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Grossman, E. S.

1983

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Grossman, E. S. 1983. A proposed function for microplications on epithelial cells. Electron microscopy society of Southern Africa-Proceedings; 13:89-90

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A PROPOSED FUNCTION FOR MICROPLICATIONS ON EPITHELIAL CELLS

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Many papers have been published describing the complex features present on the surface of epithelial cells of the oral mucosa [1]. As the structure of the oral mucosa is known to reflect a variety of functional adaptations, [2,3] several suggestions have been made as to the purpose of these intricate microplications, pits and villus-like projections. Wassersug and Johnson [4] proposed that the microplications served as a reserve area for cell stretching although in a later publication [5] dealing with the surface morphology of normal and distended fish oesophagus, no changes consistent with microplications representing a reserve area for cell stretching were found.

The present study was undertaken to compare the density of microvilli on the surface of keratinized attached gingiva spinous cells and microplications on the surface of non-keratinized alveolar mucosa spinous cells of the vervet monkey (Cercopithecus pygerythrus), in the normal and loaded state, to determine whether these surface features serve as a reserve area for cell stretching.

Twelve vervet monkeys were used to provide specimens of normal and loaded attached gingiva and alveolar mucosa as described elsewhere [6] which were then processed for scanning electron microscopy. Double sided adhesive tape was used to sequentially strip epithelial cells from the superficial to the spinous cell layer where previous studies [7] have shown maximum cell stretching to occur. Forty micrographs each of loaded and normal attached gingiva and alveolar mucosa spinous cells were taken at standard magnification for histometric analysis. This was effected by using a double lattice test system point counting method comprising 56 heavy and 384 light intersection points. The lattice was placed over the photomicrograph and with the aid of the Kontrön Digiplan® M.O.P. electronic image analyser all intersection points on the lattice intercepting microvilli or microplications were counted to estimate the percentage density of these structures per visible cell surface area. The mean value and standard deviation was calculated in each case and the results subjected to the Student's t test for independent samples to determine if a significant difference existed between the normal and loaded values.

The mean density ($\pm$ S.D.) of microvilli covering the normal attached gingiva epithelial cells was 70,2 $\pm$ 8,6% of the cell area measured and this decreased to 26,7 $\pm$ 8,0% in the loaded specimens. Similary the microplication density on the surface of the normal alveolar mucosa epithelial cells was 70,3 $\pm$ 7,8 % which decreased to 39,1 $\pm$ 7,5 % on loading. In both cases this decrease was significant at $p < 0,001$.

From these results it appears that the surface features found on the epithelial cells of the oral mucosa do serve as a reserve area for cell stretching.

References

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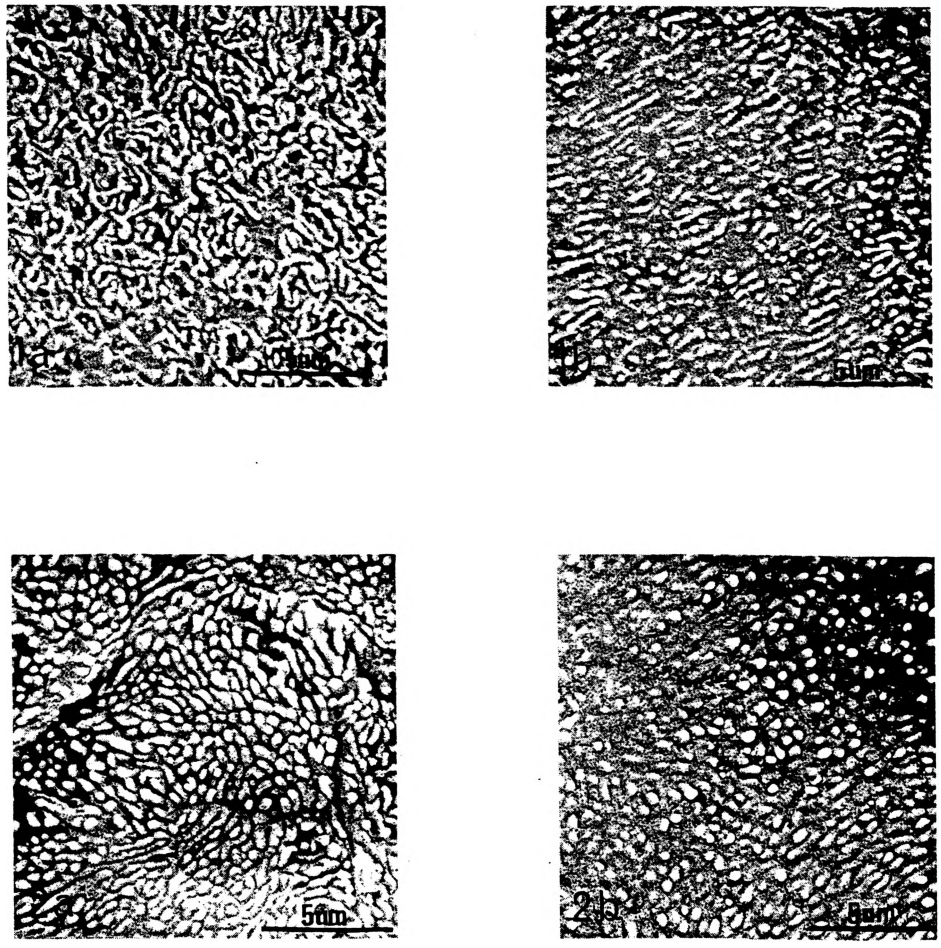


Fig. 1 Microplications found on the epithelial cell surface of the alveolar mucosa in the normal (a) and loaded (b) state.

Fig. 2. Microvilli found on the epithelial cell surface of the attached gingiva in the normal (a) and loaded (b) state.