**Fig. S1.** Fresh cord-derived CD34\(^+\) cells were isolated and transduced with a lentivirus vector expressing the shRNA PromA adapted to HIV-1\_{JRFL} (shPromA\_{JRFL} or simply shPromA). (A) A representative plot showing the CD34/CD38 expression pattern in freshly isolated CD34\(^+\) cells. (B) Representative plots showing the lentiviral transduction efficiency measured by GFP expression. (D) Summary of the CD34\(^+\) cell isolation results (upper and middle bars) and the efficiency of the following lentiviral transduction (lower bar).
Fig. S2. PromA-transduced CD34⁺ cells showed equivalent colony forming capability to mock-transduced CD34⁺ cells. In vitro differentiation of shPromA-transduced CD34⁺ cells to erythrocytes, granulocytes, or monocytes were assessed in vitro by a colony formation assay. Cells were diluted to 500/mL in MethoCult Optimum methylcellulose media (STEMCELL Technologies, VIC, Australia) containing recombinant human cytokines including SCF, granulocyte macrophage-colony stimulating factor (GM-CSF), granulocyte-colony stimulating factor (G-CSF), interleukin 3 (IL-3), and erythropoietin. Cells were seeded in 6-well plate (Corning, VIC, Australia) using a syringe and BD blunt plastic cannula (BD Biosciences, NSW, Australia). Colony-forming units per 1,000 CD34⁺ cells were counted after 14 days of culture. (A) Different types of GFP⁺ colonies were found. (B) PromA-transduced CD34⁺ cells showed no significant difference to mock-transduced cells in colony forming units of all the different colony types tested. (C) Colony forming cells were collected together for flow cytometric analysis. CD14/CD33 expression levels were compared between mock-transduced, shPromA-transduced GFP⁻, and PromA-transduced GFP⁺ cells.
**Fig. S3.** Engraftment of human cells in three transplanted NOJ mice was tested 15 weeks after transplantation, without HIV challenge. (A) PromA-expressing frequencies in human CD45+ cells, expressed as GFP+ frequencies, in group PromA are shown. These were tested in mouse PBMC (prechallenge, week 1, week 2), splenocytes (week 2) and bone marrow cells (week 2). (B) The mean GFP(shRNA)+ percentages in the different subsets of cells in bone marrow. (C) Comparison of subset frequencies in human CD45+ cells in spleen and bone marrow between Neg uninfected (transplanted with unmanipulated CD34+ cells, n = 2) and PromA uninfected (n = 3) groups.
Fig. S4. Blood CD45$^+$ frequencies were analyzed after HIV-1 infection of humanized mice. (A) Human CD45$^+$ percentages in PBMC at prechallenge, week 1, and week 2. (B) Human CD45$^+$ cell counts in blood (/ml) at prechallenge, week 1, and week 2. Comparison was done by the Mann-Whitney test. **: $P<0.01$, ***: $P<0.001$. 
**Fig. S5.** Intracellular HIV p24+ frequencies in CD3+CD8- T cells were compared between group CD34 and PromA of HIV-infected humanized mice. The analysis was done using PBMC obtained at weeks 1 and 2 post challenge. Comparison was done by the Mann-Whitney test. ***: *P*<0.001.
Fig. S6. CCR5+ T-cell frequencies of CD4+ T cells in PBMCs were analyzed at weeks 1 and 2 post HIV challenge of humanized mice. Comparison was done by the Mann-Whitney test. ***: $P<0.001$. 

% HIV CCR5+ of CD4+ T cells in PBMC

Weeks after infection
**Fig. S7.** The efficacy of shPromA to suppress HIV infection was tested in vitro using the PM1-CCR5 cells\(^1\). Cells were infected with HIV-1\(_\text{JRFL}\) at an MOI of 0.01. Twenty-four hours later, cells were seeded in RetroNectin-coated 48-well plate at the concentration of 5,000 cells/well and transduced with the lentivirus expressing shPromA at an MOI of 1 or 10. Cells were analyzed at days 3, 6, and 9 post-transduction for the intracellular expression of HIV p24\(^+\). (A) Transduction rates as determined by the expression of GFP analyzed by flow cytometry. The lentiviral MOIs were indicated. (B) Intracellular HIV p24\(^+\) percentages monitored at days 3, 6, and 9 post-transduction. (C) Percentages of suppression of HIV replication relative to the untransduced control at day 9 post-transduction were calculated by the data shown in B.