CLAIMS

1. A composition comprising:
at least a first mRNA construct comprising at least a first open reading frame (ORF), wherein the ORF is operatively linked to at least one untranslated region (UTR), wherein the UTR comprises at least one organ protection sequence (OPS), wherein the OPS sequence protects multiple organs, and wherein the OPS sequence comprises at least a first and a second micro-RNA (miRNA) target sequence, and wherein each of the at least a first and second miRNA target sequences are optimised to hybridise with a different corresponding miRNA sequence; and wherein the first ORF encodes an antigen selected from: a bacterial protein; and/or a viral protein;
at least a second mRNA construct comprising at least a second open reading frame (ORF), wherein the second ORF encodes a proinflammatory cytokine selected from: IFNγ; IFNα; IFNβ; TNFα; TGF-beta; IL-1; IL-2; IL-3; IL-4; IL-5; IL-6; IL-7; IL-8; IL-9; IL-10; IL-11; IL-12; IL-17; IL-33; IL-35; M-CSF; G-CSF; and GM-CSF; and
an in vivo delivery composition;
wherein the mRNA construct is comprised within or adsorbed to the delivery composition.

2. The composition of claim 1, wherein the delivery composition is selected from the group consisting of: a particle, such as a polymeric particle; a liposome; a lipidoid particle; and a viral vector.

3. The composition of claim 1, wherein the antigen comprises a viral protein that comprises all or a part of a coronavirus spike protein.

4. The composition of claim 3, wherein the coronavirus spike protein is a SARS-CoV-2 spike protein.

5. The composition of claim 1, wherein the OPS sequence comprises at least a third miRNA target sequence.

6. The composition of claim 5, wherein the at least a first, second and third miRNA target sequences are selected from one or more sequences that are capable of binding with: miRNA-122; miRNA-125; miRNA-199; miRNA-124a; miRNA-126; Let7 miRNA family; miRNA-375; miRNA-141; miRNA-142; miRNA-148a/b; miRNA-143; miRNA-145; miRNA-194; miRNA-200c; miRNA-203a; miRNA-205; miRNA-1; miRNA-133a; miRNA-206; miRNA-34a; miRNA-192; miRNA-194; miRNA-204; miRNA-215; miRNA-30 a,b,c; miRNA-877; miRNA-4300; miRNA-4720; and miRNA-6761.

7. The composition of claim 5, wherein the at least a first, second and third miRNA target sequences are selected from one or more of the sequences of SEQ ID NOs: 44-57.

8. The mRNA construct of claim 5, wherein the first, second and third miRNA target sequences are all different from each other.

9. The mRNA construct of claim 5, wherein the any one of the first, second and third miRNA sequences is repeated at least twice within the OPS.

10. The mRNA construct of claim 5, wherein the OPS comprises at least a fourth miRNA target sequence.

11. The mRNA construct of claim 10, wherein the fourth miRNA target sequence is different from the first, second and third miRNA target sequences.

12. The mRNA construct of claim 10, wherein the fourth miRNA sequence is repeated at least twice within the OPS.

13. The mRNA construct of claim 10, wherein the OPS comprises at least a fifth micro-RNA (miRNA) target sequence.

14. The mRNA construct of claim 13, wherein the fifth miRNA target sequence is different from the first, second, third and fourth miRNA target sequences.

15. The mRNA construct of claim 13, wherein the fifth miRNA sequence is repeated at least twice within the OPS.

16. The composition of claim 1, wherein the composition is selected from the group consisting of: a particle; a liposome; a lipidoid particle; and a viral vector.

17. The composition of claim 1, wherein the composition is for use in treating cancer.

18. The composition of claim 1, wherein the composition is for use as a vaccine, or as a vaccine adjuvant.

19. The composition of claim 1, wherein the UTR is positioned 3' to the ORF.

20. The composition of claim 1, wherein the UTR is positioned 5' to the ORF.

21. The composition of claim 1, wherein the composition is administered intravenously, subcutaneously, intra-muscularly, intranasally, intra-arterially and/or through inhalation.