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Isolation and Elimination of Latent and Productive Herpes Simplex Virus from The Sacral and Trigeminal Ganglions

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Abstract

There is an immediate need for alternative anti-herpetic treatment options effective for both primary infections and reoccurring reactivations of herpes simplex virus types 1 (HSV-1) and 2 (HSV-2). Existing options include antivirals that have been approved for clinical administration and a limited number of nucleoside analogues. The present article tests a treatment based on a systemic understanding of how the herpes virus affects cell inhibition and breakdown, and targets different phases of the viral cycle, including the entry stage, reproductive cross mutation, and cell-to-cell infection. The treatment consisted of five immunotherapeutic core compounds (5CC), which were hypothesized to be capable of neutralizing human monoclonal antibodies. These 5CC are effective inhibitors of herpes viral DNA synthesis and interferon (IFN)-induced cellular antiviral response, and they were here found to neutralize antiviral reproduction by blocking cell-to-cell infection. Antiviral activity of the 5CC against HSV-1 and HSV-2 was tested on RC-37 cells in vitro using a plaque reduction assay. The 50% inhibitory concentration (IC50) of 5CC was 0.0009% for HSV-1 plaque formation and 0.0008% for HSV-2 plaque formation. Further tests comprising of a PEA, were performed to evaluate the susceptibility of HSV-1 and HSV-2 to antiherpetic drugs in Vero cells after virus entry. Indicators of the 5CC found that the combination exhibited high levels of virucidal activity against HSV-1 and HSV-2 in viral suspension. These concentrations of the 5CC are nontoxic and reduced plaque formation by 98.2% for HSV-1 and 93.0% for HSV-2. Virus HSV-1 and HSV-2 titers were reduced significantly by 5CC to the point of being negative, ranging 0.01–0.09 in 72%. These results suggest that the 5CC are strong alternative candidates for treating herpes simplex.

Biography:

Dr Bernard Lucas Middleton, is an infectious diseases physician, scientist and clinical virologist internationally acknowledged for his research on the immunobiology of the herpes virus. His work on microbicide development, and alternative antiviral therapy has been much of his recent principal focus. He is a member of the Australian Centre for HIV and Hepatitis Virology, a Government institute aimed to combat the impact of HIV and hepatitis in Australia. Dr Middleton has previously worked as a physician as a General Practitioner in the Eastern suburbs of Melbourne in his earlier years. He then assumed a positon with the Royal Melbourne Hospital and State laboratory in Virology. Over the past 20 years he has generated many integral discoveries relating to HSV. His research has been instrumental in defining HSV infections and cell to cell interactions with host immune cells. Specifically focusing on the sacral ganglion and the trigeminal ganglion nerve points, being the initial target infection. Bringing to light new treatments which highlight the process of activation and regulation of macrophages and T Cell applications. His research served to develop a treatment (e.g. 5 core compounds) that aims at the source of infection to eliminate HSV cell to cell infection and viral envelope cessation. His collaborative work on recent studies have made key contributions to human immunology and neurobiology of HSV.

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