

THE MOLECULAR TWEEZER CLR01 INHIBITS ZIKA VIRUS INFECTION

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Zika virus (ZIKV) is an emerging arthropod-borne pathogen but also cases of sexual transmission have been reported. ZIKV is found in sites and fluids associated with sexual activity and viral loads in semen of infected patients are high and detectable up to 6 months. Therefore, ZIKV can be sexually transmitted and people that are or have been infected or travelling in high risk regions are advised to use condoms or staying abstinent. Alternatively, development of antiviral compounds that can be applied inside the vagina or rectum could protect against sexually transmitted infections. Such substances are termed microbicides and could be useful tools to prevent viral infections.

We have previously shown that the molecular tweezer, CLR01, binds to and destroys enveloped viruses such as HIV-1, HSV-2, HCMV, and HCV. The antiviral activity is mediated through a specific interaction of CLR01 with lipid raft rich regions in the viral membrane and this virucidal activity was not impaired by the presence of semen. In this study, we determined the effect of CLR01 on ZIKV infection. Using plaque reduction assays, confocal microscopy, flow cytometry and cell-based immunodetection assay, we found that CLR01 inhibited ZIKV prototype strain MR766 infection in a dose-dependent manner. Further analyses revealed that CLR01 destroys the ZIKV envelope in a time-dependent manner, with complete loss of infectivity after 10 min of virion exposure. The tweezer also inactivated ZIKV epidemic strains FB_GWUH_2016 and PRVABC-59 and prevented infection of human foreskin, cervix and colon cells, that represent potential entry portals for the virus through sexual intercourse. Finally, CLR01 retained antiviral activity against ZIKV in the presence of human semen, suggesting that CLR01 might be a useful microbicide to limit or block ZIKV spread by sexual intercourse.