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## **Recombinase Brec1 trend-setting for future HIV Therapy**

*Heinrich Pette Institute, Leibniz Institute for Experimental Virology: Approach demonstrated to work directly on HIV-patient material*

**Hamburg, Dresden. Researchers at the Heinrich Pette Institute (HPI), Leibniz Institute for Experimental Virology and the Medical Faculty of the Dresden Technical University (TUD) succeeded in developing a designer recombinase (Brec1) that is capable of specifically removing the provirus from infected cells of most primary HIV-1 isolates. The results have now been published in the renowned Journal „Nature Biotechnology“.**

With 37 Million HIV-positive people and more than two Million new infections annually, HIV remains a major world health challenge. Even though enormous advances have been made in HIV treatment, a complete cure from the disease is still not possible. Indeed, the propagation of the virus in the body can nowadays be held in check through medication, but the provirus remains present in cells of the body.

A team of researchers from the research unit ‘Antiviral Strategies’ at the HPI in Hamburg as well as the Department of Medical Systems Biology at the TUD employed directed molecular evolution to generate a designer recombinase (Brec1), which can precisely remove the provirus from the majority (>90%) of clinical HIV-1 isolates found in humans.

The team now demonstrated for the first time, that the approach works on cells directly isolated from HIV-1 patients. Importantly, the antiviral effects were accomplished without measurable cytotoxic or genotoxic side effects. Based on these findings, Brec1 represents a promising candidate for possible applications in improved HIV therapies.

“Only the complete removal of the HIV provirus from the genome of patient cells will ultimately lead to a durable cure of the infection. With the development of the Brec1 recombinase we are now able to target almost all of the clinically relevant HIV-1 isolates and remove the provirus without recognizable side effects. Therefore, the obtained results represent a solid basis for first clinical trials, which we plan to initiate”, explains the head of the HPI group, Prof. Joachim Hauber.

Brec1 recombinase was developed in close collaboration at the Heinrich Pette Institute, Leibniz Institute for Experimental Virology (Prof. Joachim Hauber) and the department of Medical Systems Biology (Prof. Frank Buchholz), TU Dresden.

The results were published in the Journal “Nature Biotechnology“:

Janet Karpinski, Ilona Hauber, Jan Chemnitz, Carola Schäfer, Maciej Paszkowski-Rogacz, Deboyoti Chakraborty, Niklas Beschorner, Helga Hofmann-Sieber, Ulrike C. Lange, Adam Grundhoff, Karl Hackmann, Evelin Schrock, Josephine Abi-Ghanem, M. Teresa Pisabarro, Vineeth Surendranath, Axel Schambach, Christoph Lindner, Jan van Lunzen, Joachim Hauber & Frank Buchholz (2016). Directed evolution of a recombinase that excises the provirus of most HIV-1 primary isolates with high specificity. Nature Biotechnology 2014 Feb 22, advance online publication. doi: 10.1038/nbt.3467.

### Press Contact

**Dr. Franziska Ahnert,  
HPI**  
Tel.: 040/48051-108  
Fax: 040/48051-103  
[presse@hpi.uni-hamburg.de](mailto:presse@hpi.uni-hamburg.de)

### Scientific Contact

**Prof. Dr. Joachim Hauber, HPI**  
Tel.: 040/480 51-241  
[joachim.hauber@hpi.uni-hamburg.de](mailto:joachim.hauber@hpi.uni-hamburg.de)

### Publication

**„Directed evolution of a recombinase that excises the provirus of most HIV-1 primary isolates with high specificity“** Nature Biotechnology, Advanced Online Publication, doi: 10.1038/nbt.3467.

**Further inquiries:**

Prof. Dr. Joachim Hauber: [joachim.hauber@hpi.uni-hamburg.de](mailto:joachim.hauber@hpi.uni-hamburg.de)  
Heinrich-Pette-Institut, Leibniz-Institut für Experimentelle Virologie,  
Hamburg

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**Heinrich Pette Institute, Leibniz Institute for Experimental Virology**

The HPI investigates the biology of human pathogenic viruses with the aim to unravel the molecular mechanisms that control viral life cycles and virus induced pathogenesis. This research will provide novel targets and therapeutic approaches for established and emerging viral disease.

The institute applies basic experimental research to develop new approaches for contemporary treatments of viral infections such as AIDS, influenza and hepatitis but also of emerging viral diseases. The HPI's research covers the most critical global viral pathogens that cause the most infections worldwide and over three million deaths annually.

The HPI is a non-profit, independent research foundation that has been part of the Leibniz Association (WGL) since 1995. Its research is partly funded by the Federal Ministry of Health (BMG) and the combined research funding by the *Länder*, which is represented by Hamburg's Ministry of Science, Research and Equality (BWFG). Significant funding is also acquired through competitive bidding from national research programs, private foundations and the industry.

The HPI is a founding member of the German Centre for Infection Research (DZIF).