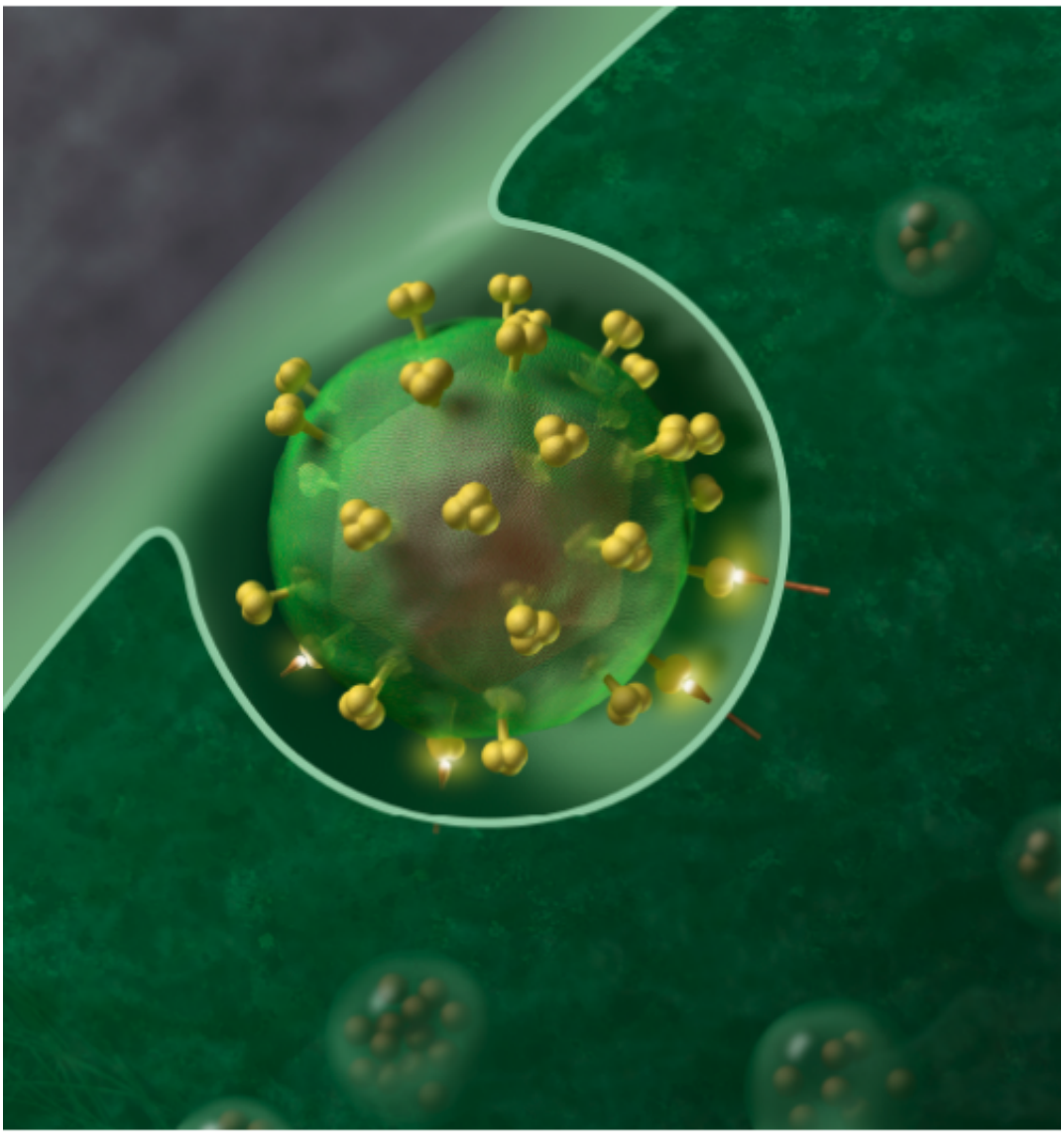
Recombinase Brec1 trend-setting for future HIV therapy

February 22 2016



HIV-1 Virus. Credit: J Roberto Trujillo/Wikipedia

Researchers at the Medical Faculty of the Technische Universität Dresden (TUD) and the Heinrich Pette Institute (HPI), Leibniz Institute for Experimental Virology 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 Department of Medical Systems Biology at the TUD as well as the research unit Antiviral Strategies at the HPI in Hamburg 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.

"The generation of molecular scalpels, such as the Brec1 recombinase, will change medical practice. Not only HIV patients will likely benefit from this development, but also many other patients with genetically caused diseases. We are about to witness the beginning of the genome surgery era", predicts the head of the Dresden group, Prof. Frank Buchholz.

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

More information: Janet Karpinski et al. Directed evolution of a recombinase that excises the provirus of most HIV-1 primary isolates with high specificity, *Nature Biotechnology* (2016). DOI: 10.1038/nbt.3467