COMPOSITIONS COMPRISING POLAR LIPIDS FOR MAINTAINING OR INCREASING MOBILITY AND VITALITY

FIELD OF THE INVENTION

[0001] The present invention relates to the use of polar lipids, in particular, polar lipids derived from milk, to maintain or increase mobility and vitality. Methods for using the polar lipids and compositions comprising the polar lipids are also provided.

BACKGROUND TO THE INVENTION

[0002] There is a progressive decline in muscle mass, strength, function and power that begins around the age of 40-45 years and accelerates in later life (Doherty. J Appl Physiol (1985). 2003 Oct;95(4):1717-27; Janssen et al. J Appl Physiol (1985). 2000 Jul;89(1):81-8; Lindle et al. J Appl Physiol (1985). 1997 Nov;83(5):1581-7). Clinically, age-related muscle loss is significant because it is associated with impairments in mobility and vitality and with an increased risk for falls and fractures and other common chronic metabolic diseases (Fielding et al., J Am Med Dir Assoc. 2011 May;12(4):24956; Cruz-Jentoft et al., Age Ageing. 2018 Oct 12).

[0003] Current consensus guidelines and expert opinion recommend regular exercise, particularly progressive resistance training (PRT), and an adequate intake of food and vitamins. At present, there are no pharmaceutical agents available to prevent muscle loss or functional decline.

[0004] There remains a need for methods and compositions to maintain or increase mobility and vitality.

[0005] It is an object of the present invention to go some way towards meeting this need, or to at least provide the public with a useful choice.

SUMMARY

[0006] In one aspect, the present disclosure provides a use of milk fat globule membrane material comprising one or more polar lipids in the manufacture of a composition or medicament for maintaining or increasing mobility and/or vitality in a subject, wherein (a) maintaining or increasing mobility comprises:

(i) increasing muscle power comprising increasing countermovement jump height by at least 0.65 cm and/or increasing countermovement jump power-to-weight ratio by

at least 6.75% following administration of the composition or medicament daily for a period of at least three or four months and wherein the subject is undertaking exercise on at least two days per week compared with performance of the subject before daily administration of the composition or medicament commenced, and/or

(ii) maintaining or increasing trunk lean muscle mass and/or maintaining or reducing trunk fat mass; and

(b) maintaining or increasing vitality comprises:

(i) increasing daily activity and decreasing sedentary time in a subject; or(ii) decreasing sedentary time by at least 7 minutes per day and/or increasing light intensity physical activity time by at least 3 minutes per day following administration of the composition or medicament daily for a period of at least three or four months and wherein the subject is undertaking exercise on at least two days per week compared with sedentary and/or light intensity physical activity time per day for the subject before daily administration of the composition or medicament commenced.

In one example the disclosure relates to a method of maintaining or increasing mobility and/or vitality in a subject, the method comprising administration of a composition comprising one or more polar lipids to a subject.

[0007] In another example the disclosure relates to use of one or more polar lipids in the manufacture of a composition or medicament for maintaining or increasing mobility and/or vitality in a subject.

[0008] In a further example the disclosure relates to one or more polar lipids for use in maintaining or increasing mobility and/or vitality in a subject.

[0009] Any of the examples or preferences described herein may relate to any of the examples herein alone or in combination with any one or more examples or preferences described herein, unless stated or indicated otherwise.

[0010] In one example the method may be a method of maintaining mobility. In another example the method may be a method of increasing mobility. In one example the one or more polar lipids may be for use in maintaining mobility. In another example the one or more polar lipids may be for use in increasing mobility.

[0011] In various examples maintaining or increasing mobility may comprise

a) treating or preventing sarcopenia or one or more sequelae of sarcopenia,

b) maintaining or increasing physical performance,

c) maintaining or reducing net bone loss and/or treating or preventing a condition associated with net bone loss,

d) maintaining or increasing body tone, or

e) any combination of any two or more of (a) to (d).

[0012] In one example the sarcopenia may be sarcopenia of aging. In one example the sarcopenia may be sarcopenia associated with the subject being sedentary. In one example the method may comprise treating or preventing sarcopenia or one or more sequelae of sarcopenia in an otherwise healthy subject.

[0013] In various examples maintaining or increasing physical performance may comprise

a) maintaining or increasing muscle power,

b) maintaining or increasing muscle strength,

c) maintaining or increasing muscle function,

d) maintaining or increasing balance,

e) maintaining or increasing flexibility,

f) maintaining or increasing aerobic fitness,

g) maintaining or increasing aerobic endurance,

h) maintaining or increasing sports performance,

i) any combination of any two or more of (a) to (h).

[0014] In various examples maintaining or reducing net bone loss may comprise

a) maintaining or increasing bone mineral content,

b) maintaining or increasing bone mineral density,

c) maintaining or increasing bone mass,

d) maintaining or reducing bone turnover,

e) maintaining or reducing bone resorption, or

f) any combination of any two or more of (a) to (e).

[0015] In various examples maintaining or increasing body tone may comprise

a) maintaining or increasing total body lean muscle mass,

b) maintaining or increasing trunk lean muscle mass,

c) maintaining or increasing muscle cross-sectional area,

d) maintaining or increasing muscle density,

e) maintaining or reducing total body fat mass,

f) maintaining or reducing trunk fat mass,

g) or any combination of any two or more of (a) to (5).

[0016] In various examples the muscle cross-sectional area may be femur or tibia muscle cross-sectional area, or a combination thereof. In various examples the muscle density may be femur or tibia muscle density, or a combination thereof.

[0017] In various examples maintaining or increasing muscle power may comprise

a) increasing static squat jump height by at least about 0.82 to about 4 cm, including at least about 0.82, 0.85, 0.9 or 1 cm,

b) increasing static squat jump power-to-weight ratio by at least about 4.5 to about 10%, including at least about 4.5, 5, 6 or 7%,

c) increasing countermovement jump height by at least about 0.65 to about 4 cm, including at least about 0.65, 0.7, 0.8, 0.9 or 1 cm,

d) increasing countermovement jump power-to-weight ratio by at least about 6.75 to about 10%, including at least about 6.75, 6.8, 6.9, 7, or 7.2%,

e) increasing fast ascent peak power by at least about 3.65 to about 8%, including at least about 3.65, 3.7, 3.8, 3.9 or 4%,

f) increasing regular pace ascent power-to-weight ratio by at least about 0.1 to about 5%, including at least about 0.1, 0.5, 0.75, 1 or 1.25%,

g) increasing concentric velocity by at least about 3.35 to about 8%, including at least about 3.35, 3.5, 3.75 or 4%,

h) increasing concentric power-to-weight ratio by at least about 3.25 to about 8%, including at least about 3.25, 3.3, 3.5, 3.75 or 4%, or

i) any combination of any two or more thereof of (a) to (h),

following administration of the composition daily for a period of at least three or four months and wherein the subject is undertaking exercise on at least two days per week compared with performance of the subject before daily administration of the composition commenced.

[0018] In various examples maintaining or increasing muscle strength may comprise

a) increasing maximal isometric grip strength in at least one hand by at least about 2.65 to about 8%, including at least about 2.65, 2.75, 3, 3.5, or 4%,

b) increasing maximal isometric dorsiflexion strength in at least one leg by at least about 3.85 to about 15%, including at least about 3.85, 4, 5, 6, 7 or 8%,

c) increasing one-repetition maximum leg press strength by at least about 22.1 to about 30%, including at least about 22.1, 22.25, 22.5, 23 or 23.5%, or

d) any combination of any two or more of (a) to (c),

following administration of the composition daily for a period of at least three or four months and wherein the subject is undertaking exercise on at least two days per week

compared with performance of the subject before daily administration of the composition commenced.

[0019] In various examples maintaining or increasing muscle function may comprise decreasing movement time by at least about 5 to about 30 milliseconds, including at least about 5, 10 or 12 milliseconds as determined by having the subject perform a choice stepping reaction time test and measuring the time from movement initiation to foot contact, following administration of the composition daily for a period of at least three or four months and wherein the subject is undertaking exercise on at least two days per week compared with performance of the subject before daily administration of the composition commenced.

[0020] In one example maintaining or increasing balance may comprise increasing the time for which the subject is able to perform a single-leg standing balance with eyes open or closed following administration of the composition daily for a period of at least three or four months and wherein the subject is undertaking exercise on at least two days per week compared with performance of the subject before daily administration of the composition commenced.

[0021] In one example maintaining or increasing flexibility may comprise increasing maximum stretch distance by at least about 1.3 to about 5 cm, including at least about 1.3, 1.5, 2 or 2.5 cm as determined by having the subject perform a sit-and-reach test following administration of the composition daily for a period of at least three or four months and wherein the subject is undertaking exercise on at least two days per week compared with performance of the subject before daily administration of the composition commenced.

[0022] In one example maintaining or increasing flexibility may comprise increasing maximum stretch distance by at least about 2.6 to about 7 cm, including at least about 2.6, 2.7, 2.8, 2.9, 3, or 3.1 cm as determined by having the subject perform a sit-and-reach test following administration of the composition daily for a period of at least two months and wherein the subject is undertaking exercise on at least two days per week compared with performance of the subject before daily administration of the composition commenced.

[0023] In one example maintaining or increasing aerobic fitness may comprise increasing mean step test number by at least about 4.25 to about 18%, including at least about 4.25, 4.5, 5, 7.5 or 10% as determined by having the subject perform a step test for 2 minutes following administration of the composition daily for a period of at least three or four months and wherein the subject is undertaking exercise on at least two days per week

compared with performance of the subject before daily administration of the composition commenced.

[0024] In various examples maintaining or reducing net bone loss may comprise

a) maintaining total body bone mineral content or increasing total body bone mineral content in the subject by at least 0.01 to about 3%, including at least about 0.01%, 0.05%, 0.1% or at least about 1.5%,

b) increasing serum parathyroid hormone (PTH) concentration by less than about 0.1 to about 10%, including less than about 8.5, 7, 5 or 3%, maintaining serum PTH concentration, or decreasing serum PTH concentration by at least about 0.01 to about 3%, including at least about 0.01, 0.1, 0.5, 1 or 1.5%,

c) decreasing serum 25-hydroyxvitamin D concentration by less than about 0.01 to about 11%, including less than about 11, 10, 5 or 3%, maintaining serum 25-hydroyxvitamin D concentration or increasing serum 25-hydroyxvitamin D concentration by at least about 0.01 to about 10%, including at least about 0.01, 0.1, 2, 5 or 7.5%,

d) decreasing plasma carboxy-terminal crosslinking telopeptide of type I collagen (β-CTx) concentration by at least about 0.25 to about 20%, including at least about 0.25, 0.5, 1, 5, 10, 12% or 15%,

e) increasing plasma procollagen type 1 N-terminal propeptide (P1NP) concentration by less than about 0.1 to about 8%, including less than about 8, 7, 5, 2 or 0.1%, maintaining plasma P1NP concentration or decreasing plasma P1NP concentration by at least about 0.1 to about 10%, including at least about 0.1, 1, 3, or 5%,

f) decreasing corrected CTX-II (corrCTx-II) concentration by at least about 2.75 to about 10%, including at least about 2.75, 3, 4 or 5%, or

g) any combination of any two or more of (a) to (f)

following administration of the composition daily for a period of at least three or four months and wherein the subject is undertaking exercise on at least two days per week compared with bone mineral density or concentration measured in the subject before daily administration of the composition commenced.

[0025] In various examples maintaining or increasing body tone may comprise

a) decreasing total body fat mass by at least about 0.05 to about 1.5 kg, including at least about 0.05, 0.1, 0.2, 0.3, 0.4 or 0.5 kg,

b) increasing total body lean muscle mass by at least about 0.75 to about 1.5 kg, including at least about 0.75, 0.8, 0.9 or 1 kg,

c) increasing trunk lean muscle mass by at least about 0.25 to about 1 kg, including at least about 0.25, 0.3, 0.4 or 0.5 kg,

d) increasing femur muscle cross-sectional area by at least about 3.25 to about 8%, including at least about 3.25, 3.5, 3.75, 4 or 4.5%,

e) increasing femur muscle density by at least about 0.4 to about 1%, including at least about 0.4, 0.5, 0.6 or 0.7%,

f) increasing tibia muscle cross-sectional area by at least about 0.7 to about 5%, including at least about 0.7, 0.75, 0.8, 1, 1.25 or 1.5%,

g) increasing tibia muscle density by at least about 0.2 to about 1%, including at least about 0.2, 0.25, 0.3 or 0.4%, or

h) any combination of any two or more of (a) and (g)

following administration of the composition daily for a period of at least three or four months and wherein the subject is undertaking exercise on at least two days per week compared with fat mass, lean muscle mass, muscle cross-sectional area and/or muscle density measured in the subject before administration of the composition commenced.

[0026] In one example the method may be a method of maintaining vitality. In another example the method may be a method of increasing vitality. In one example the one or more polar lipids may be for use in maintaining vitality. In another example the one or more polar lipids may be for use in increasing vitality.

[0027] In various examples maintaining or increasing vitality may comprise

a) decreasing sedentary time by at least about 7 to about 25 minutes per day, including at least about 7, 10, 15 or 20 minutes per day,

b) increasing light intensity physical activity time by at least about 3 to about 15 minutes per day, including at least about 3, 5, 7 or 10 minutes per day,

c) increasing moderate-vigorous physical activity time by at least about 1.25 to about 10 minutes per day, including at least about 1.25, 1.5, 2.5, 3 or 5 minutes per day,

d) increasing the score of the subject on the subjective vitality scale by at least about 2.6 to about 8, including at least about 2.6, 2.75, 3, or 3.25, or

e) any combination of any two or more of (a) to (d)

following administration of the composition daily for a period of at least three or four months and wherein the subject is undertaking exercise on at least two days per week compared with time and/or score for the subject before daily administration of the composition commenced.

[0028] In one example the subject may be a subject in need thereof.

[0029] In various examples the composition may be administered within about 1, 2, 3, 4, 5, 6, 8, 10, 12, 15, 16, 18, 20, 22 or 24 hours of the subject undertaking exercise. In various examples the composition may be administered before and/or after the subject undertakes exercise.

[0030] In various examples the subject may be aged at least about 18, 20, 21, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90 or 95 years, and any ranges may be selected from between any of these values, for example, from about 18 to about 95, 18 to about 90, 20 to about 95, 20 to about 90, 25 to about 95, 25 to about 80, 30 to about 95, 30 to about 90, about 30 to about 80, about 30 to about 75, about 30 to about 70, about 30 to about 65, 35 to about 95, about 35 to about 90, 40 to about 95, about 40 to about 90, about 40 to about 80, about 40 to about 75, about 40 to about 70, about 40 to about 65, 45 to about 95, about 45 to about 90, about 45 to about 80, about 45 to about 75, about 45 to about 70, or about 45 to about 65).

[0031] In one example the subject may be female.

[0032] In various examples the subject may be sedentary for at least about 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 14, 16, 18, 20, 22 or 24 hours per day, and any ranges may be selected from between any of these values, for example, from about 1 to about 24, about 3 to about 24, about 5 to about 24, about 6 to about 24, about 7 to about 24, about 8 to about 24 or about 9 to about 24 hours.

[0033] In various examples the subject may have a body mass index (BMI) of greater than about 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 35, 40, 45 or 50 kg/m^2 and various ranges may be selected from between any of these values, for

example, a BMI of from about 15 to about 50, about 16 to about 50, about 17 to about 50, about 20 to about 50, about 15 to about 40, about 16 to about 40 or about 17 to about 40.

[0034] In various examples the method may comprise administering the composition at least 1, 2, 3, or 4 times per day for a period of at least about 1, 2, 3, 4, 5 or 6 weeks, or 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 or 12 months, and any ranges may be selected from between any of these values, for example, from about 1 week to about 12 months, about 1 to about 12 months, about 2 to about 12 months, about 3 to about 12 months, about 4 to about 12 months or about 6 to about 12 months.

[0035] In various examples the subject may be undertaking exercise on at least about 1, 2, 3, 4 or 5 days per fortnight or about 1, 2, 3, 4, 5, 6 or 7 days per week, and any ranges may be selected from between any of these values, for example, from about 1 day per fortnight to about 7 days per week, about 3 days per fortnight to about 7 days per week, about 1 to about 7 days per week, about 2 to about 7 days per week or about 3 to about 7 days per week.

[0036] In various examples the exercise may be light intensity, moderate intensity or vigorous intensity physical activity, or any combination of any two or more thereof.

[0037] In various examples the duration of the exercise may be at least about 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 90, or 120 minutes, and any ranges may be selected from between any of these values, for example, from about 5 to about 120, about 10 to about 120, about 15 to about 120, about 20 to about 120, about 30 to about 120, about 5 to about 90, about 10 to about 90, about 15 to about 90, about 20 to about 90, about 30 to about 90, about 5 to about 60, about 10 to about 60, about 15 to about 60, about 20 to about 60, about 30 to about 60, or about 5 to about 30 minutes.

[0038] In various examples administration of the composition may maintain or increase mobility and/or vitality in the subject within about 1, 2, 3, or 4 weeks or 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, or 12 months of commencement of daily administration of the composition, and any ranges may be selected from between any of these values, for example, from about 1 week to about 12 months, about 1 to about 12, about 2 to about 12, about 3 to about 12, about 4 to about 12, about 6 to about 12, about 1 to about 9, about 2 to about 9, about 3 to about 9, about 4 to about 9, about 6 to about 9, about 1 to about 6, about 2 to about 6, about 3 to about 6, or about 4 to about 6.

[0039] In various examples, the one or more polar lipids may be administered in the form of a composition with a physiologically acceptable adjuvant or carrier.

[0040] In one example, the composition may be a nutritional composition.

[0041] In various examples, the composition may be a beverage, bar, gel, cultured milk, yoghurt, custard, ice cream, cheese, crisps, chocolate, multi-layered bites, a supplement, a tablet, a capsule, confectionery or milk powder.

[0042] In various examples the composition may be a beverage, bar, gel, shot, cultured milk, UHT milk, yoghurt, custard, ice cream, cheese, crisps, chocolate, multi-layered bites, a supplement, a tablet, a capsule, confectionery or milk powder.

[0043]

[0044] In various examples may be a beverage, a fruit juice, a sports drink or a milk drink.

[0045] In various examples, the composition may be a pharmaceutical composition or supplement and said adjuvant or carrier is a pharmaceutically acceptable adjuvant or carrier.

[0046] In various examples, the composition may be suitable for oral administration. In various examples, the composition may be suitable for parenteral administration.

[0047] In various examples, the composition may be formulated to provide or may be administered separately, simultaneously or sequentially with one or more of

(a) at least about 5 g protein per day,

(b) from about 0.1 to about 10 g lipid per day,

(c) at least about 0.75 g calcium per day,

(d) at least about 7.5 µg vitamin D per day, or

(e) any combination of any two more of (a) to (d).

[0048] In one example, the composition may be formulated to provide or may be administered separately, simultaneously or sequentially with one or more of

(a) at least about 5 g protein per day,

(b) from about 0.1 to about 10 g lipid per day,

(c) at least about 0.75 g calcium per day, and

(d) at least about 7.5 μg vitamin D per day.

[0049] In various examples, the composition may comprise on a dry basis

(a) at least about 5% by weight protein,

(b) from about 0.01 to about 20% by weight lipid,

(c) at least about 1% by weight calcium,

(d) at least about 10 μg vitamin D per 100 g of the composition, or

(e) any combination of any two or more of (a) to (d).

[0050] In various examples, the composition may comprise on a dry basis

(a) at least about 5% by weight protein,

(b) from about 0.01 to about 20% by weight lipid,

(c) at least about 1% by weight calcium, and

(d) at least about 10 μg vitamin D per 100 g of the composition.

[0051] In various examples the composition comprising the one or more polar lipids may be administered separately, simultaneously or sequentially with one or more additional compositions. In various examples the additional composition may be a nutritional composition, a beverage, bar, gel, shot, cultured milk, UHT milk, yoghurt, custard, ice cream, cheese, crisps, chocolate, multi-layered bites, a supplement, a tablet, a capsule, confectionery or milk powder. In various examples the additional agents may include protein, lipid, calcium, vitamin D, or any combination of any two or more thereof.

[0052] In various examples the composition comprising one or more polar lipids may be administered separately, simultaneously or sequentially with a composition formulated to provide

(a) at least about 5 g protein per day,

(b) from about 0.1 to about 10 g lipid per day,

(c) at least about 0.75 g calcium per day,

(d) at least about 7.5 μg vitamin D per day, or

(e) any combination of any two or more of (a) to (d).

[0053] In various examples the composition may be formulated to provide at least about 10, 25, 50, 75, 100, 120, 125, 140, 150, 160, 175, 180, 200, 220, 225, 240, 250, 260, 275, 280, 300, 320, 325, 340, 350, 360, 375, 380, 400, 425, 450, 500, 550, 600, 650, 700, 750, 850, 900, 950, 1000, 1200, 1400, 1500, 1600, 1750, 1800, 2000, 2250, 2500, 2750, 3000, 3500, 4000 or at least about 5000 mg of the one or more polar lipids per day, and various ranges may be selected from between these values, for example, from about 10 to about 5000, about 100 to about 5000, about 200 to about 5000, about 200 to about 2500, about 200 to about 2000 about 200 to about 1500, about 200 to about 1000, about 300 to about 5000 mg about 300 to about 3000, about 300 to about 2500, about 400 to about 5000, about 400 to about 4000, about 400 to about 3000, about 400 to about 2500, about 400 to about 2000 or about 400 to about 1500 mg of the one or more polar lipids per day.

[0054] In various examples, the one or more polar lipids may comprise polar lipids derived from non-human mammalian milk. In various examples, the one or more polar lipids may consist of or consist essentially of polar lipids derived from non-human mammalian milk. In various examples, the non-human mammalian milk may be sheep, goat, pig, mouse, water buffalo, camel, yak, horse, donkey, llama, deer or bovine milk. Preferred is bovine milk.

[0055] In various examples the composition may comprise one or more milk fat fractions comprising the one or more polar lipids, the milk fat fraction selected from the group comprising cream, whey cream, high fat whey, whey protein concentrate (WPC), high fat WPC, milk protein concentrate (MPC), high fat MPC, butter, ghee, by-products of anhydrous milk fat (AMF) production, buttermilk, butter serum, beta serum, sphingolipid fractions, milk fat globule membrane fractions, milk fat globule membrane lipid fractions, phospholipid fractions, and complex lipid and combinations thereof, and hydrolysates thereof.

[0056] In various examples the one or more polar lipids may comprise one or more polar lipids derived from non-human mammalian milk and one or more polar lipids derived from one or more plants, one or more marine oils, one or more fats and lipids produced by fermentation with microorganisms, egg, or any combination thereof. In one example the one or more plant sources of polar lipids may comprise soy lecithin. In various examples the one or more polar lipids may comprise egg yolk or egg lecithin or any combination thereof.

[0057] In various examples, the one or more polar lipids may comprise one or more phospholipids, one or more gangliosides, one or more ceramides, one or more cerebrosides, one or more sphingolipids, milk fat globule membrane (MFGM) material, or

any combination of any two or more thereof. In various examples, the method may comprise administration of milk fat globule membrane material comprising the one of more polar lipids.

[0058] In various examples, the one or more gangliosides may comprise one or more glycosphingolipids, GD1, GD2, GD3, GM1, GM2, GM3, one or more monosialogangliosides, one or more disialogangliosides, or one or more polysialogangliosides, or any combination of any two or more thereof. In various examples, the one or more gangliosides may comprise GD3 or GM3, or a combination thereof.

[0059] In various examples, the one or more phospholipids may comprise one or more glycerophospholipids, one or more phosphatidylcholines, one or more phosphatidylinositols, one or more phosphatidylserines, one or more phosphatidylethanolamines, one or more sphingomyelins, one or more dihydrosphingomyelins, one or more lysophospholipids, one or more phosphatidylglycerols, or any combination of any two or more thereof.

[0060] In various examples, at least about 60, 70, 80, 85, 90, 95, 99 or 100% of the fatty acids in the one or more phospholipids may be C14:0 or longer, each fatty acid optionally comprising one or more, two or more, three or more, or four or more double bonds in the main carbon chain of the fatty acid, and useful ranges may be selected between any of these values (for example, about 60 to about 100%). In various examples, the one or more phospholipids may be obtained solely from milk fat, preferably bovine milk fat. In various examples, the composition may comprise one or more phosphatidylcholines and one or more non-phosphatidylcholine polar lipids.

[0061] In various examples, the one or more lysophospholipids may comprise one or more lysophosphatidylcholines, one or more lysophosphatidylserines, one or more lysophosphatidylethanolamines, one or more lysophosphatidylinositols, or any combination of any two or more thereof. In various examples, the one or more sphingomyelins may comprise sphingomyelin, dihydrosphingomyelin, or a combination thereof. In various examples, the one or more glycerophospholipids may comprise phosphatidylglycerol.

[0062] In various examples, the composition may comprise phosphatidic acid.

[0063] In various examples, the one or more polar lipids may be obtained solely from bovine milk fat.

[0064] In various examples, the composition may comprise at least about 0.01, 0.05, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8,

1.9, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9, 9.5, 10, 10.5, 11, 11.5, 12, 12.5, 13, 13.5, 14, 14.5, 15, 15.5, 16, 16.5, 17, 17.5, 18, 18.5, 19, 19.5, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, or 70% by weight polar lipid on a dry basis, and useful ranges may be selected between any of these values (for example, about 0.01 to about 2, about 0.01 to about 5, about 0.01 to about 10, about 0.01 to about 15, about 0.01 to about 20, about 1 to about 5, about 1 to about 10, about 1 to about 15, about 1 to about 20, about 0.01 to about 70, about 1 to about 70%).

[0065] In various examples the composition may comprise at least about 0.01, 0.05, 0.075, 0.1, 0.125, 0.15, 0.175, 0.2, 0.225, 0.25, 0.275, 0.3, 0.325, 0.35 0.375, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 35, 40, 50, 55, 60, 65 or 70 g of the one or more polar lipids per 100 g of the composition on a dry basis, and useful ranges may be selected between any of these values (for example, about 0.01 to about 70, about 0.01 to about 50, about 0.01 to about 20, about 0.01 to about 15, about 0.01 to about 10, about 0.01 to about 5, 0.01 to about 1, about 0.01 to about 0.8, about 0.01 to about 0.5, about 0.1 to about 1, about 0.1 to about 0.8, or about 0.1 to about 0.5).

[0066] In various examples, the composition may comprise at least about 0.01, 0.05, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9, 9.5, 10, 10.5, 11, 11.5, 12, 12.5, 13, 13.5, 14, 14.5, 15, 15.5, 16, 16.5, 17, 17.5, 18, 18.5, 19, 19.5, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, or 70% by weight phospholipids on a dry basis, and useful ranges may be selected between any of these values (for example, about 0.01 to about 2, about 0.01 to about 5, about 0.01 to about 10, about 0.01 to about 15, about 0.01 to about 20, about 1 to about 5, about 1 to about 10, about 1 to about 15, about 1 to about 20, about 0.01 to about 70, or about 1 to about 70%).

[0067] In various examples, the composition may comprise at least about 0.01, 0.05, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9, 9.5, 10, 10.5, 11, 11.5, 12, 12.5, 13, 13.5, 14, 14.5, 15, 15.5, 16, 16.5, 17, 17.5, 18, 18.5, 19, 19.5, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, or 70% by weight milk fat globule membrane material on a dry basis, and useful ranges may be selected between any of these values (for example, about 0.01 to about 2, about 0.01 to about 5, about 0.01 to about 10, about 0.01 to about 15, about 0.01 to about 20, about 1 to about 5, about 1 to about 10, about 1 to about 15, about 1 to about 20, about 0.01 to about 70, or about 1 to about 70%).

[0068] In various examples, the composition may comprise at least about 0.01, 0.05, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9, 9.5, 10, 10.5, 11, 11.5, 12, 12.5,

13, 13.5, 14, 14.5, 15, 15.5, 16, 16.5, 17, 17.5, 18, 18.5, 19, 19.5, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, or 70% by weight on a dry basis of one or more sources of polar lipids selected from the group comprising milk fat globule membrane material, high fat whey, beta serum, buttermilk, butter serum and fractions thereof and useful ranges may be selected between any of these values (for example, about 0.01 to about 2, about 0.01 to about 5, about 0.01 to about 10, about 0.01 to about 15, about 0.01 to about 20, about 1 to about 5, about 1 to about 10, about 1 to about 15, about 1 to about 20, about 0.01 to about 70, or about 1 to about 70%).

[0069] In various examples, the composition may comprise

a) about 0.01 to about 0.5%, preferably about 0.02 to about 0.2% by weight of one or more phosphatidylcholines,
b) about 0.005 to about 0.07%, preferably about 0.008 to about 0.05% by weight of one or more phosphatidylinositols,
c) about 0.005 to about 0.07%, preferably about 0.008 to about 0.05% by weight of one or more phosphatidylserines,
d) about 0.01 to about 0.5%, preferably about 0.02 to about 0.2% by weight of one or more phosphatidylethanolamines,
e) about 0.01 to about 0.1%, preferably about 0.02 to about 0.08% by weight sphingomyelin,
f) 0.001 to about 0.05%, preferably 0.001 to about 0.02% by weight dihydrosphingomyelin,
g) any combination of any two or more of a) to f).

[0070] In various examples, the one or more polar lipids, or one or more phospholipids may comprise from about 0.01% to about 5% by weight of the total lipid in the composition.

[0071] In various examples, the total phospholipid in the composition may comprise

a) about 20 to about 40%, preferably about 25 to about 30% by weight of one or more phosphatidylcholines,
b) about 5 to about 20%, preferably about 7 to about 12% by weight of one or more phosphatidylinositols,
c) about 5 to about 20%, preferably about 7 to about 12% by weight of one or more phosphatidylserines,
d) about 15 to about 40%, preferably about 20 to about 30% by weight of one or more phosphatidylethanolamines,

e) about 10 to about 30%, preferably about 15 to about 20% by weight sphingomyelin,
f) about 0.5 to about 15%, preferably about 1 to about 5% by weight dihydrosphingomyelin, or
g) any combination of any two or more of a) to f).

[0072] In various examples, the composition may comprise from about 2 to about 10 mg gangliosides per serve. In various examples, the composition may be formulated to provide from about 2 to about 20 mg gangliosides per day.

[0073] In various examples, the composition may comprise from about 0.3 to about 6 mg gangliosides per gram of the composition.

[0074] In various examples, the composition may comprise from about 5 to about 35 mg per 100 g, preferably about 10 to about 20 mg per 100 g gangliosides. In various examples, the gangliosides may comprise 50-100% by weight GD3 and 1-60% GM3.

[0075] In various examples, the composition may comprise from about 0.1 to about 5 g phospholipids per serve.

[0076] In various examples the composition may be formulated to provide at least about 10, 25, 50, 75, 100, 120, 125, 140, 150, 160, 175, 180, 200, 220, 225, 240, 250, 260, 275, 280, 300, 320, 325, 340, 350, 360, 375, 380, 400, 425, 450, 500, 550, 600, 650, 700, 750, 850, 900, 950, 1000, 1200, 1400, 1500, 1600, 1750, 1800, 2000, 2250, 2500, 2750, 3000, 3500, 4000 or at least about 5000 mg of one or more phospholipids per day, and various ranges may be selected from between these values, for example, from about 10 to about 5000, about 100 to about 5000, about 200 to about 5000, about 200 to about 2500, about 200 to about 2000 about 200 to about 1500, about 200 to about 1000, about 300 to about 5000 mg about 300 to about 3000, about 300 to about 2500, about 400 to about 5000, about 400 to about 4000, about 400 to about 3000, about 400 to about 2500, about 400 to about 2000 or about 400 to about 1500 mg of the one or more polar lipids per day.

[0077] In various examples the composition may be formulated to provide at least about 0.01, 0.1, 0.5, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95 or 99 g protein per day, and useful ranges may be selected between any of these values (for example, about 0.01 to about 20, about 0.01 to about 25, about 0.01 to about 30, about 0.01 to about 40, about 0.01 to about 50, about 0.01 to about 60, about 0.01 to about 70, about 0.01 to about 80, or about 0.01 to about 99, about 1 to about 20, about 1 to about 25, about 1 to about 30,

about 1 to about 40, about 1 to about 50, about 1 to about 60, about 1 to about 70, about 1 to about 80, or about 1 to about 99, about 5 to about 20, about 5 to about 25, about 5 to about 30, about 5 to about 40, about 5 to about 50, about 5 to about 60, about 5 to about 70, about 5 to about 80, or about 5 to about 99 g).

[0078] In various examples the composition may comprise at least about 0.01, 0.1, 0.5, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85, 90, 95 or 99% by weight protein on a dry basis and useful ranges may be selected between any of these values (for example, about 0.01 to about 10, about 0.01 to about 20, about 0.01 to about 30, about 0.01 to about 40, about 0.01 to about 50, about 0.01 to about 60, about 0.01 to about 70, about 0.01 to about 80, or about 0.01 to about 99, about 1 to about 20, about 1 to about 25, about 1 to about 30, about 1 to about 40, about 1 to about 50, about 1 to about 60, about 1 to about 70, about 1 to about 80, or about 1 to about 99, about 2 to about 20, about 2 to about 25, about 2 to about 30, about 2 to about 40, about 2 to about 50, about 2 to about 60, about 2 to about 70, about 2 to about 80, or about 2 to about 99%).

[0079] In one example the protein may be from an animal, plant or insect source or any combination of any two or more thereof. In one example the protein may comprise casein and an additional protein source, such as animal protein, plant protein, insect protein, protein produced by fermentation with microorganisms, or any combination thereof. Suitable sources of animal protein include meat and whey protein. Suitable sources of plant protein include cereal, pulse, legume (such as pea, bean, lentil and soy protein), fruit, nut, and seed protein, or any combination of any two or more thereof.

[0080] In various examples of a composition containing protein as described above, the protein may be at least about 0.01, 0.1, 0.5, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 79, 81, 85, 90, 95 or 99% by weight casein and useful ranges may be selected between any of these values (for example, about 0.01 to about 10, about 0.01 to about 20, about 0.01 to about 30, about 0.01 to about 40, about 0.01 to about 50, about 0.01 to about 60, about 0.01 to about 70, about 0.01 to about 80, or about 0.01 to about 99% casein).

[0081] In various examples of a composition containing protein as described above, the protein may be at least about 0.01, 0.1, 0.5, 5, 10, 15, 20, 25 or 30% by weight whey protein and useful ranges may be selected between any of these values (for example, about 0.01 to about 10, about 0.01 to about 20, about 0.01 to about 30% whey protein).

[0082] In various examples of a composition containing protein as described above, the protein may be at least about 0.01, 0.1, 0.5, 5, 10, 15, 20, 25 or 30% by weight plant protein and useful ranges may be selected between any of these values (for example,

about 0.01 to about 10, about 0.01 to about 20, about 0.01 to about 30% plant protein). Suitable sources of plant protein include cereal, pulse, legume (such as pea, bean, lentil and soy protein), fruit, nut, and seed protein, or any combination of any two or more thereof.

[0083] In various examples the composition may be formulated to or may be administered separately, simultaneously or sequentially with at least about 0.01, 0.1, 0.5, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 35, 40, 45 or 50 g lipid per day and useful ranges may be selected between any of these values (for example, about 0.01 to about 5, about 0.01 to about 10, about 0.01 to about 15, about 0.01 to about 20, about 0.01 to about 30, about 0.01 to about 40, or about 0.01 to about 50, about 0.1 to about 5, about 0.1 to about 10, about 0.1 to about 15, about 0.1 to about 20, about 0.1 to about 30, about 0.1 to about 40, or about 0.1 to about 50 g).

[0084] In various examples the composition may comprise at least about 0.01, 0.1, 0.5, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 35, 40, 45 or 50% by weight lipid on a dry basis and useful ranges may be selected between any of these values (for example, about 0.01 to about 5, about 0.01 to about 10, about 0.01 to about 15, about 0.01 to about 20, about 0.01 to about 30, about 0.01 to about 40, or about 0.01 to about 50%).

[0085] In one example the lipid may be from an animal or plant source.

[0086] In various examples the composition may comprise at least about 0.01, 0.1, 0.5, 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 60 or 70% by weight carbohydrate on a dry basis and useful ranges may be selected between any of these values (for example, about 0.01 to about 10, about 0.01 to about 20, about 0.01 to about 30, about 0.01 to about 40, about 0.01 to about 50, about 0.01 to about 60, or about 0.01 to about 70%).

[0087] In various examples the carbohydrate may be selected from monosaccharides, disaccharides, oligosaccharides, or polysaccharides, and any combination of any two or more thereof.

[0088] In various examples the composition may be formulated to provide or may be administered separately, simultaneously or sequentially with at least about 0.01, 0.05, 0.1, 0.15, 0.2, 0.25, 0.3, 0.35, 0.4, 0.45, 0.5, 0.55, 0.6, 0.65, 0.7, 0.75, 0.8, 0.9, 1, 1.25, 1.5, 2, 2.5, 3, 4 or 5 g calcium per day and useful ranges may be selected between any of these values (for example, about 0.01 to about 5, about 0.01 to about 2, about 0.01 to about 1, about 0.1 to about 5, about 0.1 to about 2, about 0.1 to about 1, about 0.5 to about 5, about 0.5 to about 2, about 0.5 to about 1 g per day).

[0089] In various examples the composition may comprise at least about 0.01, 0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1, 2, 2.5, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25 or

30% by weight calcium on a dry basis and useful ranges may be selected between any of these values (for example, about 0.01 to about 3%, about 0.01 to about 4%, about 0.01 to about 5%, about 0.01 to about 10%, about 0.1 to about 3%, about 0.1 to about 4%, about 0.1 to about 5%, about 0.1 to about 10%, about 0.5 to about 3%, about 0.5 to about 4%, about 0.5 to about 5%, about 0.5 to about 10%, about 1 to about 3%, about 1 to about 4%, about 1 to about 5%, or about 1 to about 10%).

[0090] In various examples the composition may be formulated to or may be administered separately, simultaneously or sequentially with at least about 0.1, 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9, 9.5, 10, 12, 12.5, 14, 15, 16, 18, 20, 25, 30, 40 or 50 µg vitamin D per day and useful ranges may be selected between any of these values (for example, about 0.1 to about 50, about 0.1 to about 30, about 0.1 to about 20, about 1 to about 50, about 1 to about 30, about 1 to about 20, about 5 to about 50, about 5 to about 30, about 5 to about 20 µg per day).

[0091] In various examples the composition may comprise at least about 0.1, 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 5.5, 6, 6.5, 7, 7.5, 8, 8.5, 9, 9.5, 10, 12, 12.5, 14, 15, 16, 18, 20, 25, 30, 40, 50, 60, 70, 80, 90 or 100 µg vitamin D per 100 g of the composition and useful ranges may be selected between any of these values (for example, about 0.1 to about 100, about 0.1 to about 50, about 0.1 to about 20, about 1 to about 50, about 1 to about 30, about 1 to about 20, about 5 to about 50, about 5 to about 30, about 5 to about 20 µg per 100 g of the composition).

[0092] In one example the composition may have an energy content from about 1 kcal (4.184 kJ) per 100 ml to about 300 kcal (1255 kJ) per 100 ml.

[0093] In various examples the composition may comprise one or more strains of probiotic microorganisms.

[0094] In various examples the composition may comprise one or more strains of probiotic bacteria. In various examples the probiotic bacteria may comprise one or more *Bacillus* strains, *Lactobacillus* strains, *Bifidobacterium* strains, *Lactococcus* strains, or a combination of any two or more thereof. In various examples the probiotic bacteria may comprise a *Lactobacillus rhamnosus* strain, a *Bifidobacterium lactis* strain, or a combination of both *Lactobacillus rhamnosus* and *Bifidobacterium lactis.* In one example the *Lactobacillus rhamnosus* strain is *Lactobacillus* HN001 (DR20™). In one example the *Bifidobacterium lactis* strain is *Bifidobacterium lactis* HN019 (DR10™).

[0095] In various examples the probiotic microorganisms are strains of probiotic yeast. In one example the probiotic yeast may comprise one or more strains of *Saccharomyces.*

[0096] In one example the composition or formulation may comprise at least about 0.01, 0.1, 0.5, 1, 2, 3, 4, 5, 6, 7, 8, 9 or 10% by weight minerals or vitamins and useful ranges may be selected between any of these values (for example, about 0.01 to about 2, about 0.01 to about 4, about 0.01 to about 6, about 0.01 to about 8, or about 0.01 to about 10%).

[0097] In one example the composition or formulation may comprise from about 0.01% to about 95% protein, from about 0.01% to about 50% lipid, from about 0.01% to about 70% carbohydrate, and from about 0.01% to about 10% minerals and vitamins.

[0098] The term "comprising" as used in this specification means "consisting at least in part of". When interpreting statements in this specification which include that term, the features, prefaced by that term in each statement, all need to be present but other features can also be present. Related terms such as "comprise" and "comprised" are to be interpreted in the same manner.

[0099] This disclosure may also be said broadly to consist in the parts, elements and features referred to or indicated in the specification of the application, individually or collectively, and any or all combinations of any two or more of said parts, elements or features, and where specific integers are mentioned herein which have known equivalents in the art to which this disclosure relates, such known equivalents are deemed to be incorporated herein as if individually set forth.

[00100] It is intended that reference to a range of numbers disclosed herein (for example, 1 to 10) also incorporates reference to all rational numbers within that range (for example, 1, 1.1, 2, 3, 3.9, 4, 5, 6, 6.5, 7, 8, 9, and 10) and also any range of rational numbers within that range (for example, 2 to 8, 1.5 to 5.5, and 3.1 to 4.7) and, therefore, all sub-ranges of all ranges expressly disclosed herein are hereby expressly disclosed. These are only examples of what is specifically intended and all possible combinations of numerical values between the lowest value and the highest value enumerated are to be considered to be expressly stated in this application in a similar manner.

[00101] In this specification, where reference has been made to external sources of information, including patent specifications and other documents, this is generally for the purpose of providing a context for discussing the features of the present disclosure. Unless stated otherwise, reference to such sources of information is not to be construed, in any jurisdiction, as an admission that such sources of information are prior art or form part of the common general knowledge in the art.

[00102] Other examples of the disclosure may become apparent from the following description which is given by way of example only and with reference to the accompanying drawings.

DETAILED DESCRIPTION OF THE INVENTION

[00103] The present invention recognises the beneficial effects of administration of compositions comprising polar lipids, preferably polar lipids derived from milk, on mobility and vitality, particularly in middle-aged women.

[00104] Accordingly, in a first aspect the invention provides a method of maintaining or increasing mobility and/or vitality in a subject, the method comprising administration of a composition comprising one or more polar lipids to a subject.

[00105] While various routes and methods of administration are contemplated, oral administration of polar lipids, such as in a composition suitable for oral administration, is currently preferred. It will of course be appreciated that other routes and methods of administration may be utilised or preferred in certain circumstances.

[00106] The term "oral administration" includes oral, buccal, enteral and intra-gastric administration.

[00107] The term "parenteral administration" includes but is not limited to topical (including administration to any dermal, epidermal or mucosal surface), subcutaneous, intravenous, intraperitoneal, and intramuscular administration.

[00108] Unless indicated otherwise, where an amount is described in terms of percent (%) by weight or w/w, it should be understood that the amount represents the % by weight or w/w on a dry basis.

[00109] A "subject" refers to a vertebrate that is a mammal, for example, a human.

[00110] As used herein the term "and/or" means "and" or "or", or both.

[00111] As used herein "(s)" following a noun means the plural and/or singular forms of the noun.

[00112] The term "treat" and its derivatives should be interpreted in their broadest possible context. The term should not be taken to imply that a subject is treated until total recovery. Accordingly, "treat" broadly includes amelioration and/or prevention of the onset of the symptoms or severity of a particular condition.

CLAIMS

1. Use of milk fat globule membrane material comprising one or more polar lipids in the manufacture of a composition or medicament for maintaining or increasing mobility and/or vitality in a subject, wherein

(a) maintaining or increasing mobility comprises:

(i) increasing muscle power comprising increasing countermovement jump height by at least 0.65 cm and/or increasing countermovement jump power-to-weight ratio by at least 6.75% following administration of the composition or medicament daily for a period of at least three or four months and wherein the subject is undertaking exercise on at least two days per week compared with performance of the subject before daily administration of the composition or medicament commenced, and/or

(ii) maintaining or increasing trunk lean muscle mass and/or maintaining or reducing trunk fat mass; and

(b) maintaining or increasing vitality comprises:

(i) increasing daily activity and decreasing sedentary time in a subject; or

(ii) decreasing sedentary time by at least 7 minutes per day and/or increasing light intensity physical activity time by at least 3 minutes per day following administration of the composition or medicament daily for a period of at least three or four months and wherein the subject is undertaking exercise on at least two days per week compared with sedentary and/or light intensity physical activity time per day for the subject before daily administration of the composition or medicament commenced.

2. The use of claim 1, wherein

(a) countermovement jump height is increased by at least 0.7, 0.8, 0.9 or 1 cm or from 0.65 to 4 cm, and/or

(b) countermovement jump power-to-weight ratio is increased by at least 6.8, 6.9, 7, or 7.2%

following administration of the composition or medicament daily for a period of at least three or four months and wherein the subject is undertaking exercise on at

least two days per week compared with performance of the subject before daily administration of the composition or medicament commenced.

3. The use of claim 1, wherein trunk lean muscle mass is increased by at least 0.25, 0.3, 0.4 or 0.5 kg or from 0.25 to 1 kg, following administration of the composition or medicament daily for a period of at least three or four months and wherein the subject is undertaking exercise on at least two days per week compared with trunk lean muscle mass in the subject before administration of the composition or medicament commenced.

4. The use of claim 1, wherein

(a) sedentary time is decreased by at least 10, 15 or 20 minutes per day, and/or

(b) light intensity physical activity time is increased by at least 5, 7 or 10 minutes per day

following administration of the composition or medicament daily for a period of at least three or four months and wherein the subject is undertaking exercise on at least two days per week compared with sedentary and/or light intensity physical activity time per day for the subject before daily administration of the composition or medicament commenced.

5. The use of claim 1 wherein maintaining or increasing vitality further comprises

(a) increasing moderate-vigorous physical activity time by at least 1.25, 1.5, 2.5, 3 or 5 minutes per day, and/or

(b) increasing the score of the subject on the subjective vitality scale by at least 2.6, 2.75, 3, or 3.25,

following administration of the composition or medicament daily for a period of at least three or four months and wherein the subject is undertaking exercise on at least two days per week compared with moderate-vigorous physical activity time per day and/or score for the subject before daily administration of the composition or medicament commenced.

6. The use of any one of claims 1 to 5, wherein the subject is aged from 45 to 75 years, preferably from 45 to 70 years, most preferably from 45 to 65 years.

7. The use of any one of claims 1 to 6, wherein the composition or medicament is formulated to provide at least 200 mg of the one or more polar lipids per day.

8. The use of any one of claims 1 to 7, wherein the composition or medicament is

(a) a nutritional composition;

(b) a beverage, preferably a fruit juice, a sports drink or a milk drink, a bar, a gel, a shot, cultured milk, UHT milk, yoghurt, custard, ice cream, cheese, crisps, chocolate, multi-layered bites, a supplement, a tablet, a capsule, confectionery or milk powder; or

(c) a pharmaceutical composition comprising a pharmaceutically acceptable adjuvant or carrier.

9. The use of any one of claims 1 to 8, wherein the composition or medicament is formulated to provide or is to be administered separately, simultaneously or sequentially with one or more of

(a) at least 5 g protein per day,

(b) from 0.1 to 10 g lipid per day,

(c) at least 0.75 g calcium per day,

(d) at least 7.5 µg vitamin D per day,

(e) any combination of any two or more of (a) to (d), or

(f) the composition or medicament is formulated to provide

(i) at least 5 g protein per day,

(ii) from 0.1 to 10 g lipid per day,

(iii) at least 0.75 g calcium per day, and

(iv) at least 7.5 µg vitamin D per day.

10. The use of any one of claims 1 to 9, wherein the composition or medicament comprises at least 0.3 g of the one or more polar lipids per 100 g of the composition or medicament on a dry basis.

11. The use of any one of claims 1 to 10, wherein the composition or medicament comprises on a dry basis

(a) at least 5% by weight protein,

(b) from 0.01 to 20% by weight lipid,

(c) at least 1% by weight calcium,

(d) at least 10 µg vitamin D per 100 g of the composition or medicament,

(e) any combination of any two or more of (a) to (d), or

(f) the composition or medicament comprises on a dry basis

(i) at least 5% by weight protein,

(ii) from 0.01 to 20% by weight lipid,

(iii) at least 1% by weight calcium, and

(iv) at least 10 µg vitamin D per 100 g of the composition or medicament.

12. The use of any one of claims 1 to 11, wherein the one or more polar lipids comprise one or more phospholipids, one or more gangliosides, one or more ceramides, one or more cerebrosides, one or more sphingolipids or any combination of any two or more thereof.

13. The use of claim 12, wherein

(a) the one or more gangliosides comprises GD3, GM3 or a combination thereof;

(b) the one or more phospholipids comprises one or more phosphatidylcholines, one or more phosphatidylinositols, one or more phosphatidylserines, one or more lysophospholipids, one or more phosphatidylethanolamines, one or more sphingomyelins, one or more dihydrosphingomyelins, one or more glycerophospholipids, phosphatidylglycerol, or any combination of any two or more thereof;

(c) the one or more lysophospholipids comprises lysophosphatidylcholine, lysophosphatidylserine, lysophosphatidylethanolamine or any combination of any two or more thereof;

(d) the one or more sphingomyelins comprises sphingomyelin, dihydrosphingomyelin or any combination thereof; and/or

(e) the one or more glycerophospholipids comprises phosphatidylglycerol.

14. The use of any one of claims 1 to 13, wherein the composition or medicament comprises one or more strains of probiotic microorganisms.

15. The use of any one of claims 1 to 14, wherein the composition or medicament is to be administered

(a) within 16 hours of the subject undertaking exercise; and/or

(b) at least 1 or 2 times per day for a period of at least three months.

16. The use of any one of claims 1 to 15, wherein

(a) the subject is aged 45 to 65 years;

(b) the subject is female;

(c) the subject is sedentary for at least 6 hours per day; and/or

(d) the subject is undertaking exercise on at least two days per week.

17. The use of any one of claims 1 to 16, wherein the composition or medicament maintains or increases mobility and/or vitality in a subject after less than six, four or three months of commencement of administration of the composition or medicament.