Claims

1. A combination comprising two or more mRNA molecules, or a single mRNA molecule encoding a first molecule, which is a therapeutic or immunogenic protein or peptide, and a second molecule, which is a protein or a peptide having the ability to modulate an immune response against the first molecule and/or the translation product of the first molecule, wherein the combination comprises:
   (i) at least one first mRNA molecule encoding a first molecule, which is a therapeutic or immunogenic protein or peptide, and
   (ii) at least one second mRNA molecule encoding a second molecule, which is a protein or a peptide having the ability to modulate an immune response against the first molecule and/or the translation product of the first molecule,

   wherein the at least one first mRNA molecule and the at least one second mRNA molecule are co-formulated into a single vector, or wherein the at least one first mRNA molecule and the at least one second mRNA molecule are formulated into two separate compositions, optionally wherein the two separate compositions are mixed prior to administration to form a combined composition, or wherein the first molecule and the second molecule are translated from the single mRNA molecule, for example by an internal ribosomal entry site (IRES) or by a self-cleaving peptide (such as a 2A peptide), optionally wherein the single mRNA molecule is a bicystronic or a polycystronic mRNA molecule,

   wherein the at least one second mRNA molecule or the part of the single mRNA molecule encoding the second molecule is selected from the group consisting of an mRNA molecule encoding a cell-bound (or membrane-anchored) agonistic antibody or agonistic antibody fragment, or an agonistic peptide against a cell-bound (or membrane-anchored) receptor or ligand, an mRNA molecule encoding for a cell-bound (or membrane-anchored) receptor or ligand, an mRNA molecule encoding for a chemokine or a cytokine, an mRNA molecule encoding for an antagonistic antibody or an antagonistic antibody fragment against an immune checkpoint protein, an mRNA molecule encoding for an immune checkpoint inhibitor, an mRNA molecule encoding for an immune checkpoint, and an mRNA molecule encoding for a transcription factor.

2. The combination or the single mRNA molecule according to claim 1, wherein the at least one second mRNA molecule or the part of the single mRNA molecule encoding the second molecule is encoding a protein with a positive immunomodulating activity, such as a protein with the ability to increase the potency and/or the quality and/or the longevity of an immune response, or wherein the at least one second mRNA molecule or the part of the single mRNA molecule encoding the second molecule is encoding a protein with a negative immunomodulating activity, such as a protein with the ability to decrease the potency and/or the quality and/or the longevity of an immune response.

3. The combination or the single mRNA molecule according to claim 1 or 2, wherein the single vector comprising the at least one first mRNA molecule and the at least one second mRNA

molecule, or the single mRNA molecule, is comprised in a nanoparticle, which is preferably a lipo-nanoparticle (LNP) or a non-lipid based nanoparticle (such as a nanoparticle composed of polymers), and/or wherein the two separate compositions comprising the at least one first mRNA molecule and the at least one second mRNA molecule, respectively, are selected from nanoparticles, synthetic particles for *in vivo* transduction, extracellular vesicles, and viral vectors, preferably wherein the nanoparticles are LNPs or non-lipid based nanoparticles (such as nanoparticles composed of polymers), wherein the LNPs are preferably composed of ionizable cationic lipid, neutral lipid (helper lipid), cholesterol, and PEGylated lipid, optionally wherein the molar lipid ratio (%) of ionizable cationic lipid:neutral lipid:cholesterol:PEG-ylated lipid in the composition is 50:10:38.5:1.5 or 46.3:9.4:42.7:1.6, and wherein the N/P ratio is preferably, but not limited to, 3, 6, 4, or 8, wherein N is ionizable cationic lipid (nitrogen) and P is nucleotide (phosphate), and/or wherein the single vector comprising the at least one first mRNA molecule and the at least one second mRNA molecule, or each of the two separate compositions comprising the at least one first mRNA molecule and the at least one second mRNA molecule, or the single mRNA molecule, is a self-replicating RNA or a circular RNA, and/or wherein the single vector comprising the at least one first mRNA molecule and the at least one second mRNA molecule, or each of the two separate compositions comprising the at least one first mRNA molecule and the at least one second mRNA molecule, or the single mRNA molecule, is a viral vector.

4. The combination or the single mRNA molecule according to any one of claims 1 to 3, wherein the at least one second mRNA molecule or the part of the single mRNA molecule encoding the second molecule is encoding:
    i) a chemokine or a cytokine (either soluble or cell-bound or membrane-anchored) preferentially selected from but not restricted to the following list: Leptin, IL21, Ccl19, Ada, IL4, Ccl5, Cxcl9, Cxcl10, IL7, Ccl20, Ccl21a, Cxcl12, Ccl2, HMGB1, Ccl3, IL2, Efnb2, Ifng, IL12a, IL12b, IL1a, IL1b, IL36, TL1A, Cxcl13, Cxcl16, Ifnb1, IL13, IL17a, IL18, IL23a, IL6, Nlrp3, Ccl12, Ccl6, Ccl7, Ccl8, Chemerin, Csf2, Cxcl11, IL5, Ccl11, Ccl24, Ccl26, Ccl4, Csf1, IL11, Ccl17, Ccl22, Ccl25,Ccl9, Cxcl1, Cxcl14, Cxcl15, Cxcl2, Cxcl3, Cxcl5, IL22, IL3, Ccl27a, Ccl28, IL-12 single chain, IFNα, GM-CSF, IL15, IL-15sushi, and IL-15-receptor α chain chimeric protein, or
    ii) a cell-bound (or membrane-anchored) ligand preferentially selected from but not restricted to the following list: LIGHT-Tnfsf14, OX40L-Tnfsf4, GITRL-Tnfsf18, 41BBL-Tnfsf9, Cd40lg, Cd70, ICOSL, Cd80, Icam1, Flt3l, CALR, Cd86, APRIL-Tnfsf13, CD166, LFA3, CD30L-Tnfsf8, Cd48, Cd74, Cd320, Cd83, Dpp4, Cd1d1, Cd1d2, Clec4n, Clec5a, ITGAL, Slc11a1, Vcam1, CAV1, Cd14, PLXNB2, and TWEAK-Tnfsf12, or
    iii) an agonistic antibody (preferably cell-bound or membrane-anchored) or an agonistic antibody fragment (preferably cell-bound or membrane-anchored) or an

agonistic peptide (preferably cell-bound or membrane-anchored) having the same target of the molecules included in i) and/or ii).

5. The combination or the single mRNA molecule according to any one of claims 1 to 3, wherein the at least one second mRNA molecule or the part of the single mRNA molecule encoding the second molecule is encoding an antagonistic antibody or an antagonistic antibody fragment or an antagonistic peptide against an immune checkpoint protein, or an mRNA molecule encoding for an immune checkpoint inhibitor, or an mRNA molecule encoding for an immune checkpoint, and wherein the immune checkpoint protein is preferentially selected from but not restricted to any one of PD-1, cd47, cd31, PD-L1, PD-L2, BTLA, HVEM, lag3, tigit, prv, cd155, cd112, galectin-9, tim3, tim4, gitr, gitrl, tigit, Vista, cd276, cd39, cd73, CTLA4, IL10, IL35, ido, vip, IL27, and IL37.

6. The combination or the single mRNA molecule according to any one of claims 1 to 3, wherein the at least one second mRNA molecule or the part of the single mRNA molecule encoding the second molecule is encoding a transcription factor, and wherein the transcription factor is preferentially selected from but not restricted to any one of Tcf1, TFEB, TFE3, NLRC5, CIITA, Lef1, Bcl11b, Gata3, Snai3, Ets1, IRF3, IRF7, Zbtb1, irf4, stat5b, runx3, bcl11a, foxo1, ikzf3, ets1, Tcf4, pax5, Bhlhe41, irf3, irf5, irf8, eomes, Stat1, Stat3, Stat5, Cebpd, and Cebpa.

7. The combination or the single mRNA molecule according to any one of claims 1 to 3, or 5, wherein the at least one second mRNA molecule or the part of the single mRNA molecule encoding the second molecule is encoding for an antagonistic antibody or an antagonistic antibody fragment against an immune checkpoint protein or encoding an immune checkpoint inhibitor, and wherein:
   (i) the antagonistic antibody or the antagonistic antibody fragment is targeting the PD-1/PD-L1 pathway, preferably wherein the mRNA molecule is encoding for an antibody selected from Atezolizumab, Avelumab, Cemiplimab, Dostarlimab, Durvalumab, Nivolumab, and Pembrolizumab;
   (ii) the antagonistic antibody or the antagonistic antibody fragment is targeting the CTLA-4 pathway, preferably wherein the mRNA molecule is encoding for the antibody Ipilimumab, and/or
   (iii) the antagonistic antibody or the antagonistic antibody fragment is targeting the LAG-3 pathway, preferably wherein the mRNA molecule is encoding for the antibody Relatlimab.

8. The combination or the single mRNA molecule according to any one of claims 1 to 4, wherein the at least one second mRNA molecule or the part of the single mRNA molecule encoding the second molecule is encoding a chemokine or a cytokine, and wherein:
   (i) the cytokine targets the IL-2/IL-2R pathway, preferably wherein the mRNA molecule is encoding for the cytokine Aldesleukin;

(ii) the mRNA molecule is encoding for an immunomodulatory cytokine, such as Granulocyte-macrophage colony-stimulating factor (GM-CSF), and/or
(iii) the cytokine targets the IFNAR1/2 pathway.

9. The combination or the single mRNA molecule according to any one of claims 1 to 8, wherein the at least one first mRNA molecule or the part of the single mRNA molecule encoding the first molecule is encoding a therapeutic or immunogenic protein or peptide, which is preferably a therapeutic or immunogenic protein or peptide against an infectious disease antigen, such as an antigen selected from the group consisting of bacterial antigens, for example Gram-positive bacterial antigens or Gram-negative bacterial antigens, protozoan antigens, viral antigens, fungal antigens, and parasite antigens, or a cancer antigen, tumour antigen, and/or tumor neo-antigen, preferably selected from the group consisting of a single amino acid mutant peptide, a frame-shift peptide, a read-through mutation peptide, a splice site mutant peptide, and/or a senescence associated antigen, or wherein the at least one first mRNA molecule or the part of the single mRNA molecule encoding the first molecule is encoding a CAS protein, such as a CAS9 protein, or wherein the at least one first mRNA molecule or the part of the single mRNA molecule encoding the first molecule is encoding a therapeutic protein capable of correcting a disease due to a lack of a resident gene encoding the therapeutic protein or a mutation in the resident gene encoding the therapeutic protein or an inactivation of the resident gene encoding the therapeutic protein.

10. The combination or the single mRNA molecule according to any one of claims 1 to 9, wherein the at least one first mRNA molecule and the at least one second mRNA molecule, or the single mRNA molecule, is a synthetic and/or modified mRNA molecule, preferably wherein chemically modified nucleosides are incorporated, preferentially at a uracil nucleobase and/or at a cytidine nucleobase, in said at least one first mRNA molecule and said at least one second mRNA molecule, or in said single mRNA molecule, wherein every uracil nucleobase and/or every cytidine nucleobase in said at least one first mRNA molecule and said at least one second mRNA molecule, or in said single mRNA molecule, or a given percentage of uracil nucleobases and/or cytidine nucleobases in said at least one first mRNA molecule and said at least one second mRNA molecule, or in said single mRNA molecule, is replaced by chemically modified nucleosides, such as a N1-methyl-pseudouridine, pseudouridine (ψ), or 5-methylcytidine (m5C), and/or wherein the at least one first mRNA molecule and the at least one second mRNA molecule, or the single mRNA molecule, preferably include an optimized Kozak sequence, an optimized codon usage, optimized 5' and/or 3' untranslated sequences, a poly A tail, a 5' CAP preferentially selected from but not restricted to Anti-Reverse Cap Analog (ARCA), CAP0, CAP1: m7GpppNmpN, CAP2: m7GpppNmpNm, and/or an internal ribosomal entry site (IRES) in the context of linear or circular RNA.

11. A host cell comprising the combination or the single mRNA molecule according to any one of claims 1 to 10, optionally wherein the host cell is an antigen presenting cell, preferably a

professional antigen presenting cell, or a lymphocyte, preferably a T lymphocyte or T lymphocyte progenitor, more preferably a CD4 or CD8 positive T-cell.

12. A pharmaceutical composition comprising the combination or the single mRNA molecule according to any one of claims 1 to 10, or the host cell according to claim 11, and a pharmaceutical acceptable carrier, stabilizer and/or excipient.

13. A vaccine comprising the combination or the single mRNA molecule according to any one of claims 1 to 10, the host cell according to claim 11, or the pharmaceutical composition according to claim 12, optionally wherein the vaccine elicits an adaptive immune response, preferably a protective adaptive immune response against:
    (i) a virus, such as a virus selected from, but not restricted to, the following list: coronavirus, SARS coronavirus, SARS-CoV-2 coronavirus, respiratory syncytial virus (RSV), measles virus, influenza virus, rabies virus, Dengue fever virus, HIV (human immunodeficiency virus), hepatitis A virus (HAV), hepatitis B virus (HBV), hepatitis C virus (HCV), hepatitis D virus, hepatitis E virus, foot-and-mouth disease virus (FMDV), bovine leukosis virus (BLV), bovine parainfluenza virus, human parainfluenza virus (HPIV), bovine respiratory syncytial virus, porcine reproductive and respiratory syndrome virus, respiratory syncytial virus, vesicular stomatitis virus, bovine viral diarrhea virus, bovine coronavirus, BHV1 virus, equine arteritis virus, Nipah virus, BK virus, Porcine Respiratory Corona Virus Infection, Jaagsiekte Sheep Retrovirus, infectious bronchitis virus, avian pneumovirus, Calicivirus, enterovirus, Epstein-bar virus (EBV), newcastle disease virus, astrovirus, Influenzavirus A (Avian influenza) subtype H5N1, simple herpesvirus 1 (HSV-1), simple herpesvirus 2 (HSV-2), heartland virus, bocavirus (HBoV), human herpesvirus 6 (HHV-6), human herpesvirus 7 (HHV-7), human metapneumovirus (hMPV), human papilloma virus (HPV), Japanese encephalitis virus, JC virus, funin virus, Cytomegalovirus (CMV), Machupovirus, Marburg virus, infectious soft tumor virus (MCV), Lassavirus, epidemic parotitis virus, rhinovirus, rotavirus, varicella-zoster virus, Venezuelan encephalitis virus, West Nile virus, Western horse encephalitis virus, and Yellow fever virus, Filoviruses, and/or a bacterium, such as a bacterium selected from, but not restricted to, the following list: Acinetobacter, Acinetobacter baumannii, Actinobacillus, Anaplasma, Ancylostoma duodenale, hemolytic alkholderia Viralidae, Babesia, Bacillus, Bacillus anthracis, Bacillus cereus, Bacteroides, Burkholderi, Burkholderia henselae, Burkholderia mallei, Bordella pertussis, Bordetella, Brazilian burkholderia, Brucella, Campylobacter, Candida albicans, Chlamydia, Chlamydia trachomatis, Chlamydophila, Chlamydophila pneumoniae, Clostridium botulinum, Clostridium deficile, Clostridium candididium, Clostridium tetani, Corynebacterium diphtheriae, Clostridium, Clostridium burnetii, Cyanobacteria, Dientamoeba fragilis, Escherichia, Escherichia coli, Ehrlicia, Ehrlicia chafensis, Ehrlicia ewingii, Enterobacter, Enterococcus, Erwinia, Franciscella, Fusobacteria, Haemophilus, Haemophilus influenzae, Helicobacter, Hemophilus, Histoplasma capsultum, Kingera, Kingella, Kingella kingae, Klebsiella, Klebsiella granulomatis, Legionella, Legionella

pneumophila, Listeria, Meningococcus, Moraxella, Mycobacterium leprae, Mycobacterium lepromatosis, Mycobacterium tuberculosis, Mycobacterium ulcerans mulcerans, Moraxella, pneumonia mycoplasma pneumoniae, Neisseria, Pasteurella, Prevotella, Proteus, Pseudomonas, Rickettsia, Salmonella, Serratia, Shigella, Staphylococcus, Streptococcus, Treponema, Vibrio, Yersinia, and ESKAPE pathogens, and/or a parasite, such as a parasite selected from, but not restricted to, the following list: Malaria, Leshmania, Cryptosoridium, Entamoeba, Taenia solium, Acaris lumbricoides, Echinococcus, Trypanosoma cruzi, Trypanosoma brucei, Schistosoma, and/or

(ii) a cancer antigen or a tumour antigen, such as a cancer antigen or a tumour antigen selected from 1A01 HLA-A/m; 1A02; 5T4; ACRBP; AFP; AKAP4; alpha-actinin-4/m; alpha-methylacyl-coenzyme_A_racemase; ANDR; ART-4; ARTCl/m; AURKB; B2MG; B3GN5; B4GN1; B7H4; BAGE-1; BASI; BCL-2; bcr/abl; beta-catenin/m; BING-4; BIRC7; BRCAl/m; BY55; calreticulin; CAMEL; CASPA; Caspase_8; cathepsin_B; cathepsin_L; CD1A; CD1B; CD1C; CD1D; CD1E; CD20; CD22; CD276; CD33; CD3E; CD3Z; CD4; CD44_Isoform_1; CD44_lsoform_6; CD52; CD55; CD56; CD80; CD86; CD8A; CDC27/m; CDE30; CDK4/m; CDKN2A/m; CEA; CEAM6; CH3L2; CLCA2; CML28; CML66; COA-1/m; coactosin-like_protein; collagen_XXIII; COX-2; CP1B1; CSAG2; CT-9/BRD6; CT45A1; CT55; CTAG2_Isoform_LAGE-1A; CTAG2_lsoform_LAGE-1B; CTCFL; Cten; cyclin_Bl; cyclin_D1; cyp-B; DAM-10; DEP1A; E7; EF1A2; EFTUD2/m; EGFR; EGLN3; ELF2/m; EMMPRIN; EpCam; EphA2; EphA3; ErbB3; ERBB4; ERG; ETV6; EWS; EZH2; FABP7; FCGR3A_Version_1; FCGR3A_Version_2; FGF5; FGFR2; fibronectin; FOS; FOXP3; FUT1; G250; GAGE-1; GAGE-2; GAGE-3; GAGE-4; GAGE-5; GAGE-6; GAGE7b; GAGE-8JGAGE-2D); GASR; GnT-V; GPC3; GPNMB/m; GRM3; HAGE; hepsin; Her2/neu; HLA-A2/m; homeobox_NKX3.1; HOM-TES-85; HPG1; HS71A; HS71B; HST-2; hTERT; iCE; IF2B3; IL-10; IL-13Ra2; IL2-RA; IL2-RB; IL2-RG; IL-5; IMP3; ITA5; ITB1; ITB6; kallikrein-2; kailikrein-4; KI20A; KIAA0205; KIF2C; KK-LC-1; LDLR; LGMN; LIRB2; LY6K; MAGA5; MAGA8; MAGAB; MAGE-_B1; MAGE-_E1; MAGE-A1; MAGE-A10; MAGE-A12; MAGE-A2; MAGE-A3; MAGE-A4; MAGE-A6; MAGE-A9; MAGE-BIO; MAGE-B16; MAGE-B17; MAGE-B2; MAGE-B3; MAGE-B4; MAGE-B5; MAGE-B6; MAGE-C1; MAGE-C2; MAGE-C3; MAGE-D1; MAGE-D2; MAGE-D4; MAGE-E1JMAGE1); MAGE-E2; MAGE-F1; MAGE-HI; MAGEL2; mammaglobin_A; MART-l/melan-A; MART-2; MC1R; M-CSF; mesothelin; MITF; MMP1; MMP7; UC-1; MUM-l/m; MUM-2/m; MY01A; MY01B; MY01C; MY01D; MY01E; MY01F; MY01G; MY01H; NA17; NA88-A; Neo-PAP; NFYC/m; NGEP; N-myc; NPM; NRCAM; NSE; NUF2; NY-ESO-1; OA1; OS-9; osteocalcin; osteopontin; p53; PAGE-4; PAI-1; PAI-2; PAP; PATE; PAX3; PAX5; PD1L1; PDCD1; PDEF; PECA1; PGCB; PGFRB; Pim-1-Kinase; Pin-1; PLAC1; PMEL; PML; POTE; POTEF; PRAME; PRDX5/m; PRM2; prostein; proteinase-3; PSA; PSB9; PSCA; PSGR; PSM; PTPRC; RAB8A; RAGE-1; RARA; RASH; RASK; RASN; RGS5; RHAMM/CD168; RHOC; RSSA; RU1; RU2; RUNX1; S-100; SAGE; SART-1; SART-2; SART-3; SEPR; SERPINB5; SIA7F; SIA8A;

SIAT9; SIRT2/m; SOX10; SP17; SPNXA; SPXIM3; SSX-1; SSX-2; SSX3; SSX-4; ST1A1; STAG 2; STAMP-1; STEAP-1; Survivin; Survivin-2B; SYCP1; SYT-SSX-1; SYT-SSX-2; TARP; TCRg; TF2AA; TGFbeta1; TGFR2; TGM-4; TIE2; TKTL1; TPI/m; TRGV11; TRGV9; TRPC1; TRP-p8; TSG10; TSPY1; TVCJTRGV3; TX101; tyrosinase; TYRP1; TYRP2; UPA; VEGFR1, and XAGE1; and/or a tumor neo-antigen, preferably selected from the group consisting of a single amino acid mutant peptide, a frame-shift peptide, a read-through mutation peptide, a splice site mutant peptide, and/or a senescence associated antigen.

14. A pharmaceutical combination comprising:

(i) the combination or the single mRNA molecule according to any one of claims 1 to 10, the host cell according to claim 11, the pharmaceutical composition according to claim 12, or the vaccine according to claim 13, and

(ii) a checkpoint inhibitor, optionally wherein the checkpoint inhibitor is selected from Atezolizumab, Avelumab, Cemiplimab, Dostarlimab, Durvalumab, Nivolumab, Pembrolizumab, Ipilimumab, and Relatlimab,

(iii) an antagonistic antibody or an antagonistic antibody fragment or an antagonistic peptide against an immune checkpoint protein, optionally wherein the immune checkpoint protein is preferentially selected from but not restricted to any one of PD-1, cd47, cd31, PD-L1, PD-L2, BTLA, HVEM, lag3, tigit, prv, cd155, cd112, galectin-9, tim3, tim4, gitr, gitrl, tigit, Vista, cd276, cd39, cd73, CTLA4, IL10, IL35, ido, vip, IL27, and IL37, and/or

(iv) an agonistic antibody or an agonistic antibody fragment or an agonistic peptide against an immune checkpoint protein, optionally wherein the immune checkpoint protein is preferentially selected from but not restricted to any one of PD-1, cd47, cd31, PD-L1, PD-L2, BTLA, HVEM, lag3, tigit, prv, cd155, cd112, galectin-9, tim3, tim4, gitr, gitrl, tigit, Vista, cd276, cd39, cd73, CTLA4, IL10, IL35, ido, vip, IL27, and IL37.

15. A kit comprising the combination or the single mRNA molecule according to any one of claims 1 to 10, the host cell according to claim 11, the pharmaceutical composition according to claim 12, the vaccine according to claim 13, or the pharmaceutical combination to claim 14, and optionally comprising a liquid vehicle for solubilising, and further optionally technical instructions providing information on administration and/or dosage of the components.

16. The combination or the single mRNA molecule according to any one of claims 1 to 10, the host cell according to claim 11, the pharmaceutical composition according to claim 12, the vaccine according to claim 13, the pharmaceutical combination to claim 14, or the kit according to claim 15, for use in medicine.

17. Use of the combination or the single mRNA molecule according to any one of claims 1 to 10, the host cell according to claim 11, the pharmaceutical composition according to claim 12, the

vaccine according to claim 13, the pharmaceutical combination to claim 14, or the kit according to claim 15, in the manufacture of a medicament for the prevention and/or treatment of an infectious, a genetic, or a proliferative disease, wherein the infectious disease is preferably a viral infection, a bacterial infection, a fungal infection, a protozoan infection, and/or a parasite infection, such as an infection caused by a corona virus, for example a COVID-19 disease, and wherein the proliferative disease is preferably cancer, more preferably a cancer selected from pancreatic cancer, bladder cancer, breast cancer, liver cancer, lung cancer, cutaneous squamous cell carcinoma, basal cell carcinoma, melanoma, uterine (endometrial) cancer, kidney cancer, skin cancer, such as Merkel cell carcinoma, colorectal cancer, esophageal cancer, gastric cancer, head and neck cancer, neuroblastoma, leukemia, sarcoma, kidney cancer, lymphoma, mesothelioma, cervical cancer, stomach cancer, and a cancer that presents with certain genetic mutations (such as MSI-H, dMMR, or TMB-H).

18. Use of the combination or the single mRNA molecule according to any one of claims 1 to 3, 5, 9, or 10, the therapeutic protein according to claim 9, the host cell according to claim 11, the pharmaceutical composition according to claim 12, the pharmaceutical combination according to claim 14, or the kit according to claim 15, in the manufacture of a medicament for the prevention, and/or treatment of a genetic disorder.

19. Use of the combination or the single mRNA molecule according to any one of claims 1 to 10, the host cell according to claim 11, the pharmaceutical composition according to claim 12, the vaccine according to claim 13, the pharmaceutical combination to claim 14, or the kit according to claim 15, according to claim 17 and 18, wherein said use comprises administration of the combination or the single mRNA molecule according to any one of claims 1 to 10, the host cell according to claim 11, the pharmaceutical composition according to claim 12, the vaccine according to claim 13, the pharmaceutical combination to claim 14, the kit according to claim 15, the single vector comprising the at least one first mRNA molecule and the at least one second mRNA molecule, the two separate compositions comprising the at least one first mRNA molecule and the at least one second mRNA molecule, respectively, or the combined composition, or the single mRNA molecule, to a subject, optionally wherein the single vector comprising the at least one first mRNA molecule and the at least one second mRNA molecule, or the two separate compositions comprising the at least one first mRNA molecule and the at least one second mRNA molecule, respectively, or the combined composition, or the single mRNA molecule, are to be administered to the subject, further optionally wherein the two separate compositions comprising the at least one first mRNA molecule and the at least one second mRNA molecule, respectively, are to be administered separately, and wherein

    i) the two separate compositions are to be administered separately at a first location site and at a second location site, wherein the first location site is within 20 cm, 17.5 cm, 15 cm, 12.5 cm, 10 cm, 7.5 cm, 5 cm, 2.5 cm, 1 cm, 0.5 cm, 0.25 cm, or 0.1 cm, of the second location site, preferably wherein the draining lymphatic system of the first location site drains to the same lymph nodes as the lymphatic system of the second

location site, or wherein the first location site and the second location site are the same, and/or

ii) the two separate compositions are to be administered separately within a time interval of 1 hour or less, 30 minutes or less, 20 minutes or less, 15 minutes or less, 10 minutes or less, 5 minutes or less, 3 minutes or less, or 1 minute or less,

to allow a spatially and/or temporally coordinated *in vivo* expression of the at least one first molecule, which is a therapeutic or immunogenic protein or peptide, and the at least one second molecule, which is a protein or a peptide having the ability to modulate the immune response against the first molecule and/or the translation product of the first molecule.

20. Use of the combination or the single mRNA molecule according to any one of claims 1 to 10, the host cell according to claim 11, the pharmaceutical composition according to claim 12, the vaccine according to claim 13, the pharmaceutical combination to claim 14, or the kit according to claim 15, according to any one of claims 17 to 19, wherein the combination or the single mRNA molecule according to any one of claims 1 to 10, the host cell according to claim 11, the pharmaceutical composition according to claim 12, the vaccine according to claim 13, the pharmaceutical combination to claim 14, the kit according to claim 15, the single vector comprising the at least one first mRNA molecule and the at least one second mRNA molecule, the two separate compositions comprising the at least one first mRNA molecule and the at least one second mRNA molecule, respectively, or the combined composition, or the single mRNA molecule, are to be administered to the subject by intramuscular, subcutaneous, intradermal, intra-peritoneal, intravenous, and/or intra-pleural injection, wherein, preferably, the two separate compositions comprising the at least one first mRNA molecule and the at least one second mRNA molecule, respectively, are to be administered by the same route.

21. Use of the combination or the single mRNA molecule according to any one of claims 1 to 3, 5, 9, or 10, the therapeutic protein according to claim 9, the host cell according to claim 11, the pharmaceutical composition according to claim 12, the pharmaceutical combination according to claim 14, or the kit according to claim 15, according to any one of claims 18 to 20, in the manufacture of medicament in a gene therapy.