

Epithelial Barrier Integrity Profiling: A Combined Approach Using Cellular Junctional Complex Imaging & Trans-Epithelial Electrical Resistance (TEER)

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Barrier integrity is a core epithelial function of keen interest for drug discovery. We established a scalable 3D quantitative immunofluorescent imaging assay to evaluate junction complexes and combined it with TEER to assess multiple barrier integrity mechanisms at once. Air-lifted human bronchial epithelial cells had TEER measured pre- and post-treatment. Fixed cells were stained for adherens (E-cadherin) and tight (ZO-1, occludin) junctions. A novel 3D-printed 24-well holder enabled scalable in situ confocal imaging of cells in Transwell® inserts. 'In focus' junction complexes in each z plane were quantified by image analysis algorithms. Change in log₁₀(mean TEER) was used to statistically evaluate barrier integrity treatments. TGF-β reduced barrier integrity (TEER and junction complex 'total area'). This TEER-imaging approach is being used for allergic inflammation target validation. It has potential use for other epithelium and scaling for e.g. safety assessment.