CLAIMS:

1. Use of a GDP-bound form of Rab1a (Rab1a^{GDP}), one or more expressible nucleic acids encoding Rab1a^{GDP}, or a combination thereof, in the manufacture of a medicament for reducing obesity, or for preventing or treating obesity, in a subject in need thereof, in the manufacture of a medicament for reducing at least one of the following obesity-associated conditions in a subject in need thereof: inflammatory response, increased abdominal obesity, low serum high-density lipoprotein (HDL), insulin resistance, nonalcoholic fatty liver disease (NAFLD), atrial fibrillation and sleep apnea, or in the manufacture of a medicament for reducing bodyweight in an overweight subject.

2. The use of claim 1, wherein the Rab1a^{GDP} is or comprises Rab1a^{S25N}, Rab1a^{N124I}, Rab1a^{D41N} or Rab1a^{D47N}.

3. The use of claim 1, wherein the Rab1a^{GDP} comprises or consists of the amino acid sequence:

   MSSMNPEYDYLFKLLLIGDSGVGKNCLLLRFADDTYTESYISTIGVDFKIRTIELDGK
   TIKLQIWDTAGQERFRTITSSYYRGAHGIIVVYDVTDQESFNNVKQWLQEIDRYASE
   NVNKLLVGNKCDLTTKKVVDYTTAKEFADSLGIPFLETSAKNATNVEQSFMTMAAE
   IKKRMGPGATAGGAEKSNVKIQSTPVKQSGGGCC
   (SEQ ID NO: 6; Human Rab1a^{S25N});

   MGDYKDDDDKGGSGGSSMNPEYDYLFKLLLIGDSGVGKSCLLLRFADDTYTESYIS
   TIGVDFKIRTIELDGKTIKLQIWDTAGQERFRTITSSYYRGAHGIIVVYDVTDQESFNN
   VKQWLQEIDRYASENVNKLLVGIKCDLTTKKVVDYTTAKEFADSLGIPFLETSAKNA
   TNVEQSFMTMAAEIKKRMGPGATAGGAEKSNVKIQSTPVKQSGGGCC
   (SEQ ID NO: 9; Mouse Rab1^{N124I});

   the amino acid sequence of human Rab1a^{D41N}; or

   MSSMNPEYDYLFKLLLIGDSGVGKSCLLLRFADDTYTESYISTIGVNFKIRTIELDGKT
   IKLQIWDTAGQERFRTITSSYYRGAHGIIVVYDVTDQESFNNVKQWLQEIDRYASEN
   VNKLLVGNKCDLTTKKVVDYTTAKEFADSLGIPFLETSAKNATNVEQSFMTMAAEI
   KKRMGPGATAGGAEKSNVKIQSTPVKQSGGGCC

(SEQ ID NO: 18; Human Rab1a^{D47N});

or a polypeptide having at least 80%, 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% sequence identity with any of these sequences and preferentially binding GDP.

4. The use of any one of claims 1-3, wherein the Rab1a^{GDP} is in the form of a fusion protein, wherein the Rab1a^{GDP} is fused or otherwise directly or indirectly linked, optionally via a linker, with a signalling or targeting peptide, a fluorescent peptide or other marker or tracer, or another peptide or non-peptide moiety for targeted delivery, facilitating cell uptake, increasing stability or *in vivo* half-life, or improving another therapeutic, diagnostic, or *in vivo* property of the Rab1a^{GDP}.

5. The use of claim 4, wherein the Rab1a^{GDP} is in the form of a fusion protein, and comprises the amino acid sequence:

MEDAKNIKKGPAPFYPLEDGTAGEQLHKAMKRYALVPGTIAFTDAHIEVNITYAEYF
EMSVRLAEAMKRYGLNTNHRIVVCSENSLQFFMPVLGALFIGVAVAPANDIYNERE
LLNSMNISQPTVVFVSKKGLQKILNVQKKLPIIQKIIIMDSKTDYQGFQSMYTFVTSHL
PPGFNEYDFVPESFDRDKTIALIMNSSGSTGLPKGVALPHRTACVRFSHARDPIFGNQI
IPDTAILSVVPFHHGFGMFTTLGYLICGFRVVLMYRFEEELFLRSLQDYKIQSALLVPT
LFSFFAKSTLIDKYDLSNLHEIASGGAPLSKEVGEAVAKRFHLPGIRQGYGLTETTSAI
LITPEGDDKPGAVGKVVPFFEAKVVDLDTGKTLGVNQRGELCVRGPMIMSGYVNNP
EATNALIDKDGWLHSGDIAYWDEDEHFFIVDRLKSLIKYKGYQVAPAELESILLQHP
NIFDAGVAGLPDDDAGELPAAVVVLEHGKTMTEKEIVDYVASQVTTAKKLRGGVV
FVDEVPKGLTGKLDARKIREILIKAKKGGKSKLMSSMNPEYDYLFKLLLIGDSGVGK
NCLLLRFADDTYTESYISTIGVDFKIRTIELDGKTIKLQIWDTAGQERFRTITSSYYRG
AHGIIVVYDVTDQESFNNVKQWLQEIDRYASENVNKLLVGNKCDLTTKKVVDYTT
AKEFADSLGIPFLETSAKNATNVEQSFMTMAAEIKKRMGPGATAGGAEKSNVKIQST
PVKQSGGGCC

(SEQ ID NO: 21);

or a polypeptide having at least 80%, 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89%, 90%,

91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% sequence identity therewith and preferentially binding GDP.

6. The use of claim 1, wherein the one or more expressible nucleic acids are DNA-based, or RNA-based.

7. The use of claim 6, wherein the one or more expressible nucleic acids transiently express the $Rab1a^{GDP}$ in one or more cells of the subject, or wherein the one or more expressible nucleic acids integrate in the one or more cells genome and express the $Rab1a^{GDP}$ in the one or more cells of the subject.

8. The use of claim 1, wherein the one or more expressible nucleic acids comprise one or more expression vectors, plasmids, or mRNAs encoding and capable of expressing the $Rab1a^{GDP}$ inside the one or more cells of the subject.

9. The use of claim 8, wherein the one or more expressible nucleic acids comprise a nucleic acid sequence of:

ATGTCCAGCATGAATCCCGAATATGATTATTTATTCAAGTTACTTCTGATTGGCG
ACTCAGGGGTTGGAAAGAATTGCCTTCTTCTTAGGTTTGCAGATGATACATATAC
AGAAAGCTACATCAGCACAATTGGTGTGGATTTCAAAATAAGAACTATAGAGTT
AGACGGGAAAACAATCAAGCTTCAAATATGGGACACAGCAGGCCAGGAAAGAT
TTCGAACAATCACCTCCAGTTATTACAGAGGAGCCCATGGCATCATAGTTGTGTA
TGATGTGACAGATCAGGAGTCCTTCAATAATGTTAAACAGTGGCTGCAGGAAAT
AGATCGTTATGCCAGTGAAAATGTCAACAAATTGTTGGTAGGGAACAAATGTGA
TCTGACCACAAAGAAAGTAGTAGACTACACAACAGCGAAGGAATTTGCTGATTC
CCTTGGAATTCCGTTTTTGGAAACCAGTGCTAAGAATGCAACGAATGTAGAACA
GTCTTTCATGACGATGGCAGCTGAGATTAAAAAGCGAATGGGTCCCGGAGCAAC
AGCTGGTGGTGCTGAGAAGTCCAATGTTAAAATTCAGAGCACTCCAGTCAAGCA
GTCAGGTGGAGGTTGCTGCTAA

(Human $Rab1a^{S25N}$ ORF Codon Sequence, SEQ ID NO: 5);

ATGGGGGACTACAAGGACGACGATGACAAGGGGGGTAGCGGTGGATCCAGCAT

GAATCCCGAATATGATTATTTATTCAAGTTACTTCTGATTGGCGATTCTGGGGTT
GGAAAGTCCTGCCTTCTCCTTAGGTTTGCAGATGATACGTATACGGAAAGCTACA
TCAGCACAATTGGTGTGGATTTCAAGATACGAACTATAGAGTTAGATGGGAAAA
CAATCAAGCTACAGATATGGGACACAGCAGGCCAGGAAAGATTTCGAACAATCA
CTTCCAGTTATTACAGAGGAGCCCATGGCATCATAGTTGTGTATGATGTGACAGA
TCAGGAGTCCTTCAATAACGTTAAACAGTGGCTGCAGGAGATAGATCGCTACGC
CAGTGAAAATGTCAACAAGTTGTTGGTAGGGATCAAATGTGACCTGACCACAAA
GAAAGTAGTAGACTACACAACAGCAAAGGAATTTGCAGATTCCCTTGGAATTCC
ATTTTTGGAAACCAGTGCTAAGAACGCAACGAATGTAGAACAGTCTTTCATGAC
GATGGCAGCTGAGATTAAAAAGCGAATGGGTCCTGGAGCTACAGCTGGTGGTGC
CGAGAAGTCCAATGTTAAAATCCAGAGCACTCCAGTCAAGCAGTCAGGTGGAGG
CTGCTGCTAA

(Mouse Rab1a^{N124I} ORF Codon Seqeunce, SEQ ID NO: 8); or

ATGTCCAGCATGAATCCCGAATATGATTATTTATTCAAGTTACTTCTGATTGGCGACT
CAGGGGTTGGAAAGTCTTGCCTTCTTCTTAGGTTTGCAGATGATACATATACAGAAA
GCTACATCAGCACAATTGGTGTGAACTTCAAAATAAGAACTATAGAGTTAGACGGG
AAAACAATCAAGCTTCAAATATGGGACACAGCAGGCCAGGAAAGATTTCGAACAAT
CACCTCCAGTTATTACAGAGGAGCCCATGGCATCATAGTTGTGTATGATGTGACAGA
TCAGGAGTCCTTCAATAATGTTAAACAGTGGCTGCAGGAAATAGATCGTTATGCCAG
TGAAAATGTCAACAAATTGTTGGTAGGGAACAAATGTGATCTGACCACAAAGAAAG
TAGTAGACTACACAACAGCGAAGGAATTTGCTGATTCCCTTGGAATTCCGTTTTTGG
AAACCAGTGCTAAGAATGCAACGAATGTAGAACAGTCTTTCATGACGATGGCAGCT
GAGATTAAAAAGCGAATGGGTCCCGGAGCAACAGCTGGTGGTGCTGAGAAGTCCAA
TGTTAAAATTCAGAGCACTCCAGTCAAGCAGTCAGGTGGAGGTTGCTGCTAA

(Human Rab1a^{D47N} ORF Codon Sequence, SEQ ID NO: 17);

or a nucleic acid sequence having at least 80%, 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% sequence identity therewith and encoding a Rab1a^{GDP} preferentially binding GDP;

or a nucleic acid sequence equivalent to any of the above sequences due to codon redundancy.

10. The use of claim 8, wherein the one or more expressible nucleic acids comprise a nucleic acid sequence of:

ATGGAAGACGCCAAAAACATAAAGAAAGGCCCGGCGCCATTCTATCCGCTAGAG
GATGGAACCGCTGGAGAGCAACTGCATAAGGCTATGAAGAGATACGCCCTGGTT
CCTGGAACAATTGCTTTTACAGATGCACATATCGAGGTGAACATCACGTACGCG
GAATACTTCGAAATGTCCGTTCGGTTGGCAGAAGCTATGAAACGATATGGGCTG
AATACAAATCACAGAATCGTCGTATGCAGTGAAAACTCTCTTCAATTCTTTATGC
CGGTGTTGGGCGCGTTATTTATCGGAGTTGCAGTTGCGCCCGCGAACGACATTTA
TAATGAACGTGAATTGCTCAACAGTATGAACATTTCGCAGCCTACCGTAGTGTTT
GTTTCCAAAAAGGGGTTGCAAAAAATTTTGAACGTGCAAAAAAAATTACCAATA
ATCCAGAAAATTATTATCATGGATTCTAAAACGGATTACCAGGGATTTCAGTCGA
TGTACACGTTCGTCACATCTCATCTACCTCCCGGTTTTAATGAATACGATTTTGTA
CCAGAGTCCTTTGATCGTGACAAAACAATTGCACTGATAATGAACTCCTCTGGAT
CTACTGGGTTACCTAAGGGTGTGGCCCTTCCGCATAGAACTGCCTGCGTCAGATT
CTCGCATGCCAGAGATCCTATTTTTGGCAATCAAATCATTCCGGATACTGCGATT
TTAAGTGTTGTTCCATTCCATCACGGTTTTGGAATGTTTACTACACTCGGATATTT
GATATGTGGATTTCGAGTCGTCTTAATGTATAGATTTGAAGAAGAGCTGTTTTTA
CGATCCCTTCAGGATTACAAAATTCAAAGTGCGTTGCTAGTACCAACCCTATTTT
CATTCTTCGCCAAAAGCACTCTGATTGACAAATACGATTTATCTAATTTACACGA
AATTGCTTCTGGGGGCGCACCTCTTTCGAAAGAAGTCGGGGAAGCGGTTGCAAA
ACGCTTCCATCTTCCAGGGATACGACAAGGATATGGGCTCACTGAGACTACATC
AGCTATTCTGATTACACCCGAGGGGGATGATAAACCGGGCGCGGTCGGTAAAGT
TGTTCCATTTTTTGAAGCGAAGGTTGTGGATCTGGATACCGGGAAAACGCTGGGC
GTTAATCAGAGAGGCGAATTATGTGTCAGAGGACCTATGATTATGTCCGGTTATG
TAAACAATCCGGAAGCGACCAACGCCTTGATTGACAAGGATGGATGGCTACATT
CTGGAGACATAGCTTACTGGGACGAAGACGAACACTTCTTCATAGTTGACCGCTT
GAAGTCTTTAATTAAATACAAAGGATACCAGGTGGCCCCCGCTGAATTGGAGTC
GATATTGTTACAACACCCCAACATCTTCGACGCGGGCGTGGCAGGTCTTCCCGAC
GATGACGCCGGTGAACTTCCCGCCGCCGTTGTTGTTTTGGAGCACGGAAAGACG

ATGACGGAAAAAGAGATCGTGGATTACGTCGCCAGTCAAGTAACAACCGCCAAA
AAGTTGCGCGGAGGAGTTGTGTTTGTGGACGAAGTACCGAAAGGTCTTACCGGA
AAACTCGACGCAAGAAAAATCAGAGAGATCCTCATAAAGGCCAAGAAGGGCGG
AAAGTCCAAATTGATGTCCAGCATGAATCCCGAATATGATTATTTATTCAAGTTA
CTTCTGATTGGCGACTCAGGGGTTGGAAAGAATTGCCTTCTTCTTAGGTTTGCAG
ATGATACATATACAGAAAGCTACATCAGCACAATTGGTGTGGATTTCAAAATAA
GAACTATAGAGTTAGACGGGAAAACAATCAAGCTTCAAATATGGGACACAGCAG
GCCAGGAAAGATTTCGAACAATCACCTCCAGTTATTACAGAGGAGCCCATGGCA
TCATAGTTGTGTATGATGTGACAGATCAGGAGTCCTTCAATAATGTTAAACAGTG
GCTGCAGGAAATAGATCGTTATGCCAGTGAAAATGTCAACAAATTGTTGGTAGG
GAACAAATGTGATCTGACCACAAAGAAAGTAGTAGACTACACAACAGCGAAGG
AATTTGCTGATTCCCTTGGAATTCCGTTTTTGGAAACCAGTGCTAAGAATGCAAC
GAATGTAGAACAGTCTTTCATGACGATGGCAGCTGAGATTAAAAAGCGAATGGG
TCCCGGAGCAACAGCTGGTGGTGCTGAGAAGTCCAATGTTAAAATTCAGAGCAC
TCCAGTCAAGCAGTCAGGTGGAGGTTGCTGCTAA

(SEQ ID NO: 19, MG-008 ORF DNA Sequence with 5’ Luciferase Tag); or

AUGGAAGACGCCAAAAACAUAAAGAAAGGCCCGGCGCCAUUCUAUCCGCUAG
AGGAUGGAACCGCUGGAGAGCAACUGCAUAAGGCUAUGAAGAGAUACGCCCU
GGUUCCUGGAACAAUUGCUUUUACAGAUGCACAUAUCGAGGUGAACAUCACG
UACGCGGAAUACUUCGAAAUGUCCGUUCGGUUGGCAGAAGCUAUGAAACGAU
AUGGGCUGAAUACAAAUCACAGAAUCGUCGUAUGCAGUGAAAACUCUCUUCA
AUUCUUUAUGCCGGUGUUGGGCGCGUUAUUUAUCGGAGUUGCAGUUGCGCCC
GCGAACGACAUUUAUAAUGAACGUGAAUUGCUCAACAGUAUGAACAUUUCGC
AGCCUACCGUAGUGUUUGUUUCCAAAAAGGGGUUGCAAAAAAUUUUGAACGU
GCAAAAAAAAUUACCAAUAAUCCAGAAAAUUAUUAUCAUGGAUUCUAAAACG
GAUUACCAGGGAUUUCAGUCGAUGUACACGUUCGUCACAUCUCAUCUACCUCC
CGGUUUUAAUGAAUACGAUUUUGUACCAGAGUCCUUUGAUCGUGACAAAACA
AUUGCACUGAUAAUGAACUCCUCUGGAUCUACUGGGUUACCUAAGGGUGUGG
CCCUUCCGCAUAGAACUGCCUGCGUCAGAUUCUCGCAUGCCAGAGAUCCUAUU
UUUGGCAAUCAAAUCAUUCCGGAUACUGCGAUUUUAAGUGUUGUUCCAUUCC

AUCACGGUUUUGGAAUGUUUACUACACUCGGAUAUUUGAUAUGUGGAUUUCG
AGUCGUCUUAAUGUAUAGAUUUGAAGAAGAGCUGUUUUUACGAUCCCUUCAG
GAUUACAAAAUUCAAAGUGCGUUGCUAGUACCAACCCUAUUUUCAUUCUUCG
CCAAAAGCACUCUGAUUGACAAAUACGAUUUAUCUAAUUUACACGAAAUUGC
UUCUGGGGGCGCACCUCUUUCGAAAGAAGUCGGGGAAGCGGUUGCAAAACGC
UUCCAUCUUCCAGGGAUACGACAAGGAUAUGGGCUCACUGAGACUACAUCAG
CUAUUCUGAUUACACCCGAGGGGGAUGAUAAACCGGGCGCGGUCGGUAAAGU
UGUUCCAUUUUUUGAAGCGAAGGUUGUGGAUCUGGAUACCGGGAAAACGCUG
GGCGUUAAUCAGAGAGGCGAAUUAUGUGUCAGAGGACCUAUGAUUAUGUCCG
GUUAUGUAAACAAUCCGGAAGCGACCAACGCCUUGAUUGACAAGGAUGGAUG
GCUACAUUCUGGAGACAUAGCUUACUGGGACGAAGACGAACACUUCUUCAUA
GUUGACCGCUUGAAGUCUUUAAUUAAAUACAAAGGAUACCAGGUGGCCCCCG
CUGAAUUGGAGUCGAUAUUGUUACAACACCCCAACAUCUUCGACGCGGGCGU
GGCAGGUCUUCCCGACGAUGACGCCGGUGAACUUCCCGCCGCCGUUGUUGUUU
UGGAGCACGGAAAGACGAUGACGGAAAAAGAGAUCGUGGAUUACGUCGCCAG
UCAAGUAACAACCGCCAAAAAGUUGCGCGGAGGAGUUGUGUUUGUGGACGAA
GUACCGAAAGGUCUUACCGGAAAACUCGACGCAAGAAAAAUCAGAGAGAUCC
UCAUAAAGGCCAAGAAGGGCGGAAAGUCCAAAUUGAUGUCCAGCAUGAAUCC
CGAAUAUGAUUAUUUAUUCAAGUUACUUCUGAUUGGCGACUCAGGGGUUGGA
AAGAAUUGCCUUCUUCUUAGGUUUGCAGAUGAUACAUAUACAGAAAGCUACA
UCAGCACAAUUGGUGUGGAUUUCAAAAUAAGAACUAUAGAGUUAGACGGGAA
AACAAUCAAGCUUCAAAUAUGGGACACAGCAGGCCAGGAAAGAUUUCGAACA
AUCACCUCCAGUUAUUACAGAGGAGCCCAUGGCAUCAUAGUUGUGUAUGAUG
UGACAGAUCAGGAGUCCUUCAAUAAUGUUAAACAGUGGCUGCAGGAAAUAGA
UCGUUAUGCCAGUGAAAAUGUCAACAAAUUGUUGGUAGGGAACAAAUGUGAU
CUGACCACAAAGAAAGUAGUAGACUACACAACAGCGAAGGAAUUUGCUGAUU
CCCUUGGAAUUCCGUUUUUGGAAACCAGUGCUAAGAAUGCAACGAAUGUAGA
ACAGUCUUUCAUGACGAUGGCAGCUGAGAUUAAAAAGCGAAUGGGUCCCGGA
GCAACAGCUGGUGGUGCUGAGAAGUCCAAUGUUAAAAUUCAGAGCACUCCAG
UCAAGCAGUCAGGUGGAGGUUGCUGCUAA

(SEQ ID NO: 20, MG-008 ORF mRNA Sequence with 5’ Luciferase Tag);

or a nucleic acid sequence having at least 80%, 81%, 82%, 83%, 84%, 85%, 86%, 87%, 88%, 89%, 90%, 91%, 92%, 93%, 94%, 95%, 96%, 97%, 98%, or 99% sequence identity therewith and encoding a $Rab1a^{GDP}$ preferentially binding GDP;

or a nucleic acid sequence equivalent to any of the above sequences due to codon redundancy.

11. A pharmaceutical composition comprising

a GDP-bound form of Rab1a ($Rab1a^{GDP}$), one or more expressible nucleic acids encoding $Rab1a^{GDP}$, or a combination thereof; and

another anti-obesity agent.

12. Use of Rab1 encapsulated lipid nanoparticles in the manufacture of a medicament for reducing, treating or preventing obesity in a subject in need thereof, or in the manufacture of a medicament for reducing body weight in an overweight subject.

13. The use of claim 12, wherein the Rab1 encapsulated lipid nanoparticles are for administration at 0.005-0.5 mg/kg.

14. The use of claim 13, wherein the Rab1 encapsulated lipid nanoparticles are for administration at 0.3, 0.4, or 0.5 mg/kg.

15. The use of claim 13 or 14, wherein the Rab1 encapsulated lipid nanoparticles are for administration via intravenous injection.

16. A pharmaceutical composition comprising:

Rab1 encapsulated lipid nanoparticles and another anti-obesity agent.