CLAIMS

1. A DNA-targeting endonuclease comprising a TAL DNA binding domain, in which the DNA targeting endonuclease binds and cleaves the genomic DNA of an erythroid cell on chromosome 2 location 60,716,189-60,728,612 (according to UCSC Genome Browser hg 19 human genome assembly) to generate at least one genetic modification therein that disrupts DNAse I-hypersensitive sites +62, +58, or +55, in which the at least one genetic modification is an insertion or a deletion, in which the at least one genetic modification reduces the mRNA or protein expression of BCL11A in the erythroid cell.

2. An mRNA sequence encoding a DNA-targeting endonuclease according to Claim 1.

3. A polynucleotide sequence encoding a DNA-targeting endonuclease according to Claim 1.

4. A vector comprising the coding sequence of a DNA-targeting endonuclease according to Claim 1.

5. A vector comprising an mRNA sequence according to Claim 2.

6. A vector comprising a polynucleotide sequence according to Claim 3.

7. A polynucleotide sequence encoding a DNA-targeting endonuclease according to Claim 3, in which the polynucleotide sequence encoding a DNA-targeting endonuclease is operatively linked to a regulatory element.

8. An mRNA sequence according to Claim 2, or polynucleotide sequence according to Claim 3, or vector according to Claim 4, 5 or 6, further comprising a regulatory element sequence operatively linked to the DNA-targeting endonuclease coding region.

9. A DNA-targeting endonuclease according to Claim 1, in which the deletion

(a) removes the entire region between the chromosome 2 location 60,716,189 and 60,728,612;

(b) removes the entire region between chromosome 2 location 60,717,492 and 60,718,860;

(c) removes the entire region between chromosome 2 location 60,721,411 and 60,722,674;

(d) removes the entire region between chromosome 2 location 60,724,802 and 60,726,084;

(e) disrupts DHS +62;

(f) disrupts DHS +58; or

(g) disrupts DHS +55.

10. A DNA-targeting endonuclease according to Claim 1, in which the at least one genetic modification reduces BCL11A mRNA and protein expression when expressed in a human hematopoietic progenitor cell of erythroid lineage.

11. A composition comprising a DNA-targeting endonuclease according to Claim 1, an mRNA sequence according to Claim 2, a polynucleotide sequence according to Claim 3, or a vector according to Claim 4, 5 or 6.

12. A composition according to Claim 11, further comprising a pharmaceutically acceptable carrier.

13. A pharmaceutical composition comprising a pharmaceutically acceptable carrier and a DNA-targeting endonuclease comprising a TAL DNA binding domain, in which the DNA targeting endonuclease binds and cleaves the genomic DNA of an erythroid cell on chromosome 2 location 60,716,189-60,728,612 (according to UCSC Genome Browser hg 19 human genome assembly) to generate the at least one genetic modification therein that disrupts DNAse hypersensitive sites +62, +58, or +55, in which the at least one genetic modification is an insertion or a deletion, in which the at least one genetic modification reduces the mRNA or protein expression of BCL11A in the erythroid cell.

14. A pharmaceutical composition comprising a pharmaceutically acceptable carrier and an mRNA sequence according to Claim 2, or a polynucleotide sequence according to Claim 3, or a vector according to Claim 4, 5 or 6.