What is claimed is:

1. A pharmaceutical formulation comprising:

(i) recombinant adeno-associated virus (rAAV) particles,

(ii) a buffering agent at a concentration of from about 1 mM to about 20 mM,

(iii) a first salt at a concentration of from about 10 mM to about 50 mM,

(iv) a second salt at a concentration of from about 60 mM to 100 mM,

(v) a sugar at a concentration of from about 1% w/v to about 10% w/v,

(vi) a bulking agent at a concentration of from about 1% w/v to about 6% w/v, and

(vii) a surfactant at a concentration of from about 0.001% w/v to about 0.1% w/v,

wherein the formulation has a pH of from about 6.8 to about 7.8.

2. The pharmaceutical formulation of claim 1, wherein:

(a) the buffering agent is a Tris buffer or a sodium phosphate buffer, optionally wherein the buffering agent is a Tris buffer; and/or

(b) the concentration of the buffering agent is from 5 mM to 15 mM, optionally wherein the concentration of buffering agent is 10 mM ± 2 mM; and/or

(c) the first salt is sodium chloride, potassium chloride, or magnesium chloride, optionally wherein the first salt is sodium chloride; and/or

(d) the concentration of the first salt is from 20 mM to 40 mM, optionally wherein the concentration of the first salt is 30 mM ± 5 mM; and/or

(e) the second salt is arginine hydrochloride; and/or

(f) the concentration of the second salt is from 30 mM to 90 mM, optionally wherein the concentration of the second salt is 40 mM ± 5 mM or 80 mM ± 5 mM; and/or

(g) the sugar is sucrose or trehalose, optionally wherein the sugar is sucrose; and/or

(h) the concentration of sugar is from 3% w/v to 7% w/v, optionally wherein the concentration of sugar is 5% w/v ± 1% w/v; and/or

(i) the bulking agent is mannitol or glycine, optionally wherein the bulking agent is mannitol; and/or

(j) the concentration of the bulking agent is from 2% w/v to 5% w/v, optionally wherein the concentration of the bulking agent is 3.3% w/v ± 0.5% w/v; and/or

(k) the surfactant is a polysorbate or a poloxamer, optionally wherein (i) the polysorbate is polysorbate 80 and or (ii) the poloxamer is poloxamer 188; and/or

(l) the concentration of surfactant is from 0.001% w/v to 0.1% w/v, optionally wherein the surfactant concentration is 0.01% w/v ± 0.005% w/v; and/or

(m) the pH of the formulation is from 7.0 to 7.6, optionally wherein the pH of the formulation is 7.3 ± 0.1; and/or

(n) the ratio of bulking agent to sugar is from 1:1 to 1:7 or 1:1 to 1:3, optionally wherein the ratio of mannitol to sucrose is from 1:1 to 1:7 or 1:1 to 1:3; and/or

(o) the ratio of first salt to second salt is from 1:1 to 1:4, optionally wherein the ratio of sodium chloride to arginine hydrochloride is 1:1 to 1:4; and/or

(p) the formulation has a total ionic strength of from 70 mM to 120 mM, optionally wherein the total ionic strength is 80 mM ± 5 mM or 110 mM ± 10 mM; and/or

(q) the pharmaceutical formulation comprises from 1 x 10E10 vg/mL to 1 x 10E15 vg/mL, optionally from 1 x 10E12 vg/mL to 1x 10E14 vg/mL, further optionally wherein the pharmaceutical formulation comprises about 1 x 10E13 vg/mL.

3. A pharmaceutical formulation comprising:

(i) recombinant adeno-associated virus (rAAV) particles at a concentration of from 1 x 10E10 vg/mL to 1 x 10E15 vg/mL,

(ii) a phosphate buffer at a concentration of from 10 mM ± 1 mM,

(iii) sodium chloride at a concentration of 30 mM ± 3 mM,

(iv) L-arginine hydrochloride at a concentration of 80 mM ± 8 mM,

(v) sucrose at a concentration of 5% w/v ± 0.5% w/v,

(vi) mannitol at a concentration of 3.3% w/v ± 0.3% w/v, and

(vii) poloxamer 188 at a concentration of 0.005% w/v ± 0.001% w/v, wherein the formulation has a pH of 7.3 ± 0.2.

4. A pharmaceutical formulation comprising:

(i) recombinant adeno-associated virus (rAAV) particles at a concentration of from 1 x 10E10 vg/mL to 1 x 10E15 vg/mL,

(ii) a Tris buffer at a concentration of 10 mM ± 1 mM,

(iii) sodium chloride at a concentration of 30 mM ± 3 mM,

(iv) L-arginine hydrochloride at a concentration of 80 mM ± 8 mM,

(v) sucrose at a concentration of 5% w/v ± 0.5% w/v,

(vi) mannitol at a concentration of 3.3% w/v ± 0.3% w/v, and

(vii) poloxamer 188 at a concentration of 0.01% w/v ± 0.002% w/v, wherein the formulation has a pH of 7.3 ± 0.2.

5. The pharmaceutical formulation of claim 3 or 4, wherein the rAAV particles are at a concentration of from 1 x 10E12 vg/mL to 1 x 10E14 vg/mL, optionally wherein the rAAV particles are at a concentration of about 1 x 10E13 vg/mL.

6. The pharmaceutical formulation of any one of claims 1-5, wherein:

(a) the rAAV particles are of serotype AAV1, AAV2, AAV3, AAV4, AAV5, AAV6, AAV7, AAV8, AAV9, AAV-DJ, AAV-DJ/8, AAV-Rh10, AAV-retro, AAV-PHP.B, AAV8-PHP.eB, or AAV-PHP.S, optionally wherein the rAAV particles are of serotype AAV1, AAV2, AAV3, AAV4, AAV5, AAV6, AAV7, AAV8, AAV9, or AAV10, further optionally wherein the rAAV particles are of serotype:

(i) AAV1; or

(ii) AAV5; or

(iii) AAV8; or

(iv) AAV9; and/or

(b) the formulation has an average particle size of from about 20 nm to about 40 nm, as determined by dynamic light scattering; and/or

(c) the formulation contains a collection of rAAV particles comprising at least 95% full capsids, as determined by anion-exchange chromatography.

7. A stable lyophilized pharmaceutical composition formed by lyophilizing the pharmaceutical formulation of any one of claims 1-6.

8. The lyophilized pharmaceutical composition of claim 7, wherein the lyophilized pharmaceutical composition:

(a) has a moisture content of 1.5% or less, optionally 1.0% or less, further optionally from 0.5% to 0.8%, or 0.5%, 0.55%, 0.6%, 0.65%, 0.7%, 0.75%, or 0.8%; and/or

(b) can be reconstituted in 30 seconds or less, optionally in 20 seconds or less, further optionally in 15 seconds or less.

9. A reconstituted drug product formed by reconstituting the lyophilized pharmaceutical composition of claim 7 or 8.

10. The reconstituted drug product of claim 9, comprising:

(a) an average particle size of from about 20 nm to about 40 nm, as determined by dynamic light scattering; and/or

(b) a collection of rAAV particles comprising at least 95% full capsids, as determined by anion-exchange chromatography; and/or

(c) a collection of rAAV particles comprising a percentage of full capsids, as determined by anion-exchange chromatography, wherein the percentage of full capsids in the reconstituted drug product is within 2% of a percentage of full capsids in the pharmaceutical formulation prior to lyophilization, optionally wherein the percentage of full capsids in the reconstituted drug product is within 1% of a percentage of full capsids in the pharmaceutical formulation prior to lyophilization, further optionally wherein the percentage of full capsids in the reconstituted drug product is within 0.5% of a percentage of full capsids in the pharmaceutical formulation prior to lyophilization; and/or

(d) a vector genome titer, as determined by droplet digital polymerase chain reaction, wherein the vector genome titer in the reconstituted drug product is within 10% of the vector genome titer present in the pharmaceutical formulation prior to lyophilization, optionally wherein the vector genome titer in the reconstituted drug product is within 7% of the vector genome titer present in the pharmaceutical formulation prior to lyophilization.

11. The reconstituted drug product of claim 10, formed by reconstituting the lyophilized pharmaceutical composition after storage for:

(a) 1 month at a temperature of from 2-8°C; or

(b) 3 months at a temperature of from 2-8°C; or

(c) 6 months at a temperature of from 2-8°C.

12. A container containing:

(a) the pharmaceutical formulation of any one of claims 1-6; or

(b) the lyophilized pharmaceutical composition of claim 7 or 8; or

(c) the reconstituted drug product of any one of claims 9-11;

optionally wherein the container is a glass vial.

13. A kit comprising the container of claim 12, and instructions for use.

14. A method of producing the stable lyophilized pharmaceutical composition of claim 7 or 8, the method comprising performing a lyophilization process on the pharmaceutical formulation of any one of claims 1-6.

15. The method of claim 14, wherein the lyophilization process comprises (i) freezing, (ii) annealing, (iii), primary drying, and (iv) secondary drying, optionally wherein:

(a) the freezing is performed at a temperature of -45°C ± 5°C for a period of 60 minutes ± 10 minutes; and/or

(b) the freezing is performed both before and after the annealing; and/or

(c) the annealing is performed at a temperature of -20°C ± 5°C for a period of 6 hours ± 30 minutes; and/or

(d) the primary drying is performed at a temperature of -26°C ± 5°C for a period of 50 hours ± 10 hours; and/or

(e) the secondary drying is performed at a temperature of 35°C ± 5°C for a period of from 5 to 20 hours, or a period of 15 hours ± 5 hours.