Claims

1. A therapeutic delivery vesicle comprising attached to its membrane a polypeptide construct, wherein the polypeptide construct comprises at least one carrier polypeptide fused to at least one therapeutic polypeptide decoy receptor present at least partially on the outside of the delivery vesicle and wherein the at least one therapeutic polypeptide decoy receptor is signalling-incompetent.

2. The therapeutic delivery vesicle according to claim 1, wherein the polypeptide construct is a transmembrane polypeptide construct.

3. The therapeutic delivery vesicle according to any one of the preceding claims, wherein the at least one therapeutic polypeptide decoy receptor is fused to the carrier polypeptide via a chemical bond selected from the group comprising a peptide (amide) bond, a thio-ether bond, a di-sulfide bridge, a biotin-streptavidin interaction, and any combination thereof.

4. The therapeutic delivery vesicle according to any one of the preceding claims, wherein the at least one carrier polypeptide is selected from Lamp2b, CD9, CD81, CD63, syndecan, synaptotagmin, ALIX, syntenin, and any combination thereof.

5. The therapeutic delivery vesicle according to any one of the preceding claims, wherein the delivery vesicle is selected from the group comprising extracellular vesicles, exosomes, microvesicles, apoptotic bodies, microparticles, ectosomes, prostatosomes, cardiosomes, lipoprotein particles, LDL particles, VLDL particles, HDL particles, chylomicrons, liposomes, lipid-like particles, lipidoids and any combination thereof.

6. The therapeutic delivery vesicle according to any one of the preceding claims, wherein the at least one therapeutic polypeptide decoy receptor is selected from the group comprising receptors from the following

receptor families: insulin, PDGF, FGF, EGF, VEGF, HGF, TRK, EPH, AXL, LTK, TIE, ROR, DDR, RET, KLG, PTCH1, RYK, MuSK, activin, Type I TGF, Type II TGF, and TNF, interleukin (IL), and any combination thereof.

7. The therapeutic delivery vesicle according to any one of claims 1 to 6, for use in medicine.

8. The therapeutic delivery vesicle according to any one of claims 1 to 6, for use in the treatment and/or prophylaxis of Crohn's disease, ulcerative colitis, rheumatoid arthritis, multiple sclerosis, systemic lupus erythematosus, sarcoidosis, idiopathic pulmonary fibrosis, psoriasis, tumor necrosis factor (TNF) receptor-associated periodic syndrome (TRAPS), deficiency of the interleukin-1 receptor antagonist (DIRA), endometriosis, autoimmune hepatitis, scleroderma, myositis, stroke, acute spinal cord injury, vasculitis, Guillain-Barré syndrome, acute myocardial infarction, ARDS, sepsis, meningitis, encephalitis, liver failure, kidney failure, graft-vs-host disease, Duschenne muscular dystrophy and other muscle diseases, cancer-induced cachexia, anorexia, diabetes mellitus, neuro-inflammatory diseases and/or disorders, cancer (for instance cancers sensitive to EGF, VEGF, FGF), colon cancer, breast cancer, and glioma.

9. A pharmaceutical composition comprising a therapeutic delivery vesicle according to any one of claims 1 to 6 and at least one pharmaceutically acceptable excipient.

10. A signalling-incompetent polypeptide construct comprising at least one therapeutic polypeptide decoy receptor fused to at least one carrier polypeptide.

11. A polynucleotide construct encoding the signalling-incompetent polypeptide construct according to claim 10.

12. A cell comprising at least one polypeptide construct according to claim 10 and/or at least one polynucleotide construct according to claim 11.

13. A method for purifying extracellular vesicles, comprising the steps of:

    (i) exposing a sample comprising at least one extracellular vesicle to ultrafiltration;

    (ii) exposing the sample obtainable from step (i) to size exclusion liquid chromatography.

14. A method for increasing the production yield of extracellular vesicles comprising exposing vesicle-producing cells from which the extracellular vesicles are to be obtained to at least one autophagy inhibitor.

15. The method according to claim 14, wherein the at least one autophagy inhibitor is selected from the group comprising beclin -1 inhibitors, PI3K inhibitors (e.g. 3-methyladenine), inhibitors of the fusion between autophagosome and lysosome (e.g. Bafilomycin A and chloroquine), and any combination thereof.

16. A method for enriching metabolically active proteins and/or anti-apoptotic proteins in extracellular vesicles, comprising the step of exposing vesicle-producing cells from which the extracellular vesicles are to be obtained to stress-inducing conditions.

17. The method according to claim 16, wherein the stress-inducing conditions are oxygen deprivation and/or serum-starvation.

CLAIMS

1. An exosome comprising attached to its membrane a polypeptide construct, in which the polypeptide construct comprises at least one carrier polypeptide fused to at least one therapeutic polypeptide decoy receptor present at least partially on the outside of the exosome and in which the at least one therapeutic polypeptide decoy receptor is signalling-incompetent.

2. An exosome according to Claim 1, in which the polypeptide construct is a transmembrane polypeptide construct.

3. An exosome according to any preceding claim, in which the at least one therapeutic polypeptide decoy receptor is fused to the carrier polypeptide via a chemical bond selected from the group comprising a peptide (amide) bond, a thio-ether bond, a di-sulfide bridge, a biotin-streptavidin interaction, and any combination thereof.

4. An exosome according to any preceding claim, in which the at least one carrier polypeptide is selected from Lamp2b, CD9, CD81 , CD63, syndecan, synaptotagmin, ALIX, syntenin, and any combination thereof.

5. An exosome according to any preceding claim, in which the at least one therapeutic polypeptide decoy receptor is selected from the group comprising receptors from the following receptor families: insulin, PDGF, FGF, EGF, VEGF, HGF, TRK, EPH, AXL, LTK, TIE, ROR, DDR, RET, KLG, PTCH1, RYK, MuSK, activin, Type I TGF, Type II TGF, and TNF, interleukin (IL), and any combination thereof.

6. An exosome according to any of Claims 1 to 5, for use in medicine.

7. An exosome according to any of Claims 1 to 5, for use in the treatment and/or prophylaxis of Crohn’s disease, ulcerative colitis, rheumatoid arthritis, multiple sclerosis, systemic lupus erythematosus, sarcoidosis, idiopathic pulmonary fibrosis, psoriasis, tumor necrosis factor (TNF) receptor-associated periodic syndrome (TRAPS), deficiency of the interleukin-1 receptor antagonist (DIRA), endometriosis, autoimmune hepatitis, scleroderma, myositis, stroke, acute spinal cord injury, vasculitis, Guillain-Barré syndrome, acute myocardial infarction, ARDS, sepsis, meningitis, encephalitis, liver failure, kidney failure, graft-vs-host disease, Duschenne muscular dystrophy and other muscle diseases, cancer-induced cachexia, anorexia, diabetes mellitus, neuro-inflammatory diseases and/or disorders,

cancer (for instance cancers sensitive to EGF, VEGF, FGF), colon cancer, breast cancer, and glioma.

8. A pharmaceutical composition comprising an exosome according to any of Claims 1 to 5 and at least one pharmaceutically acceptable excipient.

9. A method for purifying exosomes according to any of Claims 1 to 5, comprising the steps of:

(i) exposing a sample comprising at least one exosome according to any of Claims 1 to 5 to ultrafiltration;

(ii) exposing the sample obtainable from step (i) to size exclusion liquid chromatography.

10. A method for increasing the production yield of exosomes according to any of Claims 1 to 5, comprising exposing exosome-producing cells from which the exosomes are to be obtained to at least one autophagy inhibitor.

11. A method according to Claim 10, in which the at least one autophagy inhibitor is selected from the group comprising beclin-1 inhibitors, PI3K inhibitors (e.g. 3-methyladenine), inhibitors of the fusion between autophagosome and lysosome (e.g. Bafilomycin A and chloroquine), and any combination thereof.

12. A method for enriching metabolically active proteins and/or anti-apoptotic proteins in exosomes according to any of Claims 1 to 5, comprising the step of exposing exosome-producing cells from which the exosomes are to be obtained to stress-inducing conditions.

13. The method according to Claim 12, in which the stress-inducing conditions are oxygen deprivation and/or serum-starvation.