CLAIMS

What is claimed is:

1. An allogenic, non-immunogenic, long-acting composition comprising a therapeutically effective amount of substantially pure adipogenic cells.

2. The composition of claim 1, wherein the composition is administered in a single administration, optionally wherein the adipogenic cells are cultured and expanded.

3. The composition of claim 1, wherein the composition does not substantially result in an inflammatory reaction upon administration,

optionally wherein the composition elicits less than about 40%, about 35%, about 30%, about 25%, about 24%, about 23%, about 22%, about 21%, about 20%, about 19%, about 18%, about 17%, about 16%, about 15%, about 14%, about 13%, about 12%, about 11%, about 10%, about 9%, about 8, about 7%, about 6%, about 5%, about 4%, about 3%, about 2%, or about 1% increase in TNF-alpha, IL-2, or IFN-gamma, or any combination thereof, upon administration to a subject,

optionally wherein, the composition elicits an increase of about 5%, about 10%, about 15%, about 20%, about 25%, about 30%, about 35%, about 40%, about 45%, about 50%, about 60%, about 70%, about 80%, about 90%, about 100%, about 150%, about 200%, about 250%, about 300%, about 350%, or about 400% or more of IDO, HLA-G, HGF, PGE2, TGFbeta, and IL-6, or any combination thereof, upon administration to a subject.

4. The composition of claim 1, wherein the adipogenic cells are selected from adipocytes, adipogenic stem cells (ASCs), and $CD34^+$ cells, optionally wherein the adipogenic cells are adipocytes, optionally wherein the adipogenic cells are brown/beige adipocytes or white adipocytes, optionally wherein the adipocytes express and/or secrete one or more of CIDEC, FABP4, PLIN1, LGALS12, ADIPOQ, TUSC5, SLC19A3, PPARG, LEP, CEBPA, or a combination thereof.

5. The composition of claim 4, wherein the adipocytes are characterized as having one or more, 2 or more, 3 or more, 4 or more, 5 or more, 10 or more, 15 or more, 20 or more, 25 or more, 30 or more, or 35 or more of the following:

a. being post-mitotic;

b. having a lipid content of greater than about 35% (% fresh weight of adipose tissue); optionally greater than about 40%, about 45%, about 50%, about 55%, about 60%, about 65%, about 70%, about 75%, or about 80%;

c. having a fat content in adipose tissue of about 60% to about 95%, optionally 60-94%, about 60% to about 90%, about 60% to about 85%, about 60% to about 80%, about 60% to about 75%, about 60% to about 70%, about 60% to about 65%, about 65% to about 90%, about 70% to about 90%, about 75% to about 90%, about 80% to about 90%, or about 85% to about 90%;

d. having an average fat content of about 80%, optionally about 75 to about 85%;

e. having a water content in adipose tissue of about 5% to about 40%, optionally about 6-36%, about 5% to about 35%, about 5% to about 30%, about 5% to about 25%, about 5% to about 20%, about 5% to about 15%, about 5% to about 10%, about 10% to about 40%, about 15% to about 40%, about 20% to about 40%, about 25% to about 40%, about 30% to about 40%, or about 35% to about 40%);

f. having an average water content of about 15%, optionally about 12.5% to about 17.5%;

g. having a specific gravity of about 1 g/mL, optionally 0.916 g/mL, about 0.5 g/mL, about 0.6 g/mL, about 0.7 g/mL, about 0.8 g/mL, about 0.9 g/mL, about 1.1 g/mL, or about 1.2 g/mL;

h. having a lipid content comprising one or more of stearic acid, oleic acid, linoleic acid, palmitic acid, palmitoleic acid, and myristic acid, a derivative thereof;

i. having a lipid content comprising one or more of free fatty acids, cholesterol, monoglycerides, and diglycerides;

j. having a lipid droplet of a size greater than about 90% of the cell volume, optionally greater than 95% or greater than about 98%, or about 93%, or about 95%, or about 97%, or about 99%;

k. having a lipid droplet comprising at least about 30% to about 99% of the volume of the cell; optionally at least about 40% to about 90%, about 50% to about 90%, about 60% to about 90%, about 70% to about 90% about 80% to about 90%, about 50%, about 60%, about 70%, about 80%, or about 90%;

l. having a surface size of about 20–300 μm in diameter, optionally about 20–300 μm, about 20–200 μm, about 20–100 μm, about 20–500 μm, about 20–30 μm, about 50–300 μm, about 50–200 μm, about 50–100 μm, about 100–300 μm, about 100–200 μm, about 150–300 μm, about 150–200 μm, or about 200–300 μm;

m. having a nucleus volume of about 200–400 μm^3, optionally about 200 to about 350 μm^3, about 200 to about 300 μm^3, about 200 to about 250 μm^3, about 250 to about 400 μm^3, about 250 to about 350 μm^3, about 250 to about 300 μm^3, about 300 to about 350 μm^3 or about 300 to about 400 μm^3;

n. having a total volume of about 4,000–18,000 μm^3, optionally about 4000 to about 15000 μm^3, about 5000 to about 15000 μm^3, about 10000 to about 15000 μm^3, about 12500 to about 15000 μm^3, about 4000 to about 10000 μm^3, about 5000 to about 15000 μm^3, about 7500 to about 15000 μm^3, about 10000 to about 15000 μm^3, about 12500 to about 15000 μm^3;

o. having a nucleus to cell ratio of about 1:20-1:90, optionally about 1:20 to about 1:80, about 1:20 to about 1:70, about 1:20 to about 1:60, about 1:20 to about 1:50, about 1:20 to about 1:40, about 1:20 to about 1:30; about 1:30 to about 1:80, about 1:40 to about 1:80, about 1:50 to about 1:80, about 1:60 to about 1:80, or about 1:70 to about 1:80;

p. having a flattened nucleus;

q. having a small cytoplasm of less than about 10% to about 60% of total cell volume, wherein the cytoplasm excludes lipid droplets volume, optionally less than about 20%, less than about 30%, less than about 40%, or less than about 50%;

r. being capable of absorbing and releasing liquids;

s. being buoyant in in water or an aqueous solution, optionally media, or HBSS;

t. having a non-centrally located nucleus;

u. having one or more fat droplets;

v. having a non-spherical cytoplasm;

w. being capable of secreting one or more of adiponectin, leptin, and TNF-alpha;

x. being capable of lipogenesis;

y. being capable of storing triglycerides (TG);

z. being capable of secreting non-esterified fatty acids (NEFA), optionally long chain fatty acids such as oleic acid palmitoleic acid, linoleic acid, arachidonic acid, lauric acid, and stearic acid;

aa. being responsive to hormones;

bb. being responsive to neural input;

cc. having a cell turn-over rate of about 9 years, optionally about 8 to about 10 years;

dd. having an average diameter of about 45 μm, optionally about 47.2 μm, about 40 μm, about; 42.5 μm, about 47.5 μm, or about 50 μm;

ee. a cell population having a diameter distribution wherein about 25% of cells have a diameter of less than about 50 μm; about 40% of cells have a diameter of about 50-69 μm; about 25% of cells have a diameter of about 70-89 μm, and about 10% of cells have a diameter of greater than or equal to about 90 μm;

ff. responsive to atrial natriuretic peptide (ANP);

gg. capable of lipolysis;

hh. expressing receptors that can bind and respond to steroid hormones;

ii. lysed due to phosphatidylcholine;

jj. cell density of about 1 g/ml, optionally about 0.8 g/ml, about 0.9 g/ml, about 1.1 g/ml, about 1.2 g/ml;

kk. greater than about 80% viability, optionally about 85%, about 90%, about 95%, about 97%, about 98%, or about 99%;

ll. greater than about 80% purity, optionally about 85%, about 90%, about 95%, about 97%, about 98%, or about 99%,

mm. adequate potency, optionally amount of Oil Red O eluted greater than about 200 μg/ml; and

nn. negative for microbial contamination.

6. The composition of claim 4, wherein the adipocytes are present at a concentration of about 38,000,000 cells/mL, about 70,000,000 cells/mL to about 3,000,000 cells/mL, or about 40,000,000 cells/mL to about 20,000,000 cells/mL, optionally wherein the composition comprises about 50,000 to about 6,000,000,000 adipogenic cells, optionally selected from one or more of adipocytes and adipocyte precursor cells (such as adipogenic stem cells (ASCs), and $CD34^+$ cells).

7. The composition of claim 4, wherein the adipogenic cells are ASCs, optionally wherein the ASCs are present in the composition at a concentration of about 0.1-100 million cells/mL or about 5 million cells/mL, optionally wherein the composition comprises about 1 million to about 750 million ASCs or about 120 million ASCs, optionally wherein the composition comprises an ASC concentration of about 250,000 cells/kg to about 4 million cells/kg, and optionally wherein the ASCs are characterized as having one or more, or one, two, three of the following:

a. viability of about 90% or greater;

b. glucose uptake of about 5 mmol/L to about 10 mmol/L;

c. and lactate production of about 10 mmol/L to about 15 mmol/L.

8. The composition of claim 4, wherein the ASCs express elevated levels of one or more of CDw210, CD107b, CD164, CD253, CD361, CD120b, CD213A1 CDw210b, CD340 and CDw293, or any combination thereof compared to wild type ASCs and/or unenriched ASCs,

optionally wherein the ASCs express reduced levels of one or more of CD266, CD151, CD49c, CD9, CD167, CD325, CD115 CD10, CD26, and CD142 or any combination thereof compared to wild type ASCs and/or unenriched ASCs,

optionally wherein less than about 5% of ASCs express one or more of the surface markers HLAII, CD11b, CD11c, CD14, CD45, CD31, CD34, CD80 and CD86,

optionally wherein at least about 90% or at least about 95% of the ASCs express one or more of the surface markers HLA I, CD29, CD44, CD59, CD73, CD90, and CD105,

optionally wherein the ASCs express elevated levels of CD10 compared to wild type ASCs and/or unenriched ASCs,

optionally wherein at least about 90% or at least about 95% of the ASCs express CD10 compared to wild type ASCs and/or unenriched ASCs,

optionally wherein the ASCs comprise a population of ASCs selectively enriched for CD10 compared to wild type ASCs and/or unenriched ASCs.

9. The composition of claim 1, wherein the adipogenic cells are white adipocytes obtainable by CD10-enriched ASCs,

optionally wherein the adipogenic cells are CD34+ cells,

optionally wherein adipogenic cells are mammalian adipogenic cells,

optionally wherein the adipogenic cells are selected from human adipogenic cells or adipogenic cells suitable for use in a human subject,

optionally wherein the adipogenic cells, upon administration to a subject, provide a therapeutically effective amount of adipocytes,

optionally wherein the adipogenic cells, upon administration to a subject, provide a therapeutically effective amount of one or more of erythropoietin (EPO); adipsin; phenylalanine hydroxylase (PAH); adiponectin; PEX5; ATP:cob(1)alamin adenosyl transferase (MMAB); 14-3-3 protein epsilon; 2-oxoisovalerate dehydrogenase subunit alpha, mitochondrial, BCKDHA; 2-Oxoisovalerate dehydrogenase subunit beta, mitochondrial, BCKDHB; 3-Hydroxyisobutyrate dehydrogenase (HIBADH); 3-Hydroxyisobutyryl-CoA deacylase (HIBCH); 3-Methylcrotonyl CoA carboxylase, MCCC1; 3-Methylcrotonyl CoA carboxylase, MCCC2; 4-Aminobutyrate-α- ketoglutarate aminotransferase (ABAT); 5-nucleotidase; 6-phosphogluconate dehydrogenase, decarboxylating; medium-chain acyl-CoA dehydrogenase, MCAD; short-chain acyl-CoA dehydrogenase, SCAD; very long-chain acyl-CoA dehydrogenase, VLCAD; Acetyl-CoA thiolase (acetyl-coenzyme A acetyltransferase), ACAT1; Acid ceramidase; Adenine phosphoribosyltransferase, APRT; Adenosine deaminase; Adipocyte enhancer-binding protein 1; Agrin; Aldehyde oxidase; Aldo-keto reductase family 1 member C2; Alkaline phosphatase, tissue-nonspecific isozyme; Alkyldihydroxyacetonephosphate synthase, AGPS; Alpha-2-macroglobulin; Alpha-enolase; Alpha-fetoprotein; Alpha-L-iduronidase, Alpha-N-acetylglucosaminidase; Alpha-N-acetylglucosaminidase 82 kDa form; Alpha-N-acetylglucosaminidase 77 kDa form; Aminoacylase-1; Angiotensinogen; Angiotensin-1; Angiotensin-2; Angiotensin-3; Angiotensin-4; Angiotensin 1-9; Angiotensin 1-7; Angiotensin 1-5; Angiotensin

1-4; Annexin A5; Adaptor Related Protein Complex 3 Subunit Beta 1, AP3B1; Apolipoprotein E; Argininosuccinate lyase, ASL; Argininosuccinate synthase; Argininosuccinic acid synthetase, ASS; Arylsulfatase A; Arylsulfatase A component B; Arylsulfatase A component C; Arylsulfatase B; aspartylglucosaminidase; ATP-binding cassette transporter, ABCD1; ATP-dependent RNA helicase, DDX3X; Endorepellin; Beta-2-microglobulin; Beta-galactosidase; Beta-hexosaminidase subunit alpha, HEXA; Beta-hexosaminidase subunit beta, HEXB; Bifunctional purine biosynthesis protein, PURH; Biglycan; Biotinidase; Biotinidase; Bone morphogenetic protein 1; Branching enzyme, GBE1; Calmodulin; Calreticulin; cAMP-dependent protein kinase catalytic subunit gamma; Cartilage oligomeric matrix protein; Cartilage-associated protein; Catalase; Catalase, CAT; Cathepsin A; Cathepsin B; Cathepsin D; Cathepsin F; Cathepsin K; Citrin, SLC25A13; Collagen alpha-1(I) chain; Collagen alpha-1(III) chain; Collagen alpha-1(IV) chain; Arresten; Collagen alpha-1(V) chain, Collagen alpha-1(XI) chain, Collagen alpha-1(XVIII) chain; Endostatin, Collagen alpha-2(I) chain; Collagen alpha-2(IV) chain; Canstatin; Collagen alpha-2(V) chain; Collagen alpha-2(VI) chain; Collagen alpha-3(VI) chain; Complement C1r subcomponent; Complement C1s subcomponent; Complement C3; Complement C4 beta chain; Complement factor D; Carnitine palmitoyltransferase 1A, CPT1A; Cystathionine β-synthase, CBS; Cystatin-C; Cystinosin, CTNS; Cytochrome c; Cytokine receptor-like factor 1; Cytoplasmic acetoacetyl-CoA thiolase, ACAT2; D-bifuncitonal enzyme, HSD17B4; Decorin; Dihydrolipoyl dehydrogenase, mitochondrial; Dihydroxyacetonephosphate acyltransferase, GNPAT; Dipeptidyl peptidase 1;Cathepsin C; EGF-containing fibulin-like extracellular matrix protein 1; EGF-containing fibulin-like extracellular matrix protein 2; Elastin; Elongation factor 2; Electron Transfer Flavoprotein Subunit Alpha, ETFA; Electron Transfer Flavoprotein Subunit Beta, ETFB; Electron transfer flavoprotein dehydrogenase, ETFDH; Extracellular matrix protein 1; Fibrillin-1; Fibrillin-2; Fibronectin; Fibulin-1; Fibulin-5; Formyl-Glycin generating enzyme, SUMF1; Fructose 1,6-biphosphatase, FBP1; Fumarylacetoacetase; Fumarylacetoacetate hydrolase domain-containing protein 2A, FAHD2A; Galactocerebrosidase; Galactokinase 1; Galactose-1-phosphate uridyl transferase, GALT; Ganglioside GM2 activator; Ganglioside GM2 activator isoform short; Gelsolin; GlcNAc phosphotransferase, GNPTA; Glucose-6-phosphate 1-dehydrogenase; Glucose-6-phosphate isomerase; Glucose-6-phosphate translocase, G6PT1; Glutaryl CoA dehydrogenase, GCDH; Glutathione peroxidase 3; Glutathione synthetase; Glycerol kinase; Glycerol-3-phosphate dehydrogenase [NAD(+)], cytoplasmic; Glycine cleavage enzyme system, AMT; Glycine cleavage enzyme system, GCSH; Glycogen debranching enzyme; 4-alpha-glucanotransferase; Amylo-alpha-1,6-glucosidase; Glycogen phosphorylase, liver form; Glypican-1; Glypican-6; Hydroxyacyl-CoA Dehydrogenase Trifunctional Multienzyme Complex Subunit Alpha, HADHA; Haptoglobin; Heparan N-sulfatase, N-

sulfoglucosamine sulfohydrolase, SGSH; Heparan-alpha-glucosaminide N-acetyltransferase, HGSNAT; Hormone-sensitive lipase; Hydroxyacyl-coenzyme A dehydrogenase, mitochondrial; Hyperactivity of glutamate dehydrogenase, GLUD1; Hypoxanthine-guanine phosphoribosyltransferase, HPRT; Iduronate-2-sulfatase, IDS; Insulin-like growth factor-binding protein 7; Interstitial collagenase; Isovaleryl-CoA dehydrogenase; Keratin, type II cytoskeletal 1; Keratin, type II cytoskeletal 6B; L-lactate dehydrogenase A chain; L-lactate dehydrogenase B chain; Lactoylglutathione lyase; Laminin subunit alpha-2; Laminin subunit alpha-4; Laminin subunit beta-1; Laminin subunit beta-2; Laminin subunit gamma-1; Leptin; Lipoamide acyltransferase component of branched-chain alpha-keto acid dehydrogenase complex, mitochondrial, DBT; Lipoprotein lipase; Liver and muscle phosphorylase kinase, PHKB; Liver phosphorylase kinase, PHKG2; Lysosomal acid lipase/cholesteryl ester hydrolase; Lysosomal alpha-glucosidase; Lysosomal alpha-mannosidase; Lysosomal protective protein; CLN6 Transmembrane ER Protein, CLN6; CLN8 Transmembrane ER And ERGIC Protein, CLN8; Lysosomal transmembrane CLN3 protein, CLN3; Lysosomal transmembrane CLN5 protein, CLN5; Lysosome-associated membrane glycoprotein 2; Lysosomal trafficking regulator, LYST; Malonyl-CoA decarboxylase, MLYCD; Matrilin-3; Matrix Gla protein; Melanophilin, MLPH; Methionine synthase reductase, MTRR; Methylene tetrahydrofolate homocysteine methyltransferase, MTR; Methylenetetrahydrofolate reductase, MTHFR; Methylmalonic semialdehyde dehydrogenase, ALDH6A1; Methylmalonyl-CoA mutase; Mevalonate kinase; Mitochondrial branched-chain aminotransferase 2, BCAT2; Mitochondrial ornithine translocase, SLC25A15; Methylmalonic aciduria type A, MMAA; Molybdopterin synthase, Gephyrin, MOCS1A; Mucolipin-1, MCOLN1; Muscle phosphorylase kinase, PHKA1; Myosin Va, MYO5A; Myosin light chain 4; N-Acetylgalactosamine-6 Sulfatase, GALNS ; N-acetylglucosamine-6-sulfatase; Nicotinamide N-methyltransferase; NPC intracellular cholesterol transporter 1, NPC1; Palmitoyl-protein thioesterase-1, PPT1; Palmitoyl-protein thioesterase, PPT2; Pentraxin-related protein, PTX3; Peptidyl-prolyl cis-trans isomerase, FKBP10; Peroxidasin homolog; Peroxin-1, 2, 3, 5, 6, 7, 10, 12, 13, 14, 26, Phosphoacetylglucosamine mutase; Phosphoglucomutase-1; Phosphoglycerate kinase 1; Phosphoglycerate mutase 1; Pigment epithelium-derived factor, PEDF; Plasma alpha-L-fucosidase; Plasma membrane carnitine transport, OCTN2; Plasma protease C1 inhibitor; Plasminogen activator inhibitor 1; Procollagen-lysine,2-oxoglutarate 5-dioxygenase 1; Propionyl-CoA carboxylase; Prosaposin; Proteoglycan 4; Proteoglycan 4 C-terminal part; Pyruvate carboxylase; Pyruvate dehydrogenase complex, DLAT; Pyruvate dehydrogenase complex, PDHB; Pyruvate dehydrogenase complex, PDHX; Pyruvate dehydrogenase complex, PDP1; Ras-related protein Rab-27A, RAB27A; Retinol-binding protein 4; Ribonuclease T2; Semaphorin-7A; Sepiapterin reductase; Serine protease, HTRA1; Serotransferrin; Serpin B6; Serum amyloid

A-1 protein; Short branched-chain acyl-CoA dehydrogenase, ACADSB; Sialic acid synthase; Sialidase-1; Sialin (sialic acid transport), SLC17A5; Solute Carrier Family 22 Member 5, SLC22A5; SPARC-related modular calcium-binding protein 2; Spectrin alpha chain, non-erythrocytic 1; Sphingomyelin phosphodiesterase, SMPD1; Succinyl-CoA 3-oxoacid-CoA transferase, OXCT1; Sushi repeat-containing protein, SRPX2; Tafazzin; Tenascin; Thrombospondin-2; Transforming growth factor-beta-induced protein ig-h3; Transitional endoplasmic reticulum ATPase; Triosephosphate isomerase; Tripeptidyl-peptidase 1; Tumor necrosis factor receptor superfamily member 11B; Vascular endothelial growth factor C; Versican core protein; Vimentin; Vitamin K-dependent protein S; X-linked phosphorylase kinase, PHKA2; Xaa-Pro dipeptidase; α-Fucosidase, FUCA1; α-Galactosidase A, GLA; α-N-Acetylglucosaminidase, NAGA; β-Glucocerebrosidase (aka Glucosylceramidase); GBA, β-glucuronidase, GUSB; β-mannosidasen; VEGFA; VEGF165; FGF2; FGF4; PDGF-BB (platelet-derived growth factor); Ang1 (angiopoiten 1), TGFβ (transforming growth factor); LPA-producing enzyme (AXT); and phthalimide neovascularization factor (PNF1) .

10. The composition of claim 1, wherein the adipogenic cells comprise a heterologous nucleic acid,

optionally wherein the heterologous nucleic acid comprises an adipocyte-specific promoter, optionally an adiponectin promoter or an aP2/FABP4 promoter optionally comprising a minimal proximal promoter sequence, and optionally further comprises one or more of a distal enhancer sequence and additional transcription factor binding sites, optionally C/EBPα binding sites,

optionally wherein the adipocyte specific promoter is an adiponectin promoter, optionally a human adiponectin promoter,

optionally wherein the adipocyte specific promoter is in operative association with a therapeutic protein.

11. An autologous, non-immunogenic, long-acting composition comprising a therapeutically effective amount of substantially pure adipogenic cells, wherein the adipogenic cells comprise one or more heterologous nucleic acid.

12. The composition of claim 11, wherein the adipogenic cells are at least about 60%, about 65%, about 70%, about 75%, about 80%, about 85%, about 90%, about 91%, about 92%, about 93%, about 94%, about 95%, about 96%, about 97%, about 98%, or about 99% or more viable,

optionally wherein the composition is substantially free of one or more bacteria, virus, fungus, and pyrogen,

optionally wherein the composition comprises a pharmaceutically acceptable carrier, diluent, excipient, or vehicle,

optionally wherein the diluent comprises one or more of saline, phosphate buffered saline, Dulbecco's Modified Eagle Medium DMEM, alpha modified Minimal Essential Medium (alpha.MEM), Roswell Park Memorial Institute Media 1640 (RPMI Media 1640), HBSS, human albumin, and Ringer's solution and the like, or any combination thereof,

optionally wherein the composition comprises a therapeutically effective amount of one or more of heparin, FBS, human albumin, bFGF, PPAR-y agonists, insulin, and a Rho kinase inhibitor, or any combination thereof,

optionally wherein the composition comprises a scaffold,

optionally wherein the scaffold comprises biodegradable biomaterials, optionally natural biomaterials such as collagen, various proteoglycans, alginate-based substrates and chitosan,

optionally wherein the scaffold comprises synthetic biomaterials, optionally synthetic polymer-based materials,

optionally wherein the scaffold comprises one or more of a hydrogel, a matrigel, alginates, collagens, chitosans, PGAs, PLAs, and PGA/PLA copolymers, silk, acellular/ de-cellularized scaffolds, optionally from cadavers or non-human animals, biodegradable biomaterials, optionally. collagen, proteoglycans, alginate-based substrates, or chitosan, or any combination thereof.

13. The composition of claim 12, wherein the composition further comprises a therapeutically effective amount of one or more additional therapeutic agents, optionally wherein the additional therapeutic agent is one or more of an analgesic and an anti-infective agent,

optionally wherein the composition is formulated for administration by a route selected from subcutaneous, intradermal, intramuscular, intracranial, intraocular, intravenous, and fat pad,

optionally wherein the adipogenic cells persist up to 1 day, up to 2 days, up to 3 days, up to 4 days, up to 5 days, up to 6 days, up to 7 days, up to 2 weeks, up to 3 weeks, up to 1 month, up to 2 months, up to

3 months, up to 4 months, up to 5 months, up to 6 months, up to 7 months, up to 8 months, up to 9 months, up to 10 months, up to 11 months, up to 1 year, or up to 2 years post engraftment, or more,

optionally wherein the adipogenic cells secrete one or more proteins and/or other molecules up to 1 day, up to 2 days, up to 3 days, up to 4 days, up to 5 days, up to 6 days, up to 7 days, up to 2 weeks, up to 3 weeks, up to 1 month, up to 2 months, up to 3 months, up to 4 months, up to 5 months, up to 6 months, up to 7 months, up to 8 months, up to 9 months, up to 10 months, up to 11 months, up to 1 year, or up to 2 years post engraftment, or more.

14. A syringe comprising the composition of any one of claims 1-13, optionally wherein the syringe is prefilled, optionally with a volume of less than about 3 mL or about 2 mL or less, optionally wherein the composition is stable for at least 12, 24, 36, or 48 hours, and exhibits less than about 35%, about 30%, about 25%, about 20%, about 19%, about 18%, about 17%, about 16%, about 15%, about 14%, about 13%, about 12%, about 11%, about 10%, about 9%, about 8%, about 7%, about 6%, or about 5% loss of cell viability when stored at –80 °C, –20 °C, 4 °C, or 21 °C.

15. A pharmaceutical composition for the treatment of a disease or disorder comprising the composition of claim 1, to a subject in need thereof, optionally wherein the treatment comprises administering the composition of claim 1, optionally wherein the treatment comprises administering the composition via the syringe of claim 14,

optionally wherein the composition is formulated for administration in a single administration, optionally at a single site or multiple sites,

optionally wherein the composition is formulated for administration in multiple administrations, optionally at a single site or multiple sites,

optionally wherein the composition is formulated for administration by subcutaneous injection.

16. The pharmaceutical composition of claim 15, wherein the disease or disorder is selected from Lysosomal storage disorders, Metabolic disorders, Complement deficiencies, Adipocyte disorders, Endocrine disorders, Vascular diseases, Branched-chain amino acid metabolism disorders, Connective tissue disorders, Fatty acid transport and mitochrondrial oxidation disorders, Genetic dyslipidemias, Hematological disorders, Phenylalanine and tyrosine metabolism disorders, Purine metabolism disorders, Urea cycle disorders, Beta-amino acid and gamma-amino acid disorders, Ketone metabolism disorders, Galactosemia,

Glycerol Metabolism Disorders, Glycine Metabolism Disorders, Lysine Metabolism Disorders, Methionine and Sulfur Metabolism Disorders, or Peroxisome biogenesis or very long chain fatty acid metabolism disorders,

optionally wherein the disease or disorder is selected from Wolman disease, Obesity, C3 deficiency, Familial lipodystrophy, Cachexia, Hereditary angioedema, Propionic acidemia Type 1, Ehlers-Danlos syndrome, long-chain 3-hydroxy acyl-CoA dehydrogenase deficiency , Familial LPL deficiency, Protein S deficiency, Tyrosinemia type I, Adenine phosphoribosyltransferase deficiency, Citrullinemia type I, Methylmalonic semialdehyde dehydrogenase deficiency, Succinyl-CoA 3- oxoacid-CoA transferase deficiency, Galactose-1-phosphate uridyl transferase deficiency, Glycerol kinase deficiency, Nonketotic hyperglycinemia, Glutaric acidemia type I, Molybdenum cofactor defect, or Zellweger syndrome,

optionally wherein the composition comprises adipogenic cells that are not transformed,

optionally wherein the subject has, is suspected of having, or is suspected of having elevated risk for a disease or disorder selected from Lysosomal storage disorders, Metabolic disorders, Hematological disorders, Bone and connective tissue disorders, Endocrine disorders, Inflammatory disorders, Monogenic disorders, Cancer, Cardiovascular disorders, Branched-chain amino acid metabolism disorders, Fatty acid transport and mitochrondrial oxidation disorders, Genetic dyslipidemias, Phenylalanine and tyrosine metabolism disorders, Purine metabolism disorders, Urea cycle disorders, Ketone metabolism disorders, Glycine Metabolism Disorders, Lysine Metabolism Disorders, Methionine and Sulfur Metabolism Disorders, Peroxisome biogenesis and very long chain fatty acid metabolism disorders, or other protein deficiency disorders,

optionally wherein the disease or disorder is selected from Cystinosis, T2D, Hemophilia A or B, Stickler syndrome, Osteoporosis, Rheumatoid Arthritis, A1AT deficiency, Breast cancer, Atherosclerosis, Isobutyryl-CoA dehydrogenase deficiency, carnitine-acylcarnitine translocase deficiency, Sitosterolemia, Phenylketonuria, Hereditary xanthinuria, Ornithine-transcarbamoylase deficiency, 3-Hydroxy-3-methylglutaryl-CoA synthase deficiency, Nonketotic hyperglycinemia, Hyperlysinemia, Homocystinuria, Refsum disease, or growth failure in children with kidney disease,

optionally wherein the composition comprises adipogenic cells that are transformed, optionally comprising a heterologous nucleic acid comprising a therapeutic transgene,

optionally wherein the adipogenic cells comprise one or more of a gene, or genes associated with cystinosin, GLP-1, Factor VIII, Factor IX, COL2A1, Parathyroid hormone (1-84), alkaline phosphatase, alpha-

1 antitrypsin, Trastuzumab, Apolipoprotein A1, Isobutyryl-CoA dehydrogenase, SLC25A20, ATP-binding cassette sub-family G member 5, ABCG5, Phenylalanine hydroxylase, Xanthine dehydrogenase, Ornithine-transcarbamoylase, 3-Hydroxy-3- methylglutaryl-CoA synthase, Glycine cleavage system P protein, Lysine:α-ketoglutarate reductase, Cystathionine β-synthase, Phytanoyl-CoA hydroxylase, and human growth hormone (somatotropin), wherein the gene is in operative association with an adipocyte-specific promoter,

optionally wherein the adipogenic cells are CD34+ cells and the disease or disorder is selected from Wolman disease, Obesity, C3 deficiency, Familial lipodystrophy, Cachexia, Hereditary angioedema, Propionic acidemia Type 1, Ehlers-Danlos syndrome, long-chain 3-hydroxy acyl-CoA dehydrogenase deficiency , Familial LPL deficiency, Protein S deficiency, Tyrosinemia type I, Adenine phosphoribosyltransferase deficiency, Citrullinemia type I, Methylmalonic semialdehyde dehydrogenase deficiency, Succinyl-CoA 3- oxoacid-CoA transferase deficiency, Galactose-1-phosphate uridyl transferase deficiency, Glycerol kinase deficiency, Nonketotic hyperglycinemia, Glutaric acidemia type I, Molybdenum cofactor defect, Zellweger syndrome, Cystinosis, T2D, Hemophilia A or B, Stickler syndrome, Osteoporosis, Rheumatoid Arthritis, A1AT deficiency, Breast cancer, Atherosclerosis, Isobutyryl-CoA dehydrogenase deficiency, carnitine-acylcarnitine translocase deficiency, Sitosterolemia, Phenylketonuria, Hereditary xanthinuria, Ornithine-transcarbamoylase deficiency, 3-Hydroxy-3- methylglutaryl-CoA synthase deficiency, Nonketotic hyperglycinemia , Hyperlysinemia, Homocystinuria, Refsum disease, or growth failure in children with kidney disease.

17. Use of a composition of any one of claims 1-13 in the manufacture of a medicament for treating, preventing, or ameliorating a disease or disorder.

18. A process for in vivo electroporation of adipogenic cells comprising:

injecting the adipogenic cells into adipose tissue of a subject;

placing the adipose tissue between a first plate electrode and a second plate electrode; and

passing a current from the first plate electrode through the adipose tissue to the second plate electrode.

19. An allogenic, non-immunogenic, long-acting composition comprising a therapeutically effective amount of substantially pure adipogenic cells, wherein the adipogenic cells comprise a heterologous nucleic acid,

optionally wherein the adipogenic cells express elevated levels of CD10 compared to wild type adipogenic cells and/or unenriched adipogenic cells,

optionally wherein at least about 90% or at least about 95% of the adipogenic cells express CD10,

optionally wherein the adipogenic cells are obtainable from CD10-enriched ASCs, optionally wherein the adipogenic cells are white adipocytes obtainable from ASCs that expresses elevated levels of CD10 compared to wild type ASCs and/or unenriched ASCs,

optionally wherein the heterologous nucleic acid comprises an adipocyte-specific promoter.

20. An allogenic, non-immunogenic, long-acting composition comprising a therapeutically effective amount of substantially pure adipogenic cells, wherein the adipogenic cells are obtainable from ASCs that express elevated levels of CD10 compared to wild type ASCs and/or unenriched ASCs,

optionally wherein the adipogenic cells comprise a heterologous nucleic acid, optionally wherein the heterologous nucleic acid comprises an adipocyte-specific promoter,

optionally wherein at least about 90% or at least about 95% of the adipogenic cells express CD10,

optionally wherein the adipogenic cells are white adipocytes.