Candida albicans Infection Decreases The Expression Of The Na^+-K^+-$2Cl^-$ Cotransporter 1 In T84 and Madin Darby Canine Kidney Cells

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The commensal human fungal pathogen, *Candida albicans*, prior to infect the human body, must penetrate the intestinal mucosal barrier. To do so, it needs to bypass the different protective mechanisms such as fluid secretion. The basolateral Na^+-K^+-$2Cl^-$ cotransporter 1 (NKCC1) is a key protein regulating fluid secretion in the intestine. We hypothesize that *C. albicans* decreases fluid secretion prior to invasion by inducing NKCC1 internalization. In our experiments, we used Madin Darby canine kidney (MDCK) cells expressing a GFP-NKCC1 fluorescent tag and T84 cells, a human colonic cell line. Cells were infected with 100,000 *C. albicans* for varying lengths of time, fixed, stained and mounted for fluorescence microscopy. The number of internalized vesicles was evaluated using FIJI. Our results show that in MDCK cells, *C. albicans* only increased NKCC1 internalization at the 30-minute time point ($P<0.05$), all subsequent time points were not significant. Similarly, infecting T84 cells with *C. albicans* significantly induced NKCC1 internalization at the 30-minute ($P<0.05$), 1 hour ($P<0.05$), and 90-minute ($P<0.05$) time points. Past 90 minutes, we observed a sharp decline in the number of internalized vesicles that continued to decrease through 6 hours of exposure to *C. albicans*. Finally, in *C. albicans*-T84 infected cells, using an immunoblot approach, we found that total NKCC1 protein expression was decreased by ~20% ($P<0.05$) compared to uninfected cells. Our results suggest that *C. albicans* induces internalization of NKCC1, and subsequent degradation of NKCC1, which would decrease fluid secretion and allow adhesion, and invasion of the epithelium.