, et al.  
**In vitro effect of deoxynivalenol on the differentiation of human colonic cell lines Caco-2 and T84.**  
(1998) Mycopathologia. 142(3):161-7.
5. Sutton SC, et al.  
**Simultaneous in vitro measurement of intestinal tissue permeability and transepithelial electrical resistance (TEER) using Sweetana-Grass diffusion cells.**  
(1992 ) Pharm Res. Mar; 9(3):316-9.
6. Teoh DA, et al.  
***Giardia lamblia* rearranges F-actin and alpha-actinin in human colonic and duodenal monolayers and reduces transepithelial electrical resistance.**  
(2000) J Parasitol. Aug; 86(4):800-6.
7. Stevenson, BR, et al.  
**Phosphorylation of the Tight-Junction Protein ZO-1 in 2 Strains of Madin-Darby Canine Kidney Cells Which Differ in Transepithelial Resistance.**  
(1989) Biochemical Journal. Oct 15; 263(2): 597-599.
8. Francis, SA, et al.  
**Rapid reduction of MDCK cell cholesterol by methyl-beta-cyclodextrin alters steady state transepithelial electrical resistance**  
(1999) European Journal of Cell Biology 78: 7
9. Grant, T, et al.  
**Characterization of the interaction between *Yersinia enterocolitica* biotype 1A and phagocytes and epithelial cells in vitro**  
(1999) Infection and Immunity 67: 9
10. Grupp, C, et al.  
**A bumetanide-sensitive, apically localized Na(+)/2Cl(-)/K(+) cotransport in the rat inner medullary collecting duct**  
(1999) Pflugers Archiv-European Journal Of Physiology 439: 1-2
11. Liu, DZ, et al.  
**Dodecylphosphocholine-mediated enhancement of paracellular permeability and cytotoxicity in Caco-2 cell monolayers**  
(1999) Journal of Pharmaceutical Sciences 88: 11

12. Robledo, RF, et al.  
**Modulation of bronchial epithelial cell barrier function by in vitro jet propulsion fuel 8 exposure**  
(1999) Toxicological Sciences 51: 1
13. Garate, MA, et al.  
**Overexpression of the ferritin iron-responsive element decreases the labile iron pool and abolishes the regulation of iron absorption by intestinal epithelial (Caco-2) cells**  
(2000) Journal Of Biological Chemistry 275: 3
14. Hilgendorf, C, et al.  
**Caco-2 versus Caco-2/HT29-MTX co-cultured cell lines: Permeabilities via diffusion, inside- and outside-directed carrier-mediated transport**  
(2000) Journal of Pharmaceutical Sciences 89: 1
15. Reichert, M, et al.  
**The PDZ domains of zonula occludens-1 induce an epithelial to mesenchymal transition of Madin-Darby canine kidney I cells - Evidence for a role of beta-catenin/Tcf/Lef signaling**  
(2000) Journal of Biological Chemistry 275: 13
16. Wang, GS, et al.  
**Increasing epithelial junction permeability enhances gene transfer to airway epithelia in vivo**  
(2000) American Journal of Respiratory Cell and Molecular Biology 22:2
17. Rotoli, BM, et al.  
**Secretin increases the paracellular permeability of CAPAN-1 pancreatic duct cells**  
(2000) Cellular Physiology and Biochemistry 10: 1-2
18. Ali, M. H., et al.  
**Endothelial permeability and IL-6 production during hypoxia: role of ROS in signal transduction**  
(1999) American Journal of Physiology-Lung Cellular and Molecular Physiology 277:5
19. Mishler DR, et al.  
**AVP reduces transepithelial resistance across IMCD cell monolayers.**  
(1990) Am J Physiol Jun;258(6 Pt 2):F1561-F1568
20. Hurst RD, Fritz IB.  
**Properties of an immortalised vascular endothelial/glioma cell co-culture model of the blood-brain barrier**  
(1996) J Cell Physiol Apr;167(1):81-88
21. Busch, C, et al.  
**Involvement of a conserved tryptophan residue in the UDP-glucose binding of large clostridial cytotoxin glycosyltransferases.**  
(2000) Journal of Biological Chemistry 275:18

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