Promising effective and safe Epstein-Barr virus (EBV) vaccine based on VLPs (P-989)

Key facts

- Prevention of EBV-associated malignancies
- New VLPs devoid of viral DNA (infectious and contaminating DNA)

Abstract
Epstein-Barr virus (EBV) is the most common etiological agent of infectious mononucleosis (IM) and a major cause of virus-associated human cancers, predominantely lymphomas and carcinomas. EBV infection mostly occurs in early childhood and remains usually asymptomatic. However, in highly developed countries up to 50% of adolescents remain EBV-negative. Delayed EBV infections often leads to the development of IM with a median duration of 16 days and only gradual recovery. Long-lasting fatigue for several month interferes with productivity and diminishes the quality of life. Following primary infection, EBV establishes a clinically silent persistent B-cell infection in healthy individuals. Immunsuppression, typically in the setting of organ transplantation or after HIV infection, often results in increased EBV loads and a higher risk of developing EBV-associated diseases. Therefore, many efforts have been devoted to the development of prophylactic and therapeutic EBV vaccines, but up to now, with limited success. We have developed EBV virus-like particles (VLPs) that express a wide spectrum of structural viral proteins and elicit a potent cytotoxic CD4-positive T-cell response. In the present invention DKFZ inventors knocked out two proteins involved in DNA packaging. This allows the production of VLPs completely devoid of viral DNA that offer a safe and effective preventative vaccine against EBV infection.

Development Stage
Infection studies performed on primary resting B cells showed that these new EBV-VLPs are not transforming. Additionally, it could be shown in qPCR assays that they are free of any contaminating EBV DNA. Incubation of EBV-VLP with B cells cocultivated with EBV-specific T-cell clones elicited IFN-γ release in a dose-dependent manner that was similar in amplitude to the one observed with wild-type viruses [please see Reference].

The Technology
In the present invention, DKFZ inventors used recombinant technology to excise two proteins (BBRF1 and BFLF1) involved in DNA packaging.

Applications and Commercial Opportunity
DKFZ is looking for an industrial partner to further develop the preventive vaccine based on the VLP-EBVs.

Inventors
The inventors are Henri-Jacques Delecluse, Regina Feederle and Sophia Pavlova from the DKFZ.

Intellectual Property
An international patent application was filed in December 2012 (WO2013098364).

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References:
Pavlova S, Feederle R, Gärtner K, Fuchs W, Granzow H, Delecluse HJ. An Epstein-Barr virus mutant produces immunogenic defective particles devoid of viral DNA. J Virol. 2013 Feb;87(4):2011-22.