

TITLE

NUTRITIONAL COMPOSITIONS COMPRISING FRUIT FLAKES INCLUDING DOCOSAHEXAENOIC ACID

BACKGROUND

[0001] The present disclosure generally relates to health and nutrition. More specifically, the present disclosure relates to nutritional compositions having fruit flakes including docosahexaenoic acid and methods of making and using the nutritional compositions.

[0002] There are many types of nutritional compositions currently on the market. Nutritional compositions can be targeted toward certain consumer types, for example, young, elderly, athletic, etc., based on the specific ingredients of the nutritional composition. Nutritional compositions containing dehydrated fruit flakes are known in the market. However, there remains a need for fruit flakes that contain additional micronutrients and macronutrients.

SUMMARY

[0003] Nutritional compositions having fruit flakes and methods of making and using the nutritional compositions are provided. In a general embodiment, the present disclosure provides a nutritional composition having fruit flakes including docosahexaenoic acid. The docosahexaenoic acid can be incorporated directly into the fruit flakes. The docosahexaenoic acid can be derived from fish oil and preferably encapsulated. The fruit flakes can be made from any suitable fruit including apple, mango, peach, etc.

[0004] In an embodiment, the nutritional composition is free from preservatives. Even without preservatives, the fruit flakes can be stable (e.g., does not substantially spoil or oxidize) for 12 months or more.

[0005] The nutritional composition can be in a formulation designed for any infant. The active ingredients in the nutritional composition can also be provided as a modular product. A modular product can be defined as a method of delivering one or more specific nutrients as a supplement and not intended to be used for sole source

nutrition. In addition, the nutritional compositions can be shelf stable and exhibit good shelf life at ambient or even above ambient temperatures that may be encountered during distribution.

[0006] In an embodiment, the nutritional composition further includes one or more prebiotics. The prebiotic can be fructooligosaccharides, inulin, lactulose, galactooligosaccharides, acacia gum, soyoligosaccharides, xylooligosaccharides, isomaltooligosaccharides, gentiooligosaccharides, lactosucrose, glucooligosaccharides, pecticoligosaccharides, resistant starches, sugar alcohols or a combination thereof.

[0007] In an embodiment, the nutritional composition further includes one or more probiotics. The probiotic can be Saccharomyces, Debaromyces, Candida, Pichia, Torulopsis, Aspergillus, Rhizopus, Mucor, Penicillium, Torulopsis, Bifidobacterium, Bacteroides, Clostridium, Fusobacterium, Melissococcus, Propionibacterium, Streptococcus, Enterococcus, Lactococcus, Staphylococcus, Peptostreptococcus, Bacillus, Pediococcus, Micrococcus, Leuconostoc, Weissella, Aerococcus, Oenococcus, Lactobacillus or a combination thereof.

[0008] In another embodiment, the nutritional composition further includes one or more amino acids. The amino acid can be Isoleucine, Alanine, Leucine, Asparagine, Lysine, Aspartate, Methionine, Cysteine, Phenylalanine, Glutamate, Threonine, Glutamine, Tryptophan, Glycine, Valine, Proline, Serine, Tyrosine, Arginine, Histidine or a combination thereof.

[0009] In an embodiment, the nutritional composition further includes one or more symbiotics, phytonutrients, antioxidants, and/or partially hydrolyzed guar gum.

[0010] In an embodiment, the nutritional composition is in an administerable form such as pharmaceutical formulations, nutritional formulations, dietary supplements, functional foods, beverage products or a combination thereof.

[0011] In another embodiment, the present disclosure provides a fruit flake including docosahexaenoic acid. The fruit flake can be apple flakes, mango flakes, peach flakes or a combination thereof. The fruit flake can be free from preservatives.

[0012] The fruit flakes can be 100% fruit with docosahexaenoic acid and provided in a convenient package. The fruit flakes can be poured into a bowl and water can be added to produce a fruit puree. The fruit puree can have the proper consistency and flavor for infants and contribute to the infant's brain and eye

development. Moreover, addition of water to create a fruit puree gives a caregiver a sense of involvement in making food for the child.

[0013] In an alternative embodiment, the present disclosure provides a method of making a nutritional composition. The method comprises incorporating docosahexaenoic acid into a fruit flake. The incorporating can be done using any suitable process.

[0014] In yet another embodiment, the present disclosure provides a method of making fruit flakes. The method comprises pureeing a fruit to form a fruit puree, adding docosahexaenoic acid to the fruit puree, drying the fruit puree, and flaking (e.g., cutting, chopping, grinding, etc.) the dried fruit puree into fruit flakes.

[0015] In an embodiment, the method further comprises sifting the fruit flakes. The method can further comprise packing the fruit flakes into any suitable container. The method can be performed under aseptic conditions.

[0016] In another embodiment, the present disclosure provides a method of making an infant food. The method comprises providing fruit flakes including docosahexaenoic acid and adding a liquid to the fruit flakes to form a fruit puree.

[0017] In an alternative embodiment, the present disclosure provides a method of providing nutrition to an infant. The method comprises providing fruit flakes including docosahexaenoic acid, adding a liquid to the fruit flakes to form a fruit puree, and administering the fruit puree to the infant.

[0018] An advantage of the present disclosure is to provide an improved nutritional composition including docosahexaenoic acid.

[0019] Another advantage of the present disclosure is to provide a method of making an improved nutritional composition.

[0020] Yet another advantage of the present disclosure is to provide a fruit flake that includes docosahexaenoic acid.

[0021] Still another advantage of the present disclosure is to provide an improved method of providing nutrition to an infant.

[0022] Additional features and advantages are described herein, and will be apparent from the following Detailed Description and the figures.

BRIEF DESCRIPTION OF THE FIGURES

[0023] FIG. 1 shows a schematic of a manufacturing process for making fruit flakes in an embodiment.

DETAILED DESCRIPTION

[0024] The present disclosure relates to nutritional compositions and methods of making the nutritional compositions. In a general embodiment, the present disclosure provides a nutritional composition having fruit flakes including docosahexaenoic acid (“DHA”). The fruit flakes can be made from any suitable fruit including apple, mango, peach, etc.

[0025] The DHA can be incorporated directly into the fruit flakes by mixing or blending during the fruit flake manufacturing process. The DHA can be derived from fish oil. The DHA can be, for example, in the form of an encapsulated powder DHA (e.g., tuna oil microencapsulated with gelatin).

[0026] Docosahexaenoic acid (commonly known as DHA; 22:6(ω -3), all-cis-docosa-4,7,10,13,16,19-hexa-enoic acid; trivial name cervonic acid) is an omega-3 essential fatty acid. Regarding its chemical structure, DHA is a carboxylic acid with a 22-carbon chain and six cis double bonds. The first double bond is located at the third carbon from the omega end.

[0027] DHA is the most abundant essential fatty acid (polyunsaturated fatty acids (“PUFAs”)) in the brain and retina. It comprises 40% of the PUFAs in the brain and 60% of the PUFAs in the retina. 50% of the weight of the neuron's plasma membrane is composed of DHA. DHA contributes to the development of brain and eyes especially in infants below 2 years of age.

[0028] Fish oils are rich in DHA. Most of the DHA in fish and more complex organisms originates in photosynthetic and heterotrophic micro-algae, and becomes increasingly concentrated in organisms as it moves up the food chain. DHA is also commercially manufactured from micro-algae. DHA manufactured using micro-algae is vegetarian. Most animals make very little DHA through metabolism, including humans. However, small amounts are manufactured internally through the

consumption of α -linolenic acid, an omega-3 fatty acid found in plants, animals and milk.

[0029] As used herein, the term “fruit flake” includes particles of fruit. The fruit particles can have any suitable diameter, density and moisture content. The fruit particles can be partially or wholly dissolvable in a liquid. Preferably, the fruit particles are dehydrated.

[0030] As used herein, the term “nutritional composition” includes, but is not limited to, complete nutritional compositions, partial or incomplete nutritional compositions, and disease or condition specific nutritional compositions. A complete nutritional composition (i.e. those which contain all the essential macro and micro nutrients) can be used as a sole source of nutrition for the patient. Patients can receive 100% of their nutritional requirements from such a complete nutritional composition. A partial or incomplete nutritional composition does not contain all the essential macro and micro nutrients and cannot be used as a sole source of nutrition for the patient. Partial or incomplete nutritional compositions can be used as a nutritional supplement. A disease or condition specific nutritional composition is a composition that delivers nutrients or pharmaceuticals and can be a complete or partial nutritional composition.

[0031] In another embodiment, the present disclosure provides a fruit flake including docosahexaenoic acid. The fruit flake can be made from any suitable fruit such as apples, mangos, peaches, etc. The fruit flake can be free from preservatives while still being stable for 12 months or more.

[0032] The fruit flakes can be 100% fruit with DHA and provided in a convenient package. The fruit flakes can be poured into a bowl and water can be added to the fruit flakes in any suitable amount to produce a fruit puree. The fruit puree can have the proper consistency and flavor for infants and contribute to the infant's brain and eye development.

[0033] In an embodiment, the nutritional composition further includes one or more prebiotics. As used herein, a prebiotic is a selectively fermented ingredient that allows specific changes, both in the composition and/or activity in the gastrointestinal microflora, that confers benefits upon host well-being and health. Non-limiting examples of prebiotics include fructooligosaccharides, inulin, lactulose, galactooligosaccharides, acacia gum, soyoligosaccharides, xylooligosaccharides,

isomaltooligosaccharides, gentiooligosaccharides, lactosucrose, glucooligosaccharides, pecticoligosaccharides, resistant starches, sugar alcohols or a combination thereof.

[0034] In an embodiment, the nutritional composition further includes one or more probiotics. As used herein, probiotics are defined as microorganisms (e.g., live) that could confer health benefits on the host when administered in adequate amounts. Non-limiting examples of probiotics include *Saccharomyces*, *Debaromyces*, *Candida*, *Pichia*, *Torulopsis*, *Aspergillus*, *Rhizopus*, *Mucor*, *Penicillium*, *Torulopsis*, *Bifidobacterium*, *Bacteroides*, *Clostridium*, *Fusobacterium*, *Melissococcus*, *Propionibacterium*, *Streptococcus*, *Enterococcus*, *Lactococcus*, *Staphylococcus*, *Peptostreptococcus*, *Bacillus*, *Pediococcus*, *Micrococcus*, *Leuconostoc*, *Weissella*, *Aerococcus*, *Oenococcus*, *Lactobacillus* or a combination thereof.

[0035] In another embodiment, the nutritional composition further includes one or more amino acids. Non-limiting examples of amino acids include Isoleucine, Alanine, Leucine, Asparagine, Lysine, Aspartate, Methionine, Cysteine, Phenylalanine, Glutamate, Threonine, Glutamine, Tryptophan, Glycine, Valine, Proline, Serine, Tyrosine, Arginine, Histidine or a combination thereof.

[0036] In an embodiment, the nutritional composition further includes one or more symbiotics, phytonutrients and/or antioxidants. As used herein, a symbiotic is a supplement that contains both a prebiotic and a probiotic that work together to improve the microflora of the intestine. Non-limiting examples of phytonutrients include quercetin, curcumin and limonin. Antioxidants are molecules capable of slowing or preventing the oxidation of other molecules. Non-limiting examples of antioxidants include vitamin A, carotenoids, vitamin C, vitamin E, selenium, flavonoids, polyphenols, lycopene, lutein, lignan, coenzyme Q10 ("CoQ10") and glutathione.

[0037] In an alternative embodiment, the present disclosure provides a method of making a nutritional composition. The present invention provides the advantage of providing a stable medium for delivery of DHA by incorporation of the DHA directly into a fruit flake. The incorporating can be done using any suitable mixing process. It was surprisingly found that incorporating the DHA directly into the fruit flake provides better stability for the DHA and prevents oxidation of the DHA, which suffers easily from mechanical damage that causes gelatin capsule to break, thereby exposing oil to air and turning the DHA rancid.

[0038] As illustrated in FIG. 1, a method of making fruit flakes comprises pureeing a fruit to form a fruit puree, adding DHA to the fruit puree (e.g., by mixing or blending in a process tank), drying the fruit puree, and flaking the dried fruit puree into fruit flakes. The dried fruit puree can be made into fruit flakes using any suitable method such as grinding or cutting the dried fruit puree. The methods can be performed under aseptic conditions. The dried fruit flakes should meet critical parameters of thickness, density and moisture to maintain stability during shelf-life.

[0039] For example, the fruit puree can be added into one or more drying drums and air flow provided to each of the drying drums. The air flow, quality and pattern can be modified as necessary to dry the fruit puree to the desired physical composition.

[0040] The rotations per minute ("RPMs") of the drying drums can also be controlled to affect the drying conditions of the fruit puree. For example, very low RPMs can provide good results.

[0041] Once the fruit puree has dried and been formed into flakes via cutting, grinding, etc., the method can further comprise sifting the fruit flakes. This can be used to obtain fruit flakes have a specified size or diameter. The fruit flakes can be packed into any suitable container.

[0042] In another embodiment, the present disclosure provides a method of making an infant food. The method comprises providing fruit flakes including docosahexaenoic acid and adding a liquid to the fruit flakes to form a fruit puree. For example, 16 grams of fruit flakes can be added to a pouch type bag for single portion servings. The portion can contain 18 mg of DHA and provide, when mixed with 80 ml of water, a fruit puree ready to eat and specially designed for infants or young children.

[0043] In an alternative embodiment, the present disclosure provides a method of providing nutrition to an infant. The method comprises providing fruit flakes including docosahexaenoic acid, adding a liquid to the fruit flakes to form a fruit puree, and administering the fruit puree to the infant. The liquid can include water, milk, formula or any suitable fruit juice. Any suitable amount of liquid can be combined or mixed with the fruit flakes to form a fruit puree having a desired consistency. The fruit puree can contribute to the infant's brain and eye development.

[0044] It should be understood that various changes and modifications to the presently preferred embodiments described herein will be apparent to those skilled in the art. Such changes and modifications can be made without departing from the spirit and scope of the present subject matter and without diminishing its intended advantages. It is therefore intended that such changes and modifications be covered by the appended claims.

CLAIMS

The invention is claimed as follows:

1. A nutritional composition comprising fruit flakes including docosahexaenoic acid.
2. The nutritional composition of Claim 1, wherein the fruit flakes are selected from the group consisting of apple flakes, mango flakes, peach flakes and combinations thereof.
3. The nutritional composition of Claim 1, wherein the nutritional composition is free from preservatives.
4. The nutritional composition of Claim 1, wherein the docosahexaenoic acid is derived from fish oil.
5. The nutritional composition of Claim 1 further comprising a prebiotic.
6. The nutritional composition of Claim 5, wherein the prebiotic is selected from the group consisting of partially hydrolyzed guar gum, fructooligosaccharides, inulin, lactulose, galactooligosaccharides, acacia gum, soyoligosaccharides, xylooligosaccharides, isomaltooligosaccharides, gentiooligosaccharides, lactosucrose, glucooligosaccharides, pecticoligosaccharides, resistant starches, sugar alcohols and combinations thereof.
7. The nutritional composition of Claim 1 further comprising a probiotic.
8. The nutritional composition of Claim 7, wherein the probiotic is selected from the group consisting of Saccharomyces, Debaromyces, Candida, Pichia, Torulopsis, Aspergillus, Rhizopus, Mucor, Penicillium, Torulopsis, Bifidobacterium, Bacteroides, Clostridium, Fusobacterium, Melissococcus, Propionibacterium, Streptococcus, Enterococcus, Lactococcus, Staphylococcus, Peptostreptococcus,

Bacillus, Pediococcus, Micrococcus, Leuconostoc, Weissella, Aerococcus, Oenococcus, Lactobacillus and combinations thereof.

9. The nutritional composition of Claim 1 further comprising a symbiotic.
10. The nutritional composition of Claim 1 further comprising an amino acid.
11. The nutritional composition of Claim 10, wherein the amino acid is selected from the group consisting of Isoleucine, Alanine, Leucine, Asparagine, Lysine, Aspartate, Methionine, Cysteine, Phenylalanine, Glutamate, Threonine, Glutamine, Tryptophan, Glycine, Valine, Proline, Serine, Tyrosine, Arginine, Histidine and combinations thereof.
12. The nutritional composition of Claim 1 further comprising a phytonutrient.
13. The nutritional composition of Claim 12, wherein the phytonutrient is selected from the group consisting of quercetin, curcumin, limonin and combinations thereof.
14. The nutritional composition of Claim 1 further comprising an antioxidant.
15. The nutritional composition of Claim 1, wherein the nutritional composition is in an administerable form selected from the group consisting of pharmaceutical formulations, nutritional formulations, dietary supplements, functional foods and beverage products.
16. A fruit flake comprising docosahexaenoic acid.

17. The fruit flake of Claim 16, wherein the fruit flake is selected from the group consisting of apple flakes, mango flakes, peach flakes and combinations thereof.
18. The fruit flake of Claim 16, wherein the fruit flake is free from preservatives.
19. The fruit flake of Claim 16, wherein the docosahexaenoic acid is derived from fish oil.
20. A method of making a nutritional composition, the method comprising:
incorporating docosahexaenoic acid into a fruit flake.
21. A method of making fruit flakes, the method comprising:
pureeing a fruit to form a fruit puree;
adding docosahexaenoic acid to the fruit puree;
drying the fruit puree; and
flaking the dried fruit puree into fruit flakes.
22. The method of Claim 21, further comprising sifting the fruit flakes.
23. The method of Claim 21, further comprising packing the fruit flakes.
24. The method of Claim 21, wherein the fruit is selected from the group consisting of apple, mango, peach and combinations thereof.
25. The method of Claim 21, wherein the method is performed under aseptic conditions.
26. A method of making an infant food, the method comprising:
providing fruit flakes including docosahexaenoic acid; and
adding a liquid to the fruit flakes to form a fruit puree.

27. A method of providing nutrition to an infant, the method comprising:
providing fruit flakes including docosahexaenoic acid;
adding a liquid to the fruit flakes to form a fruit puree; and
administering the fruit puree to the infant.
28. A method of delivering stable docosahexaenoic acid comprising the
steps of:
incorporating the docosahexaenoic acid to a fruit flake;
adding a liquid to a fruit flake to form a fruit puree; and
administering the fruit puree to the infant.