BIOCHEMISTRY 640

(Biomembranes Discussion Group)

Wednesday, January 31, 2018

Room 4-70 Medical Sciences Building

4:00 PM

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"*Staphylococcus aureus* and tight junctions: influence of pathogenic bacteria on tight junction properties"

Tight junctions form a barrier between the cells of the epidermis. For pathogenic microbes, they form the physical obstacle preventing the invasion of the skin. Infection by *Staphyloccus aureus* decreases transepithelial resistance (TER) of the tight junctions immediately after inoculation and damages the function of the model keratinocyte cell line, HaCaT (Ohnemus et, al., 2008). However, whether *S. aureus* infection has any impact on the tight junction properties of human epidermis or of primary human keratinocytes was unknown. Inoculating the normal human epidermal keratinocyte (NHEK) cells derived from juvenile foreskin with *S. aureus* suggested that the TER increased initially (up to 12 hours after inoculation), however, in long term (after 15 hours) it decreased. Immunofluorescence experiments suggested that infection with *S. aureus* increased the localization of occludin and claudin-4 at the tight junction, but this was not caused by an increase of protein abundance. *S. aureus* infection also significantly increased the proinflammatory cytokines IL-1ß, TNF-alpha, IL-6 and IL-8 levels in the NHEKs. This study also showed for the first time that *S. aureus* is able to grow on a mimic to human skin, reconstructed human epidermis (RHE). Immunohistochemistry experiments revealed that claudin-1 and claudin-4 were internalized 72 hours after the inoculation of RHE with *S. aureus*, without degradation of the proteins of the tight junctions. The TER in the RHE did not significantly reduce after 72 hours of inoculation suggesting that the overall tight junction barrier function was not affected by the bacterial infection. This study signifies the influence of *S. aureus* infection on the tight junction properties of a cell line and a model epidermis and shows that the bacteria has biphasic effect (short term and long term) on TER of the cell line but not of the RHE.

Article

Basler et. al., (2017). Biphasic influence of Staphylococcus aureus on human epidermal tight junctions. Ann. N.Y. Acad. Sci. 53-70.