Claims:

1. An isolated nucleotide sequence wherein said sequence is SEQ ID NO: 1.

2. A gene construction comprising the nucleotide sequence according to claim 1.

3. An expression vector comprising the gene construction according to claim 2.

4. The expression vector as defined in claim 3, wherein said vector is an adeno-associated vector.

5. The expression vector according to claim 4, wherein the serotype of the adeno-associated vector is 1, 2, 5, 7, 8 or 9.

6. The expression vector according to claim 5, wherein the serotype is 9.

7. The expression vector according to claim 4, comprising a CAG promoter operably linked to SEQ ID NO: 1.

8. The expression vector according to claim 7, wherein the expression vector is AAV9-CAG-co-hu-SFMD.

9. A plasmid pAAV-CAG-co-hu-SFMD with accession number DSM 24817, containing the isolated nucleotide sequence according to claim 1.

10. The expression vector according to claim 3 comprising a hAAT promoter operably linked to SEQ ID NO: 1.

11. The expression vector according to claim 10, wherein the expression vector is an adeno-associated virus serotype 9 (AAV9) comprising the codon optimized human sulfamidase gene (co-hu-SFMD) of SEQ ID NO: 1 operably linked to a human alpha1-antitrypsin promoter (hAAT) known as AAV9-hAAT-co-hu-SFMD.

12. A plasmid pAAV-hAAT-co-hu-SFMD comprising the codon optimized human sulfamidase gene (co-hu-SFMD) of SEQ ID NO: 1 according to claim 1 operably linked to a human alpha1-antitrypsin promoter (hAAT).

13. A pharmaceutical composition comprising the nucleotide sequence according to claim 1.

14. A pharmaceutical composition comprising the gene construction according to claim 2.

15. A pharmaceutical composition comprising the expression vector according to claim 3.

16. A method for increasing the sulfamidase activity in the body comprising administering to a subject in need thereof the pharmaceutical composition according to claim 13, 14, or 15.

17. A method for the treatment of mucopolysaccharidoses comprising administering to a subject having mucopolysaccharidoses the pharmaceutical composition according to claim 13, 14, or 15.

18. A method of producing the expression vectors according to claim 4 comprising the steps of:

i) providing a first vector comprising SEQ ID NO: 1 interposed between a first AAV terminal repeat and a second AAV terminal repeat, a CAG or hAAT promoter operably linked to SEQ ID NO: 1; a second vector comprising an AAV rep gene and an AAV cap gene; and a third vector comprising an adenovirus helper function;

ii) co-transfecting competent cells with the vectors of step i);

iii) culturing the transfected cells of step ii); and

iv) purifying the expression vectors from the culture of step iii).

19. An isolated cell transfected with the nucleotide sequence according to claim 1.

20. An isolated cell transfected with the gene construction according to claim 2.

21. An isolated cell transfected with the expression vector according to claim 3.

Claims

1. An isolated nucleotide sequence wherein said sequence is SEQ ID NO: 1.

2. A gene construction comprising the nucleotide sequence according to claim 1.

3. An expression vector comprising the gene construction according to claim 2.

4. The expression vector as defined in claim 3, wherein said vector is an adeno-associated vector.

5. The expression vector according to claim 4, wherein the serotype of the adeno-associated vector is 1, 2, 5, 7, 8 or 9.

6. The expression vector according to claim 5, wherein the serotype is 9.

7. The expression vector according to claim 4, comprising a CAG promoter operably linked to SEQ ID NO: 1.

8. The expression vector according to claim 7, wherein the expression vector is an adeno-associated virus serotype 9 (AAV9) comprising the codon optimized human sulfamidase gene (co-hu-SFMD) of SEQ ID NO: 1 operably linked to a cytomegalovirus early enhancer element and chicken B-actin promoter (CAG), identified as AAV9-CAG-co-hu-SFMD.

9. A plasmid pAAV-CAG-co-hu-SFMD with accession number DSM 24817, containing the codon optimized human sulfamidase gene (co-hu-SFMD) of SEQ ID NO:1 according to claim 1 operably linked to a cytomegalovirus early enhancer element and chicken B-actin promoter (CAG).

10. The expression vector according to claim 3 comprising a hAAT promoter operably linked to SEQ ID NO: 1.

11. The expression vector according to claim 10, wherein the expression vector is an adeno-associated virus serotype 9 (AAV9) comprising the codon optimized human sulfamidase gene (co-hu-SFMD) of SEQ ID NO: 1 operably linked to a human alpha1-antitrypsin promoter (hAAT) known as AAV9-hAAT-co-hu-SFMD.

12. A plasmid pAAV-hAAT-co-hu-SFMD comprising the codon optimized human sulfamidase gene (co-hu-SFMD) of SEQ ID NO: 1 according to claim 1 operably linked to a human alpha1-antitrypsin promoter (hAAT).

13. A pharmaceutical composition comprising the nucleotide sequence according to claim 1.

14. A pharmaceutical composition comprising the gene construction according to claim 2.

15. A pharmaceutical composition comprising the expression vector according to claim 3.

16. Use of the pharmaceutical composition according to claim 13, 14 or 15 for the manufacture of a medicament for increasing the sulfamidase activity in the body.

17. Use of the pharmaceutical composition according to claims 13, 14, or 15 for the manufacture of a medicament for the treatment of mucopolysaccharidoses.

18. A method of producing the expression vectors according to claim 4 comprising the steps of:

i) providing a first vector comprising SEQ ID NO: 1 interposed between a first AAV terminal repeat and a second AAV terminal repeat, a CAG or hAAT promoter operably linked to SEQ ID NO: 1; a second vector comprising an AAV rep gene and an AAV cap gene; and a third vector comprising an adenovirus helper function;

ii) co-transfecting competent cells with the vectors of step i);

iii) culturing the transfected cells of step ii); and

iv) purifying the expression vectors from the culture of step iii).

19. An isolated cell transfected with the nucleotide sequence according to claim 1.

20. An isolated cell transfected with the gene construction according to claim 2.

21. An isolated cell transfected with the expression vector according to claim 3.