Quantitative analysis of endothelial cell swelling and ruffling of luminal membrane

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Background: Our earlier studies have shown endothelial cell swelling and ruffling of the luminal surface membrane in the large intestinal microvasculature in primates treated with Shiga toxin producing *E. coli* (STEC). In this study we have used image analysis to quantify these changes. **Methods:** Electron micrographs of 24 and 22 mucosal capillaries from the large intestines of STEC infected monkeys and from uninfected controls respectively were selected. The images were digitized, and the perimeter of the capillary lumen (P1), the luminal area (A1) and the area of the vessel wall (A2) were measured using a program written in JAVA. Compactness index (CI) of the lumen boundary, (P1/vA1), was calculated and used as an indicator of smoothness or ruffling of the luminal membrane. The ratio of the area of the lumen (A1) to the area of capillary wall (A2) served as an indicator of endothelial swelling. **Results:** The compactness index was significantly higher in infected animals (p=0.01) when compared to controls indicating that the luminal membrane of endothelial cells was ruffled in STEC infected monkeys. The ratio of area of the lumen to the area of capillary wall was reduced (p=0.02), indicating significant endothelial swelling. **Conclusions:** This study reports a novel way of quantifying two morphologic changes commonly seen in endothelial injury or perturbation.