CLAIMS

What is claimed is:

1. An immunomodulatory polynucleotide, comprising:

a) a palindromic sequence comprising at least two CG dinucleotides, wherein the CG dinucleotides are separated by 0, 1, 2, 3, 4 or 5 bases and wherein the palindromic sequence is at least 8 bases in length; and

b) a $(TCG)_y$ sequence, wherein y is 1~~ or 2~~, wherein the 5' T of the $(TCG)_y$ sequence is positioned 0~~, 1, 2 or 3~~ bases from the 5' end of the polynucleotide; wherein the palindromic sequence of (a) includes all or part of the $(TCG)_y$ sequence; and

wherein a CG of the $(TCG)_y$ sequence may be one of the CG dinucleotides of the palindromic sequence of (a),

wherein the polynucleotide is 15-50 bases or base pairs in length.

2. The immunomodulatory polynucleotide according to claim 1 wherein the palindromic sequence has a base composition of more than one-third A's and T's.

3. The immunomodulatory polynucleotide according to claim 1, comprising:

a) 5'-$N_x(TCG(N_q))_yN_w(X_1X_2CGX_2'X_1'(CG)_p)_z$ (SEQ ID NO:156)

wherein N are nucleosides, x = 0~~-3~~, y = 1-4, w = ~~-2, -1,~~ 0~~, 1 or 2~~, p = 0 or 1, q = 0, 1 or 2, and z = 1-20, X_1 and X_1' are self-complimentary nucleosides, X_2 and X_2'are self-complimentary nucleosides, and wherein the 5'T of the $(TCG(N_q))_y$ sequence is 0~~-3~~ bases from the 5' end of the polynucleotide; and

b) a palindromic sequence at least 8 bases in length wherein the palindromic sequence comprises the first ($X_1X_2CGX_2'X_1'$) of the $(X_1X_2CGX_2'X_1'(CG)_p)_z$ sequences.

4. The immunomodulatory polynucleotide according to claim 3 wherein the palindromic sequence has a base composition of more than one-third A's and T's.

5. The immunomodulatory polynucleotide according to claim 3 wherein the IMP comprises a sequence selected from the group consisting of ~~SEQ ID NO:27, SEQ ID NO:38,~~ SEQ ID NO:39, ~~SEQ ID NO:44, SEQ ID NO:45, SEQ ID NO:75, SEQ ID NO:109,~~ SEQ ID NO:117, SEQ ID NO:171, SEQ ID NO:175, and SEQ ID NO:172.

6. The immunomodulatory polynucleotide according to claim 1, comprising:

a) 5'-$N_x(TCG(N_q))_yN_w(X_1X_2CGX_3X_3'CGX_2'X_1'(CG)_p)_z$ (SEQ ID NO:159)

wherein N are nucleosides, x = 0-~~3~~, y = 1-4, w = -2, -1, 0, 1 or 2, p = 0 or 1, q = 0, 1 or 2, and z = 1-20, X_1 and X_1' are self-complimentary nucleosides, X_2 and X_2'are self-complimentary nucleosides, X_3 and X_3' are self-complimentary nucleosides and wherein the 5'T of the $(TCG(N_q))_y$ sequence is 0-~~3~~ bases from the 5' end of the polynucleotide; and

b) a palindromic sequence at least 10 bases in length wherein the palindromic sequence comprises the first ($X_1X_2CGX_3X_3'CGX_2'X_1'$) of the $(X_1X_2CGX_3X_3'CGX_2'X_1'(CG)_p)_z$ sequences.

7. The immunomodulatory polynucleotide according to claim 6 wherein the palindromic sequence has a base composition of more than one-third A's and T's.

8. The immunomodulatory polynucleotide according to claim 1, comprising:

a) 5'-$N_x(TCG(N_q))_yN_w(X_1X_2X_3X_4X_5CGX_5'X_4'X_3'X_2'X_1'(CG)_p)_z$ (SEQ ID NO:160)

wherein N are nucleosides, x = 0-3, y = 1-4, w = -3, -2, -1, 0, 1 or 2, p = 0 or 1, q = 0, 1 or 2, and z = 1-20, X_1 and X_1' are self-complimentary nucleosides, X_2 and X_2' are self-complimentary nucleosides, X_3 and X_3' are self-complimentary nucleosides, X_4 and X_4' are self-complimentary nucleosides, X_5 and X_5' are self-complimentary nucleosides, and wherein the 5' T of the $(TCG(N_q))_y$ sequence is 0-3 bases from the 5' end of the polynucleotide; and

b) a palindromic sequence at least 12 bases in length wherein the palindromic sequence comprises the first ($X_1X_2X_3X_4X_5CGX_5'X_4'X_3'X_2'X_1'$) of the ($X_1X_2X_3X_4X_5CG\ X_5'X_4'X_3'X_2'X_1'(CG)_p)_z$ sequences.

9. The immunomodulatory polynucleotide according to claim 8 wherein the palindromic sequence has a base composition of more than one-third A's and T's.

10. The immunomodulatory polynucleotide according to claim 1, comprising:

a) 5'-$N_x(TCG(N_q))_yN_w(CGX_1X_1'CG(CG)_p)_z$ (SEQ ID NO: 161)

wherein N are nucleosides, x = 0-3, y = 1-4, w = -2, 0, 1 or 2, p = 0 or 1, q = 0, 1 or 2, and z = 1-20, wherein X_1 and X_1' are self-complimentary nucleosides and wherein the 5' T of the $(TCG(N_q))_y$ sequence is 0-3 bases from the 5' end of the polynucleotide; and

b) a palindromic sequence at least 8 bases in length wherein the palindromic sequence comprises the first ($CGX_1X_1'CG$) of the ($CG\ X_1X_1'CG\ (CG)_p)_z$ sequences.

11. The immunomodulatory polynucleotide according to claim 10 wherein the palindromic sequence has a base composition of more than one-third A's and T's.

12. The immunomodulatory polynucleotide according to claim 1, comprising:

a) 5'-$N_x(TCG(N_q))_yN_w(X_1CGCGX_1'(CG)_p)_z$ (SEQ ID NO: 162)

wherein N are nucleosides, x = 0-~~3~~, y = 1-4, w = -1, 0, 1 or 2, p = 0 or 1, q = 0, 1 or 2, and z = 1-20, X_1 and X_1' are self-complimentary nucleosides and wherein the 5' T of the $(TCG(N_q))_y$ sequence is 0-~~3~~ bases from the 5' end of the polynucleotide; and

b) a palindromic sequence at least 8 bases in length wherein the palindromic sequence comprises the first (X_1CGCGX_1') of the $(X_1CGCGX_1'(CG)_p)_z$ sequences.

13. The immunomodulatory polynucleotide according to claim 12 wherein the palindromic sequence has a base composition of more than one-third A's and T's.

14. The immunomodulatory polynucleotide according to claim 1, comprising:

a) 5'-$N_x(TCG(N_q))_yN_w(X_1X_2CGCGX_2'X_1'(CG)_p)_z$ (SEQ ID NO: 163)

wherein N are nucleosides, x = 0-~~3~~, y = 1-4, w = -2, -1, 0, 1 or 2, p = 0 or 1, q = 0, 1 or 2, and z = 1-20, X_1 and X_1' are self-complimentary nucleosides, X_2 and X_2' are self-complimentary nucleosides, and wherein the 5' T of the $(TCG(N_q))_y$ sequence is 0-~~3~~ bases from the 5' end of the polynucleotide; and

b) a palindromic sequence at least 8 bases in length wherein the palindromic sequence comprises the first ($X_1X_2CGCG\ X_2'X_1'$) of the ($X_1X_2CGCG\ X_2'X_1'(CG)_p)_z$ sequences.

15. The immunomodulatory polynucleotide according to claim 14 wherein the palindromic sequence has a base composition of more than one-third A's and T's.

16. The immunomodulatory polynucleotide according to claim 1, comprising:

a) 5'-$N_x(TCG(N_q))_yN_w(X_1X_2X_3CGCGX_3'$ $X_2'X_1'(CG)_p)_z$ (SEQ ID NO: 164)

wherein N are nucleosides, x = 0-~~3~~, y = 1-4, w = -3, -2, -1, 0,1 or 2, p = 0 or 1, q = 0, 1 or 2, and z = 1-20, X_1 and X_1' are self-complimentary nucleosides, X_2 and X_2' are self-complimentary nucleosides, X_3 and X_3' are self-complimentary nucleosides, and wherein the 5' T of the $(TCG(N_q))_y$ sequence is 0-~~3~~ bases from the 5' end of the polynucleotide; and

b) a palindromic sequence at least 10 bases in length wherein the palindromic sequence comprises the first ($X_1X_2X_3CGCGX_3'$ $X_2'X_1'$) of the ($X_1X_2X_3CGCGX_3'$ $X_2'X_1'(CG)_p)_z$ sequences.

17. The immunomodulatory polynucleotide according to claim 16 wherein the palindromic sequence has a base composition of more than one-third A's and T's.

18. The immunomodulatory polynucleotide according to claim 1, comprising:

a) 5'-$N_x(TCG(N_q))_yN_w(CGX_1X_2X_2'X_1'CG(CG)_p)_z$ (SEQ ID NO: 165)

wherein N are nucleosides, x = 0-~~3~~, y = 1-4, w = -2, 0, 1 or 2, p = 0 or 1, q = 0, 1 or 2, and z = 1-20, X_1 and X_1' are self-complimentary nucleosides, X_2 and X_2' are self-complimentary nucleosides, and wherein the 5' T of the $(TCG(N_q))_y$ sequence is 0-~~3~~ bases from the 5' end of the polynucleotide; and

b) a palindromic sequence at least 8 bases in length wherein the palindromic sequence comprises the first ($CGX_1X_2X_2'X_1'CG$) of the ($CGX_1X_2X_2'X_1'CG(CG)_p)_z$ sequences.

19. The immunomodulatory polynucleotide according to claim 18 wherein the palindromic sequence has a base composition of more than one-third A's and T's.

20. The immunomodulatory polynucleotide according to any one of claims 1 to 19, wherein the immunomodulatory polynucleotide comprises a modification of one or more phosphate groups and wherein the modification of one of more phosphate groups is a phosphorothioate linkage.

21~~20~~. An immunomodulatory composition comprising the immunomodulatory polynucleotide according to any one of claims 1 to 20.

22~~21~~. Use of the immunomodulatory polynucleotide according to any one of claims 1 to 20~~, 3 and 5~~ in the manufacture of a medicament to modulate an immune response in an individual.

23~~22~~. Use of the immunomodulatory polynucleotide according to any one of claims 1 to 20~~, 3 and 5~~ in the manufacture of a medicament to increase IFN-γ in an individual.

~~23. Use of the immunomodulatory polynucleotide according to claim 1 or 5 in the manufacture of a medicament to increase IFN-α in an individual.~~

~~24. Use of the immunomodulatory polynucleotide according to claim 3 in the manufacture of a medicament to increase IFN-α in an individual.~~

24~~25~~. Use of the immunomodulatory polynucleotide according to any one of claims 1

to 20~~, 3 and 5~~ in the manufacture of a medicament to ameliorate a symptom of an infectious disease in an individual.

25~~26~~. Use of the immunomodulatory polynucleotide according to any one of claims 1 to 20~~, 3 and 5~~ in the manufacture of a medicament to ameliorate a symptom of an IgE-related disorder in an individual.

26. Use of the immunomodulatory polynucleotide according to any one of claims 1 to 20 in the manufacture of a medicament to treat asthma.