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A chemically modified milk protein for preventing HIV sexual transmission and treating HPV infection

Most recently, more than 90% of the new HIV infections in China occurred through sexual transmission, particularly among the men who have sex with men (MSM). Therefore, it is urgently needed to develop effective and safe microbicides to prevent sexual transmission of HIV. We previously have shown that a chemically modified bovine milk protein, β -lactoglobulin (3HP- β -LG, also known as JB01) is effective against infection by a broad-spectrum of HIV and SIV. It is highly stable, soluble, safe and abundant in milk. Therefore, we have been developing JB01 in a slow-release gel formulation as an effective, safe and inexpensive microbicide for prevention of HIV sexual transmission in China and other countries. Later, we have demonstrated that JB01 is also highly effective against infection by HPV strains, including both the high- and low-risk types. Mechanism studies have demonstrated that JB01 protein that carries increased net-negative charges, because of the modification of the positively charged lysine and arginine residues, blocks HPV entry through its interaction with the positively charged proteins, such as L1 and L2 proteins on the surface of HPV. The results from a randomized open-label clinical trial of a JB01 biological dressing (JB01-BD) administered intravaginally have demonstrated that JB01-BD is safe, since no serious adverse events were recorded. The deteriorated vaginal micro-environment, due to the HPV infection, became normalized after the treatment. While only 13.5% of women in the non-treatment group becoming HPV-negative, about 60.5% of HPV-positive women in the treatment group became HPV-negative ($P < 0.001$). These results suggest that JB01-BD is a safe and effective topical biological agent for the treatment of cervical HPV infection and reduction of morbidity of cervical cancer caused by the high-risk HPV infection. Since its approval by China Food and Drug Administration (CFDA) in 2013, JB01-BD has been used in more than 500 hospitals in China for treating women with cervical infection of HPV.

Biography

Shibo Jiang has pioneered the studies on development of anti-HIV microbicides for prevention of sexual transmission of HIV. His major research interest is to develop antiviral drugs, microbicides and vaccines against HIV, HPV, influenza virus, SARS-CoV, MERS-CoV, Ebola virus and Zika virus. He discovered the first highly potent anti-HIV C-peptide and his patent was licensed to Trimeris for developing the first peptide anti-HIV drug, T-20 (Enfuvirtide, Fuzeon). In collaboration with Shanxi Jinbo Biomedicine Co., Ltd., he has successfully developed an anti-HPV bioproduct, JB-01, for controlling HPV infection and reducing morbidity of cervical cancer, which was approved for clinical use in more than 500 hospitals in China. He has published 374 peer-reviewed SCI papers with >11,000 citations. He has applied for 26 US patents (18 of them were issued) and 17 Chinese and PCT patents (5 of them were issued) and given more than 190 oral presentations at international conferences, academic institutions and pharmaceutical companies in more than 30 countries.

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