



## Histatin-5-Based Antifungal Peptides for Oral Topical Applications

### Key Investigator

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### Field

Microbiology

### Technology

Peptide-based hydrogel

### Advantages

Novel oral topical administration

### Status

Available for licensing

### Patent Status

US Patent Pending

### UMB Docket

### Reference

MR-2016-100

### External

### References

Kong et al. [Development and In Vivo Evaluation of a Novel Histatin-5 Bioadhesive Hydrogel Formulation against Oral Candidiasis](#). *Antimicrob Agents Chemother.* (2015)

### Summary

*Candida albicans* is a fungus colonizing human mucosal surface. It commonly causes recurrent infections which can become life-threatening in immunosuppressed and immunocompromised patients. Histatin-5 (Hst-5) is a cationic antimicrobial peptide found in saliva with antifungal activity against *C. albicans*, related fungal organisms, and several bacteria. In a murine model of oral *Candida* infection, Hst-5 protected against infection of *C. albicans* in oral mucosa. Hst-5 has also been shown to clear existing lesions in the oral cavity and relieve associated tissue inflammation. The mechanism of action underlying its effect in *Candida* infections is different from the current standard of care of azole and polyene drugs and does not induce resistance. One limitation of the therapeutic potential of Hst-5 is that *C. albicans* is able to degrade and deactivate Hst-5 via a secreted proteolytic enzyme. This technology refers to Hst-5-derived antifungal peptides resistant to proteolysis and efficacious in treating or preventing *Candida* infections, and to their oral topical administration using a biocompatible hydrogel delivery system.

### Technology

UMB researchers have developed a biocompatible hydrogel delivery system that is optimized for viscosity, stability, and controlled sustained release of Hst-5 and its derivatives. Efficacy of the hydrogel in inhibiting *Candida* adherence and biofilm formation on denture acrylic discs has been shown *in vitro* and in

an *ex vivo* model of infection. As denture stomatitis is the most common *Candida* infection, an animal model of denture stomatitis has been to evaluate the efficacy of the formulation against biofilm formation on denture acrylic and infection of denture associated palatal tissue. Specifically, a denture appliance has been designed to fit the oral cavity of the rat model. Findings have demonstrated the suitability of the gel for use on denture acrylic material and in protecting palatal tissue against *Candida* infection. Findings from *in vivo* evaluation of the formulation in a mouse model of oral candidiasis demonstrated anti-inflammatory and tissue regeneration properties for the gel.

### Market

Oral candidiasis is common in infants, the elderly, cancer and diabetes patients, hospitalized patients, and is the most common opportunistic infection in HIV+ individuals. It can also lead to denture stomatitis in 70% of denture wearers, where an oral topical application of an antifungal can be a preventative strategy against infection. *Candida* colonizes other mucosal surfaces and the application of Hst-5 peptides via hydrogel is not limited to the oral cavity but other mucosal tissue as well. Approximately 30% of the estimated 46,000 healthcare-associated *Candida* infections among hospitalized patients in the US each year result in death. Each case of *Candida* infection results in 3–13 days of additional hospitalization and a total of \$6,000–\$29,000 in direct healthcare costs. Given the public health threat of these infections and their resistance to first and second line treatments, the global market for human antifungal therapeutics reached \$11.8 billion in 2013 and is expected to grow to nearly \$13.9 billion in 2018.

### Technology Status

Hst-5 hydrogel has been tested in animal model of *Candida* infection; various Hst-5-derived peptides are at different stages of testing (*in vitro*, *ex vivo* and *in vivo* assays).

