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## **A sheep model to investigate the role of fungal biofilms in sinusitis: fungal and bacterial synergy.**

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### **Abstract**

**BACKGROUND:** The role of fungi in the spectrum of chronic rhinosinusitis (CRS) is poorly understood. Fungal biofilms have recently been discovered in CRS patients. We have developed an animal model for the investigation of sinonasal fungal biofilms. The role of type I hypersensitivity and pathogenic bacteria is presented.

**METHODS:** Thirty sheep were sensitized with fungal antigens-*Aspergillus fumigatus* and *Alternaria alternata*, or control. Endoscopic surgery was performed to expose both frontal sinus ostia-1 was occluded. Fungi with or without *Staphylococcus aureus* were inoculated into the sinus. Skin-prick tests assessed for fungal allergy. Fungal and *S. aureus* biofilms, histology, and culture rates were assessed.

**RESULTS:** Forty-five percent of experimental sheep were sensitized to fungal antigen. Only 1 sinus inoculated with fungus developed minimal fungal biofilm. Eighty percent developed fungal biofilm when *S. aureus* was co-inoculated. The presence of hypersensitivity to fungus was not related to fungal biofilm development.

**CONCLUSION:** Significant fungal biofilm only occurred when *S. aureus* was the co-inoculum. Hypersensitivity was not requisite. The relationship of *S. aureus* to fungal biofilms is of great clinical interest. Fungi may be opportunistic pathogens that simply require inflamed mucosa with weakened innate defenses; alternatively, a cross-kingdom synergy could be contributing to fungal proliferation.

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