Claims

1. A DNA construct for immunomodulation comprising at least one sequence motif $N^1N^2CGN^3N^4$, wherein N^1N^2 and N^3N^4 is any combination of A, C, T, and G, and C is deoxycytidine, G is deoxyguanosine, A is deoxyadenosine and T is deoxythymidine comprising at least one nucleotide which is in L-conformation.

2. The construct according to claim 1, wherein N^1N^2 is an element selected from the group comprising GT, GG, GA, AT or AA, N^3N^4 is an element selected from the group comprising CT or TT.

3. The construct according to claim 1 or 2, wherein at least one nucleotide in L-conformation is comprised within the terminal five nucleotides located at the 5'- and/or the 3'-end of a DNA single strand.

4. The construct according to any of the preceding claims, wherein at least one G stretch of at least three consecutive deoxyguanosine is located near the 5' and/or 3' end.

5. The construct according to any of the preceding claims, wherein a G stretch of at least three consecutive deoxyguanosine is located between two sequence motifs according to claim 1 or 2.

6. The construct according to any of the preceding claims, wherein at least five bases are located between two sequences motifs according to claim 1 or 2, excluding deoxyguanosine.

7. The construct according to any of the preceding claims, wherein the DNA is a linear open-chained DNA construct comprising single or double-stranded DNA or is a linear DNA construct, which comprises at least one end with a single stranded loop.

8. The construct according to any of the preceding claims, wherein the sequence motif $N^1N^2CGN^3N^4$ as defined in claim 1 is located within a single-stranded and/or a double-stranded region of the DNA sequence.

9. The construct according to any of the preceding claims, comprising inter- and/or intramolecular base-pairs and at least one unpaired, single-stranded region.

10. The construct according to claim 6, wherein at least two constructs ligate with each other.

11. The construct according to any of the preceding claims, wherein at least one nucleotide in L- or D-conformation is modified with a functional group selected from the group comprising carboxyl, amine, amide, aldimine, ketal, acetal, ester, ether, disulfide, thiol and aldehyde groups.

12. The construct according to claim 8, wherein the modified nucleotide is linked to a compound selected from the group comprising peptides, proteins, carbohydrates, antibodies, lipids, micelles, vesicles, synthetic molecules, polymers, micro projectiles, metal particles, nanoparticles, or a solid phase.

13. The construct according to any of the preceding claims, comprising a first G stretch at the 5' end and three sequence motifs according to claims 1 or 2, wherein at least five bases are located between the first and second motif, excluding deoxyguanosine, and a G stretch, which is located between the second and third sequence motif and wherein two of the three 3' terminal deoxynucleotides are in L-conformation.

14. The construct according to claim 13, comprising at least one further G stretch.

15. A pharmaceutical composition comprising a DNA construct according to any of the claims 1 to 9.

16. The pharmaceutical composition according to claim 12, comprising additionally a chemotherapeutic.

17. A vaccine comprising a DNA construct according to any of the claims 1 to 9.

18. The vaccine according to claim 12, wherein the DNA construct is comprised as adjuvant.

19. The use of a DNA construct according to any of the claims 1 to 9, a pharmaceutical composition according to claims 10 or 11 or a vaccine according to claims 12 or 13 for the treatment of cancer or autoimmune diseases.

20. Use of a DNA construct according to any of the claims 1 to 9, a pharmaceutical composition according to claims 10 or 11 or a vaccine according to claims 12 or 13 for the modulation of the immune system.

Claims

1. A non-coding DNA construct for immunomodulation comprising at least one sequence motif $N^1N^2CGN^3N^4$, wherein N^1N^2 and N^3N^4 is any combination of A, C, T, and G, and C is deoxycytidine, G is deoxyguanosine, A is deoxyadenosine and T is deoxythymidine comprising at least one nucleotide which is in L-conformation.

2. The construct according to claim 1, wherein N^1N^2 is an element selected from the group comprising GT, GG, GA, AT or AA, N^3N^4 is an element selected from the group comprising CT or TT.

3. The construct according to claim 1 or 2, wherein at least one nucleotide in L-conformation is comprised within the terminal five nucleotides located at the 5'- and/or the 3'-end of a DNA single strand.

4. The construct according to any of the preceding claims, wherein at least one G stretch of at least three consecutive deoxyguanosine is located near the 5' and/or 3' end.

5. The construct according to any of the preceding claims, wherein a G stretch of at least three consecutive deoxyguanosine is located between two sequence motifs according to claim 1 or 2.

6. The construct according to any of the preceding claims, wherein at least five bases are located between two sequences motifs according to claim 1 or 2, excluding deoxyguanosine.

7. The construct according to any of the preceding claims, wherein the DNA is a linear open-chained DNA construct comprising single or double-stranded DNA or is a linear DNA construct, which comprises at least one end with a single stranded loop.

8. The construct according to any of the preceding claims, wherein the sequence motif $N^1N^2CGN^3N^4$ as defined in claim 1 is located within a single-stranded and/or a double-stranded region of the DNA sequence.

9. The construct according to any of the preceding claims, comprising inter- and/or intramolecular base-pairs and at least one unpaired, single-stranded region.

10. The construct according to claim 9, wherein at least two constructs ligate with each other.

11. The construct according to any of the preceding claims, wherein at least one nucleotide in L- or D-conformation is modified with a functional group selected from the group comprising carboxyl, amine, amide, aldimine, ketal, acetal, ester, ether, disulfide, thiol and aldehyde groups.

12. The construct according to claim 11, wherein the modified nucleotide is linked to a compound selected from the group comprising peptides, proteins, carbohydrates, antibodies, lipids, micelles, vesicles, synthetic molecules, polymers, micro projectiles, metal particles, nanoparticles, or a solid phase.

13. The construct according to any of the preceding claims, comprising a first G stretch at the 5' end and three sequence motifs according to claims 1 or 2, wherein at least five bases are located between the first and second motif, excluding deoxyguanosine, and a G stretch, which is located between the second and third sequence motif and wherein two of the three 3' terminal deoxynucleotides are in L-conformation.

14. The construct according to claim 13, comprising at least one further G stretch.

15. A pharmaceutical composition comprising a DNA construct according to any of the claims 1 to 14.

16. The pharmaceutical composition according to claim 15, comprising additionally a chemotherapeutic.

17. A vaccine comprising a DNA construct according to any of the claims 1 to 14.

18. The vaccine according to claim 17, wherein the DNA construct is comprised as adjuvant.

19. Use of a DNA construct according to any of the claims 1 to 14, a pharmaceutical composition according to claims 15 or 16 or a vaccine according to claims 17 or 18 in the preparation of a drug for the treatment of cancer or autoimmune diseases.

20. Use of a DNA construct according to any of the claims 1 to 14, a pharmaceutical composition according to claims 15 or 16 or a vaccine according to claims 17 or 18 in the preparation of a drug for the modulation of the immune system.