Broad Spectrum Antimicrobial Quaternary Ammonium Silane (K21) Effective Against HSV-1 and HHV-6

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Introduction

The quaternary ammonium silane, code-named K21 manufactured by Designer Molecule, Inc. (DMI), is a broad-spectrum antibacterial, antifungal and antiviral macromolecule created through sol-gel chemistry, using an ethoxylated version of an organosilane quaternary ammonium compound and TetraEthyl Ortho Silicate (TEOS) as precursors. A methacryloxy version of the antimicrobial macromolecule has already got FDA approval. K21 was originally developed for use in dental healthcare (i.e. in tooth cavities, coating of implants and sutures). Antimicrobial assessment of K21 showed inhibited growth of several types of microorganisms including *E. coli, Chlamydia trachomatis, Mycobacterium tuberculosis* and *Porphyromonas gingivalis etc.*

Objectives

As some of the Human herpesviruses including HSV-1, HHV-6A, HHV-6B, HHV-7, HCMV and EBV reside in the human oral cavities and are shed in the saliva to induce infection; we tested *in vitro* the effect of K21 on HSV-1 and HHV-6 infection.

Material and Methods

Genetically modified virus strains were used to directly monitor rate of virus infection in presence of K21 using epifluorescence microscope. Plaque assay and quantitative PCR was used to monitor changes in viral infection pattern. Immunoblotting was carried out to study effect of K21 on viral early and late proteins. In addition, Flow cytometry was used to quantify effect of the compound and virus infection on host cell death.

Results and Conclusions

Our results show strong inhibitory effect of K21 on both HSV-1 and HHV-6 infection. As K21 has very low toxicity, it might be very useful in inhibiting infections caused by various other human DNA viruses. Assessment of K21 activity against several other human viruses is in progress.