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TEER in Gingival Tissues; a Novel Approach in Testing Oral Health Products

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Objectives Gingival epithelial is the first line of defence against bacteria hence it is vital to understand the impact of oral care products on gingival barrier integrity.

Transepithelial Electrical Resistance (TEER) is a widely recognised technique that indicates the integrity of cellular barriers in cell culture models. Often TEER is measured on monolayer cells and given their sensitive nature, studies are limited to testing merely ingredients. To understand the impact of oral health products on gum barrier integrity a novel method developed to measure TEER on reconstructed gingival tissues.

Methods Gin100 tissues from Mattek were challenged by exposure to E.coli LPS, P.gingivalis LPS or Subtilisin-A and incubated for 6, 12 and 24hr. TEER values collected at baseline and after each timepoint and compared to un-challenged group (PBS). TEER was measured using EVOM3. To visualise the tissues, samples were fixed and imaged using histology imaging techniques. Statistical analysis performed at the 0.05 significance and a general linear model ANOVA used.

Results E.coli and P.gingivalis LPS at their highest concentrations (10ug/mL) did not reduce the barrier integrity significantly (TEER value range of 73.2% to 113.52% for E.coli and 80.5% to 91.3% for P.gingivalis). However, Subtilisin-A significantly reduced the TEER value to $80.3 \pm 2.5\%$, $53.1 \pm 3.4\%$, and $28.7 \pm 3.6\%$ at 0.1, 1 and 10 ug/mL respectively 12h post challenge (Table 1). Histology imaging demonstrates the damage on surface and basal membrane of the tissue when challenged by 1ug/mL Subtilisin-A (Figure 1). Results of this study led to selection of 1ug/mL of Subtilisin-A as bacterial challenge for future studies.

Conclusions Development of a robust TEER method in gingival tissues provides a unique opportunity to evaluate the impact of products on gum barrier integrity. Having a reliable bacterial challenge is key to distinguish between different test items. Future studies are in progress to examine different dentifrices in this model.