CLAIMS

1. A nucleic acid comprising, in order from 5' to 3':

(i) a first AAV2 inverted terminal repeat (ITR) sequence;

(ii) a muscle creatine kinase promoter/enhancer sequence set out in nucleotides 147-860 of SEQ ID NO: 11;

(iii) a nucleotide sequence encoding a human NT-3 polypeptide; and

(iv) a second AAV2 ITR sequence;

wherein the human NT-3 polypeptide has an amino acid sequence that is at least 90% identical to SEQ ID NO: 2 or is 100% identical to SEQ ID NO: 2, or is encoded by a nucleotide sequence 90% identical to nucleotides 1077-1850 of SEQ ID NO: 11 or 100% identical to nucleotides 1077-1850 of SEQ ID NO: 11.

2. The nucleic acid of claim 1 further comprising 3' to the promoter/enhancer, a chimeric intron set out in nucleotides 892-1024 of SEQ ID NO: 11.

3. The nucleic acid of claim 1 or 2 further comprising 3' to the nucleotide sequence encoding a human NT-3 polypeptide, a SV40 polyadenylation signal set out in nucleotides 1860-2059 of SEQ ID NO: 11.

4. The nucleic acid of any one of claims 1-3,

wherein the first ITR is set out in nucleotides 7-112 of SEQ ID NO: 11, and

wherein the second ITR is set out in nucleotides 2121-2248 of SEQ ID NO: 11.

5. A nucleic acid comprising an scAAV1.tMCK.NTF3 genome that is

(a) at least 90% identical to the nucleotide sequence set out in SEQ ID NO: 11 or

(b) set out in SEQ ID NO: 11.

6. A recombinant adeno-associated virus particle (rAAV) comprising the nucleic acid of any one of claims 1-5, wherein the rAAV is infectious.

7. The rAAV particle of claim 6, wherein the AAV DNA in the rAAV genome is from AAV-1.

8. A composition comprising the rAAV particle of claim 6 or 7 and a pharmaceutically acceptable carrier.

9. The composition of claim 8, wherein the composition is formulated to treat a muscle wasting disorder or neuropathy in a subject in need thereof or is formulated to stimulate muscle growth in a subject in need thereof.

10. A composition comprising a nucleic acid encoding a NT-3 polypeptide for use in treating a muscle wasting disorder or neuropathy in a human subject or improving muscle strength in a human subject or stimulating muscle growth in a human subject, wherein:

a) the nucleic acid comprises a nucleotide sequence that is 90% identical to the nucleotide sequence of SEQ ID NO: 1,

b) the nucleic acid comprises the nucleotide sequence of SEQ ID NO: 1;

c) the nucleic acid comprises a nucleic acid sequence encoding an amino acid sequence that is at least 90% identical to SEQ ID NO: 2 or is 100% identical to SEQ ID NO: 2,

d) the nucleic acid encoding the NT-3 polypeptide is the nucleic acid of any one of claims 1-5,

e) the nucleic acid encoding the NT-3 polypeptide is the recombinant adeno-associated evirus (rAAV) scAAV1.tMCK.NTF3, and the rAAV is administered at a dose that results in sustained expression of a low concentration of NT-3 polypeptide,

f) the nucleic acid encoding the NT-3 polypeptide is the recombinant adeno-associated virus (rAAV) scAAV1.tMCK.NTF3, the composition is formulated for an intramuscular route of administration and the dose of the rAAV is about $1.5x10^{12}$ vg/kg to about $6.5x10^{12}$ vg/kg,

g) the nucleic acid encoding the NT-3 polypeptide is the recombinant adeno-associated virus (rAAV) scAAV1.tMCK.NTF3, the composition is formulated for an intramuscular route of administration and the dose of the rAAV is about $2x10^{12}$ vg/kg to about $6x10^{12}$ vg/kg,

h) the nucleic acid encoding the NT-3 polypeptide is the recombinant adeno-associated virus (rAAV) scAAV1.tMCK.NTF3, the composition is formulated for an intramuscular route of administration and the dose of the rAAV is about $2x10^{12}$ vg/kg,

i) the nucleic acid encoding the NT-3 polypeptide is the recombinant adeno-associated virus (rAAV) scAAV1.tMCK.NTF3, the composition is formulated for an intramuscular route of administration and the dose of the rAAV is about $4x10^{12}$ vg/kg,

j) the nucleic acid encoding the NT-3 polypeptide is the recombinant adeno-associated virus (rAAV) scAAV1.tMCK.NTF3, the composition is formulated for an intramuscular route of administration and the dose of the rAAV administered is about $6x10^{12}$ vg/kg,

k) the nucleic acid encoding the NT-3 polypeptide is the recombinant adeno-associated virus (rAAV) scAAV1.tMCK.NTF3, the composition is formulated for an intramuscular injection at a concentration of about $2x10^{13}$ vg/ml administered using 3 to 6 injections per muscle of about 0.5 to 1 ml, or

l) the nucleic acid encoding the NT-3 polypeptide is the recombinant adeno-associated virus (rAAV) scAAV1.tMCK.NTF3, the composition is formulated for an intramuscular injection at a concentration of about $2x10^{13}$ vg/ml administered using multiple injections at a total volume of about 5 to 14 ml.

11. The composition of claim 10, wherein the scAAV1.tMCK.NTF3 comprises the NT-3 gene cassette set out in SEQ ID NO: 11.

12. The composition of claim 10 or 11, wherein the composition is formulated for intramuscular injection.

13. The composition of any one of claims 10-12, wherein the improvement in the muscle strength is measured as a decrease in composite score on the CMT Pediatric Scale (CMTPeds) or as a decrease in disease progression over a two year time period.

14. Use of a nucleic acid encoding the NT-3 polypeptide for the manufacture of a medicament for treating a muscle wasting disorder or neuropathy in a human subject or improving muscle strength or stimulating muscle growth in a human subject, wherein:

a) the nucleic acid comprises a nucleotide sequence that is 90% identical to the nucleotide sequence of SEQ ID NO: 1,

b) the nucleic acid comprises the nucleotide sequence of SEQ ID NO: 1;

c) the nucleic acid comprises a nucleic acid sequence encoding the an amino acid sequence that is at least 90% identical to SEQ ID NO:2 or is 100% identical to SEQ ID NO: 2,

d) the nucleic acid encoding the NT-3 polypeptide is the nucleic acid of any one of claims 1-5,

e) the nucleic acid encoding the NT-3 polypeptide is the recombinant adeno-associated evirus (rAAV) scAAV1.tMCK.NTF3, and the rAAV is at a dose that results in sustained expression of a low concentration of NT-3 polypeptide,

f) the nucleic acid encoding the NT-3 polypeptide is the recombinant adeno-associated virus (rAAV) scAAV1.tMCK.NTF3, the medicament is formulated for an intramuscular route of administration and the dose of the rAAV is about $1.5x10^{12}$ vg/kg to about $6.5x10^{12}$ vg/kg,

g) the nucleic acid encoding the NT-3 polypeptide is the recombinant adeno-associated virus (rAAV) scAAV1.tMCK.NTF3, the medicament is formulated for an intramuscular route of administration and the dose of the rAAV is about $2x10^{12}$ vg/kg to about $6x10^{12}$ vg/kg,

h) the nucleic acid encoding the NT-3 polypeptide is the recombinant adeno-associated virus (rAAV) scAAV1.tMCK.NTF3, the medicament is formulated for an intramuscular route of administration and the dose of the rAAV is about $2x10^{12}$ vg/kg,

i) the nucleic acid encoding the NT-3 polypeptide is the recombinant adeno-associated virus (rAAV) scAAV1.tMCK.NTF3, the medicament is formulated for an intramuscular route of administration and the dose of the rAAV is about $4x10^{12}$ vg/kg,

j) the nucleic acid encoding the NT-3 polypeptide is the recombinant adeno-associated virus (rAAV) scAAV1.tMCK.NTF3, the medicament is formulated for an intramuscular route of administration and the dose of the rAAV administered is about $6x10^{12}$ vg/kg,

k) the nucleic acid encoding the NT-3 polypeptide is the recombinant adeno-associated virus (rAAV) scAAV1.tMCK.NTF3, the medicament is formulated for an intramuscular injection at a concentration of about 2x1013 vg/ml administered using 3 to 6 injections per muscle of about 0.5 to 1 ml, or

l) the nucleic acid encoding the NT-3 polypeptide is the recombinant adeno-associated virus (rAAV) scAAV1.tMCK.NTF3, the medicament is formulated for an intramuscular injection at a concentration of about $2x10^{13}$ vg/ml administered using multiple injections at a total volume of about 5 to 14 ml.

15. The use of claim 14, wherein the scAAV1.tMCK.NTF3 comprises the NT-3 gene cassette set out in SEQ ID NO: 11.

16. The use of claim 14 or 15, wherein medicament is formulated for an intramuscular injection.

17. The use of any one of claims 14-16, wherein the improvement in the muscle strength is measured as a decrease in composite score on the CMT Pediatric Scale (CMTPeds) or as a decrease in disease progression over a two year time period.

18. The composition or use of any one of claims 10-17, wherein the subject is suffering from Charcot-Marie-Tooth (CMT) neuropathy.

19. The composition or use of claim 18, wherein the subject has one of the genetic variants provided in Table 1, the genetic variant Val30Met, the genetic variant Ile107Val or the the genetic variant Ser77Tyr.

20. The composition or use of any one of claims 10-19, wherein the subject is suffering from the subject is suffering from a transthyretin amyloid neuropathy, an acquired neuropathy caused by cancer, diabetes mellitus, human immunodeficiency virus (HIV) infection, thyroid disorder, hypothyroidism, hypoglycemia, uremia, renal insufficiency, hepatic dysfunction, hepatic failure, polycythemia, connective tissue disorders, lyme disease, celiac disease, leprosy, porphyria, Sjogren's syndrome, poliomyelitis, acromegaly, disorders of lipid/glycolipid metabolism, West Nile syndrome, amyloidosis, mitochondrial disorders, dysproteinemic disorders, monoclonal gammapathy of undetermined significance (MGUS), POEMS syndrome, nutritional/vitamin deficiency, vitamin B_{12} deficiency, vitamin E deficiency, copper deficiency, hereditary myopathy, peripheral neuropathy, toxic neuropathy, autoimmune peripheral polyneuropathy, acute inflammatory demyelinating polyradiculoneuropathy (AIDP), chronic inflammatory demyelinating polyradiculoneuropahty (CIDP), vasculitic mononeuritis multiplex, paraneuropathy, idiopathic ganglionitis, amyotrophic lateral sclerosis, multifocal motor conduction lock neuropathy, or lower motor neuron syndrome, neuromuscular disease, muscular atrophy, drug-induced myopathy, sarcopenia, cachexia, type II muscle fiber atrophy, age-related muscular atrophy or an acquired autoimmune primary muscle disorder.