Synthetic Peptides with Broad Spectrum Antiviral Activity

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Technology description

Viruses such as herpes simplex virus (HSV-1 and HSV-2), human papilloma virus (HPV) and human immunodeficiency virus (HIV) cause a variety of diseases. Several peptides that inhibit viruses have been developed in recent years; however, many of these known antiviral peptides are extremely hydrophobic, are only effective against a limited number of viruses, do not prevent initial viral infection and do not function topically. Broad spectrum antivirals that could be applied topically and incorporated into products such as condom lubricants could help stem the spread of HIV and other viral infections. UW-Madison researchers have developed novel synthetic peptides potentially capable of blocking cell infection by a wide range of enveloped and non-enveloped viruses, including HSV-1, HSV-2, HPV and HIV. These synthetic peptides are based on membrane transit peptides, i.e., they contain an amino acid sequence that makes them able to cross lipid bilayers to enter cells and subcellular compartments. In addition, the peptide sequences include a solubility tag - a short sequence of covalently attached, positively charged amino acids - for increased solubility in aqueous solution.

The first of these peptides to be characterized, called EB for entry blocker, shows activity against HSV, HPV and HIVin vitroand is capable of blocking infection at both the entry stage and during cell-to-cell spreading. In addition,in vivostudies demonstrated that EB provides significant protection against HSV when administered as a topical treatment. These results suggest that these peptides will be effective topical antiviral agents and that EB is a promising lead compound for improved viral inhibitors. Peptides can be readily prepared using classical protein synthesis techniques.

Application area

Potential Applications

Topical antiviral agent

Advantages

Effective in vitro against herpes simplex virus (HSV-1 and HSV-2), human papilloma virus (HPV) and human immunodeficiency virus (HIV) Broad-spectrum activity against both enveloped and non-enveloped viruses Could provide significant protection against sexually-transmitted viral infections when applied topically in products such as vaginal creams and foams, or condom lubricants Very stable Addition of the solubility sequence to the antiviral peptide overcomes problems with other peptide antivirals, which are typically hydrophobic and therefore not very bioavailable.

Institution

Wisconsin Alumni Research Foundation

Inventors

Curtis Brandt
Hermann Bultmann

联系我们

叶先生

电 话：021-65679356
手 机：13414935137
邮 箱：yeyingsheng@zf-ym.com