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## CCR5-based stem cell gene therapy: Hope for HIV infection cure

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In 2011, Allers et al.'s reported a cure of patient with HIV infection (1). Results showing that a patient remained without HIV infection for more than 3.5 years after accepting CCR5- $\Delta$ 32 bone marrow transplant supported the therapeutic potential of CCR5- $\Delta$ 32 related gene therapy strategies. Among HIV-related cellular targets, CCR5 appears to be the focus of gene therapy related studies (2). Two types of particular clinical epidemiological observations prompted us to think the possibility of CCR5-based hematopoietic stem cell gene therapy against HIV infection. The first evidence is the identification of mutant CCR5 having resistant to HIV infection by three independent reports in 1996 (3-5). Another brainstorming data were that anti-CCR5 IgA had been confirmed for its protective effect against HIV infection (6). As our body chosen CCR5 to be a target of immune system in respecting to preventing from HIV infection, the anti-CCR5 IgA may suggest the difficulties in the development of vaccine directly targeting HIV itself. As early as 2005, we described these HIV gene therapy strategies as follows: « In a therapeutic point of view AIDS can be treated as aplastic anemia or leukemia and transplanted with bone marrow carrying CCR5- $\Delta$ 32. ...However, allogenic bone marrow transplantation has two drawbacks: immune rejection and the limited number of available donors. ... Thus, in order to be more beneficial to more HIV infected people, it is technically easier to introduce the CCR5- $\Delta$ 32 genotype through genetic engineering of hemopoietic stem cells isolated from the patients themselves » (7) Although it is still too early for definitive conclusions on the therapeutic potential of CCR5-based stem cell gene therapy strategies, it is our hope that more individuals with HIV infection will benefit from these new therapeutic strategies.