Autologous hematopoietic stem cell (HSC)–targeted gene therapy provides a one–time cure for various genetic diseases including sickle cell disease (SCD) and ?–thalassemia. In HSC gene–addition therapy, patient CD34+ HSCs are genetically modified by adding a therapeutic ?–globin gene with lentiviral transduction, followed by autologous transplantation. Alternatively, novel gene–editing therapies allow for the correction of the mutated ?–globin gene, instead of addition.