primary carotenoid in the composition. However, the use of canthaxanthin is known to be limited due to adverse effects it may have on pigmentation. U.S. patent 5,290,605 describes food-stuff and beverages intended for providing protection to the skin against UV sun radiation. Said foodstuff and beverages comprising carotenoids as well as ascorbic acid, tocopherols, coenzyme Q10 and reduced glutathione. U.S. patent 6,110,478 further describes a composition for protecting skin against UV radiation and the harmful effects thereof, wherein the composition contains a pro-vitamin A carotenoid and lycopene. The use of such a composition is limited by the negative effect pro-vitamin A carotenoids may have on the subject's health at certain dosage levels. An excess of vitamin A, which is produced in the body from pro-vitamin A carotenoids, was found to have adverse effects on health. Stahl et al ("Dietary Tomato Paste Protects against Ultraviolet Light-induced Erythema in Humans", Biochemical and Molecular Action of Nutrients, Research Communication, (2001) 1449-1451) have shown the protective effect of tomato paste which is known to contain inter alia lycopene, beta-carotene and tocopherol, against UV light-induced erythema. However, Stahl has reported a problem in achieving desired carotenoid serum levels, suggesting poor bioavailability.

[004] Accordingly, there is a long felt need to develop a composition for protecting skin against UV radiation, as well as improving other skin parameters, which is suitable for oral administration and is safe at a wide range of dosages.

SUMMARY

[005] The present disclosure is directed, in some examples, to compositions comprising lycopene and use thereof, such as in oral formulations. Further provided are methods for their use in prevention or treatment of different skin conditions, or improving skin appearance or health. In some examples skin conditions are caused by ultraviolet radiation.

[006] According to one aspect, there is provided a composition comprising (a) lycopene; (b) phytoene and phytofluene; and (c) carnosic acid, wherein the weight ratio of (a) to (b) is from 1:0.05 to 1:0.9.

[007] There is provided a method for improving one or more skin parameters in a subject in need thereof, comprising the step of administering to the subject a therapeutically effective amount of the herein disclosed composition, thereby improving one or more skin parameters in the subject.

[008] In some examples, the weight ratio of lycopene and carnosic acid is from 1:0.05 to 1:0.9.

[009] In some examples, the composition further comprises tocopherol.

[010] In some examples, the weight ratio of lycopene and tocopherol is from 1:0.05 to 1:0.9.

[011] In some examples, the composition further comprises beta-carotene.

[012] In some examples, the weight ratio of lycopene and beta-carotene is from. 1:0.005 to 1:0.5.

[013] In some examples, the composition is an oral composition.

[014] In some examples, the composition further comprises a nutraceutical, a cosmeceutical, or a pharmaceutical acceptable excipient.

[015] According to another aspect, there is provide the composition as defined herein for use in improving one or more skin parameters in a subject in need thereof. In some examples, the composition is for use in improving one or more skin parameters.

[016] In some examples, the one or more skin parameters are selected from the group consisting of: face lines/wrinkles, mean skin carotenoid level, skin luminosity, skin radiance, and ultraviolet radiation (UV)-induced damage.

[017] In some examples, the composition is a cosmeceutical composition.

[018] In some examples, the composition is an anti-wrinkles composition.

[019] In some examples, the method comprises a step of determining the level of a carotenoid in the skin of a subject, wherein a reduced level of said carotenoid in the skin of the subject compared to a control baseline is indicative of the subject is suitable for treatment using the herein disclosed composition.

[020] In some examples, the subject is afflicted with a reduced level of a carotenoid.

[021] In some examples, the skin is the palm skin.

[022] In some examples, improving UV-induced damage in a subject comprises preventing or treating a skin-related condition caused by UV radiation in the subject.

[023] In some examples, treating comprises inhibiting the production of TNF-alpha, IL-6, erythema reduction, or any combination thereof, in the subject.

[024] Unless otherwise defined, all technical and/or scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which the disclosure pertains. Although methods and materials similar or equivalent to those described herein can be used in the practice or testing of embodiments of the disclosure, exemplary methods and/or materials are described below. In case of conflict, the patent specification, including definitions, will control. In addition, the materials, methods, and examples are illustrative only and are not intended to be necessarily limiting.

[025] Further embodiments, examples and the full scope of applicability of the present disclosure will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the disclosure, are given by way of illustration only, since various changes and modifications within the spirit and scope of the disclosure will become apparent to those skilled in the art from this detailed description.

CLAIMS

What is claimed is:

1. A composition comprising (a) lycopene; (b) phytoene and phytofluene; and (c) carnosic acid, wherein the weight ratio of (a) to (b) is from 1:0.05 to 1:0.9.
2. The composition of claim 1, wherein the weight ratio of lycopene and carnosic acid is from 1:0.05 to 1:0.9.
3. The composition of claim 1 or 2, wherein said composition further comprises tocopherol.
4. The composition of claim 3, wherein the weight ratio of lycopene and tocopherol is from 1:0.05 to 1:0.9.
5. The composition of any one of claims 1-4, wherein said composition further comprises beta-carotene.
6. The composition of claim 5, wherein the weight ratio of lycopene and beta-carotene is from. 1:0.005 to 1:0.5.
7. The composition of any one of claims 1-6, wherein said composition is an oral composition.
8. The composition of any one of claims 1-7, further comprising a nutraceutical, a cosmeceutical, or a pharmaceutical acceptable excipient.
9. The composition of any one of claims 1-8, for use in improving one or more skin parameters in a subject in need thereof.
10. The composition of claim 9, wherein said one or more skin parameters are selected from the group consisting of: face lines/wrinkles, mean skin carotenoid level, skin luminosity, skin radiance, and ultraviolet radiation (UV)-induced damage.
11. The composition of any one of claims 1-10, being a cosmeceutical composition.
12. The composition of any one of claims 1-11, being an anti-wrinkles composition.