WHAT IS CLAIMED IS:

1. A fusosome comprising:

a) a lipid bilayer comprising a re-targeted paramyxoviral fusogen; and

b) a nucleic acid that comprises:

(i) a payload gene encoding an exogenous agent; and

(ii) a positive target cell-specific regulatory element operatively linked to the payload gene, wherein the positive target cell-specific regulatory element increases expression of the payload gene in a CNS cell relative to an otherwise similar fusosome lacking the positive target cell-specific regulatory element,

wherein the re-targeted paramyxoviral fusogen is linked to a targeting domain and the re-targeted fusogen leads to preferential delivery of the exogenous agent to the CNS cell compared to a non-CNS.

2. The fusosome of claim 1, wherein the nucleic acid further comprises a non-target cell-specific regulatory element (NTCSRE), operatively linked to the payload gene, wherein the NTCSRE decreases expression of the payload gene in a non-target cell relative to an otherwise similar fusosome lacking the NTCSRE, wherein the target cell is a first type of CNS cell and the non-target cell is a second, different type of CNS cell or a non-CNS cell.

3. The fusosome of claim 2, wherein:

a) the target cell is a neuron and the non-target cell is a glial cell, or

b) the target cell is a glial cell, and the non-target cell is a neuron.

4. The fusosome of claim 3, wherein the glial cell is an oligodendrocyte, an astrocyte, or a microglia cell.

5. The fusosome of any of claims 1-4, wherein the fusosome further comprises one or both of:

(i) a first exogenous or overexpressed immunosuppressive protein on the lipid bilayer, wherein the immunosuppressive protein is a complement regulatory protein or CD47; or

(ii) a first immunostimulatory protein that is absent or present at reduced levels, wherein the immunostimulatory protein is an MHC I or MHC II protein, optionally wherein the reduced level is reduced by at least 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, or 90% compared to a fusosome generated from an otherwise similar, unmodified source cell.

6. The fusosome of any of claims 1-5, wherein the payload gene is a gene that treats a lysosomal storage disease or disorder or a CNS disease or disorder, optionally wherein the disease or disorder is a genetic deficiency.

7. The fusosome of claim 5 or claim 6, wherein:

the fusosome comprises (i) and (ii); or

the fusosome comprises (i) and further comprises a second exogenous or overexpressed immunosuppressive protein on the lipid bilayer; or

the fusosome comprises (ii) and further comprises a second immunostimulatory protein that is absent or present at reduced levels, optionally wherein the reduced level is reduced by at least 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, or 90% compared to a fusosome generated from an otherwise similar, unmodified source cell.

8. The fusosome of any of claims 1-7, wherein the payload gene is chosen from: SYNE1, SETX, FMR1, SLC6A8, UBE3A, SOD1, TDP43, C9orf72, FXN, MECP2, ASPA, ALDH7A1, TPP1, FUCA1, GALC, HEXA, HEXB, MANBA, ARSA, GNPTAB, or MCOLN1.

9. The fusosome of any of claims 1-8, wherein the CNS cell is a neuron or a glial cell, optionally wherein the CNS cell is a pan-neuronal cell, a GABAergic neuron, a Glutamatergic neuron, a Cholinergic neuron, a Dopaminergic neuron, a Serotonergic neuron, a glial cell, an astrocyte, a microglial cell, an oligodendrocyte, or a choroid plexus cell.

10. The fusosome of any one of claims 1-9, wherein the paramyxovirus fusogen comprises a sequence chosen from paramyxovirus F and G proteins or F and H proteins or F and HN proteins.

11. The fusosome of any of claims 1-10, wherein the fusogen comprises a sequence chosen from Nipah virus F and G proteins, measles virus F and H proteins, tupaia paramyxovirus F and H proteins, Hendra virus F and G proteins, Henipavirus F and G proteins, Morbilivirus F and H proteins, respirovirus F and HN protein, a Sendai virus F and HN protein, rubulavirus F and HN proteins, or avulavirus F and HN proteins.

12. The fusosome of any claims 1-11, wherein the positive target cell-specific regulatory element comprises a CNS cell-specific promoter, a CNS cell-specific enhancer, a CNS cell-specific splice site, a CNS cell-specific site extending half-life of an RNA or protein, a CNS cell-specific mRNA nuclear export promoting site, a CNS cell-specific translational enhancing site, or a CNS cell-specific post-translational modification site.

13. The fusosome of any claims 1-12, wherein the positive target cell-specific regulatory element comprises a CNS cell-specific promoter.

14. The fusosome of claim 13, wherein the positive CNS cell-specific regulatory element comprises a promoter chosen from a SYN, NSE, CaMKII, aTubulin, PDGF, fSST, fNPY, GAD67, DLX5/6, VGLUT1, Dock10, ChAT, VAChT, Drd1a, TPH-2, GFAP, EAAT1, GS, CX3CR1, TMEM119, MBP, CNP, or CRFR2β promoter.

15. The fusosome of any of claims 2-14, wherein:

the NTCSRE comprises a non-target cell-specific miRNA recognition sequence, non-target cell-specific protease recognition site, non-target cell-specific ubiquitin ligase site, non-target cell-specific transcriptional repression site, or non-target cell-specific epigenetic repression site; and/or

the NTCSRE comprises a tissue-specific miRNA recognition sequence, tissue-specific protease recognition site, tissue-specific ubiquitin ligase site, tissue-specific transcriptional repression site, or tissue-specific epigenetic repression site.

16. The fusosome of any of claims 2-15, wherein the NTCSRE comprises a non-target cell-specific miRNA recognition sequence and the miRNA recognition sequence is able to be bound by one or more of miR-338-3p, miR-9, miR-125b-5p, miR-342-3p, or miR-124; optionally wherein the miRNA is or comprises the sequence set forth in any one of SEQ ID NOS: 156-162.

17. The fusosome of claim 15 or claim 16, wherein the NTCSRE is situated or encoded within a transcribed region encoding the exogenous agent, optionally wherein an RNA produced by the transcribed region comprises the miRNA recognition sequence within a UTR or coding region.

18. The fusosome of any of claims 1-17, wherein the nucleic acid comprises one or more insulator elements.

19. The fusosome of claim 18, wherein the nucleic acid comprises two insulator elements, optionally wherein the two insulator elements comprise a first insulator element upstream of the payload gene and a second insulator element downstream of the payload gene, optionally wherein the first insulator element and second insulator element comprise the same or different sequences.

20. The fusosome of any of claims 1-19, wherein the fusosome is a retroviral vector particle.

21. The fusosome of any of claims 1-20, wherein the fusosome is a lentiviral vector particle.

22. A pharmaceutical composition comprising the fusosome of any of any of claims 1-21, and a pharmaceutically acceptable carrier, diluent, or excipient.

23. The fusosome of any of claims 1-21 or the pharmaceutical composition of claim 22, for use in delivering an exogenous agent to a subject, wherein the exogenous agent is a therapeutic agent.

24. The fusosome or pharmaceutical composition for use of claim 23, wherein the exogenous agent is to be delivered to a CNS cell of the subject.

25. The fusosome of any of claims 1-21 or the pharmaceutical composition of claim 22, for use in modulating a function, in a subject, a CNS tissue, or a CNS cell, wherein the fusosome or the pharmaceutical composition is to be contacted with the CNS tissue or the CNS cell of the subject, and wherein the exogenous agent is a therapeutic agent.

26. The fusosome or pharmaceutical composition for use of claim 25, wherein the CNS cell is neuron or a glial cell, optionally wherein the CNS cell is a pan-neuronal cell, a GABAergic neuron, a Glutamatergic neuron, a Cholinergic neuron, a Dopaminergic neuron, a Serotonergic neuron, a glial cell, an astrocyte, a microglial cell, an oligodendrocyte, or a choroid plexus cell.

27. The fusosome or pharmaceutical composition for use of claim 25 or claim 26, wherein the CNS tissue or the CNS cell is present in a subject.

28. The fusosome of any of claims 1-21 or the pharmaceutical composition of claim 22 for use in treating a subject with a CNS disease or disorder or a lysosomal disease or disorder, wherein the exogenous agent is a therapeutic agent for treating the subject with the CNS disease or disorder or a lysosomal disease or disorder.

29. Use of a fusosome of any of claims 1-21 or the pharmaceutical composition of claim 22 in the manufacture of a medicament for treating a subject with a CNS disease or disorder or a lysosomal disease or disorder, wherein the exogenous agent is a therapeutic agent for treating the subject with the CNS disease or disorder or the lysosomal disease or disorder.

30. The fusosome or pharmaceutical composition for use of claim 28 or the use of claim 29, wherein the CNS disease or disorder or a lysosomal disease or disorder is caused by a genetic deficiency.

31. The fusosome or pharmaceutical composition for use of claim 28 or claim 30 or the use of claim 29 or claim 30, wherein the disease or disorder is selected from Spinocerebellar Ataxia; Autosomal Recessive, Type 1; Ataxia with Oculomotor Apraxia, Type 2; Fragile X Syndrome; Cerebral Creatine Deficiency Syndrome 1; Angelman Syndrome; Amyotrophic Lateral Sclerosis; Friedreich's Ataxia; Rett Syndrome; Canavan Disease; Pyridoxine-Dependent Epilepsy; Batten Disease, Fucosidosis; Krabbe Disease; Tay Sachs Disease; Sandhoff Disease; Beta-mannosidosis; Metachromatic Leukodystrophy; Mucolipidosis Type IIIa; Mucolipidosis Type IIIb; or Mucolipidosis Type IV.

32. The use of any one of claims 29-31 or the fusosome or pharmaceutical composition for use of any one of claims 23-28, 31, or 32 , wherein the subject is a human subject.

33. A fusosome of any of claims 1-21 or the pharmaceutical composition of claim 22 for use in treating a genetic deficiency associated with a CNS disease or disorder or a lysosomal disease or disorder, wherein the exogenous agent is a therapeutic agent for treating the genetic deficiency.

34. Use of a fusosome of any of claims 1-21 or the pharmaceutical composition of claim 22 in the manufacture of a medicament for treating a genetic deficiency associated with a CNS disease or disorder or a lysosomal disease or disorder, wherein the exogenous agent is a therapeutic agent for treating the genetic deficiency.

35. A method of making the fusosome of any of claims 1-21, comprising:

a) providing a cell that comprises the nucleic acid and the fusogen;

b) culturing the cell under conditions that allow for production of the fusosome, and

c) separating, enriching, or purifying the fusosome from the cell, thereby making the fusosome.

36. The fusosome or pharmaceutical composition for use of claim 33, or the use of claim 34, wherein the disease or disorder is selected from Spinocerebellar Ataxia; Autosomal Recessive, Type 1; Ataxia with Oculomotor Apraxia, Type 2; Fragile X Syndrome; Cerebral Creatine Deficiency Syndrome 1; Angelman Syndrome; Amyotrophic Lateral Sclerosis; Friedreich's Ataxia; Rett Syndrome; Canavan Disease; Pyridoxine-Dependent Epilepsy; Batten Disease, Fucosidosis; Krabbe Disease; Tay Sachs Disease; Sandhoff Disease; Beta-mannosidosis; Metachromatic Leukodystrophy; Mucolipidosis Type IIIa; Mucolipidosis Type IIIb; or Mucolipidosis Type IV.

37. The fusosome or pharmaceutical composition for use of any one of claims 28, 30, 31, or 33 or the use of any one of claims 29-32, or 34, wherein the therapeutic agent is a nucleic acid, optionally wherein the nucleic acid is a DNA, a cDNA, a RNA, a gRNA, a pre-mRNA, a mRNA, a miRNA, or a siRNA, or an exogenous protein, optionally wherein is an antibody.