

WHAT IS CLAIMED IS:

1. A combination comprising:
a flavonoid, for example in an amount from about 0.1 g to about 1.5 g; and
5 one or more of:
ascorbic acid, ascorbate, or a combination thereof, for example in an
amount from about 0.2 g to about 2.0 g;
N-acetyl cysteine, for example in an amount from about 0.10 g to about 1.2
g;
10 alpha-lipoic acid, for example in an amount from about 0.05 g to about 0.60
g; and
at least one carotenoid, for example in an amount from about 1 mg to about
50 mg.
- 15 2. The combination according to claim 1, comprising:
the flavonoid and the ascorbic acid, ascorbate or combination thereof in a
mass/mass ratio from about 1:10 to about 5:4;
the flavonoid and the N-acetyl cysteine in a mass/mass ratio from about 1:5 to about
5:1;
20 the flavonoid and the alpha-lipoic acid in a mass/mass ratio from about 1:5 to about
5:1;
the flavonoid and the at least one carotenoid in a mass/mass ratio from about 200:1
to about 10:1; or
any combination thereof.
- 25 3. The combination according to claim 1 or 2, wherein the combination comprises:
the flavonoid;
the ascorbic acid or ascorbate;
optionally the N-acetyl cysteine;
30 the alpha-lipoic acid; and
optionally the at least one carotenoid.
4. The combination according to any one of claims 1 to 3, wherein the flavonoid is a
flavonol, such as quercetin or a quercetin derivative; or a flavanonol, such as
35 dihydroquercetin or a dihydroquercetin derivative.

5. The combination according to claim 4, wherein the quercetin derivative is a glycosylated quercetin.
- 5 6. The combination according to claim 5, wherein the glycosylated quercetin is quercetin-3-O-palutside, quercetin-3-O-glucoside, quercetin-3-O-rutinoside, quercetin-3-O-galactoside, or quercetin-3-O-rhamnoside.
7. The combination according to any one of claims 1 to 6, wherein the at least one
10 carotenoid comprises:
a carotene compound, such as beta-carotene;
a xanthophyll compound, such as lutein, astaxanthin, zeaxanthin, or a combination thereof; or
a combination thereof.
- 15 8. The combination according to any one of claims 1 to 7, further comprising folic acid, folate, methylfolate, or a combination thereof, for example in an amount from about 100 µg to about 400 µg.
- 20 9. The combination according to claim 8, wherein the flavonoid and the folic acid, folate, methylfolate, or combination thereof are in a mass/mass ratio from about 10,000:1 to about 100:1.
10. The combination according to any one of claims 1 to 9, further comprising iodide,
25 for example potassium iodide in an amount for about 30 mg to about 160 mg.
11. The combination according to claim 10, wherein the flavonoid and the iodide are in a mass/mass ratio from about 10:1 to about 1:1.
- 30 12. The combination according to any one of claims 1 to 9, further comprising an anti-oxidizing glycosylated or un-glycosylated isoflavone, such as genistein or daidzein.
13. The combination according to any one of claims 1 to 9, further comprising an anti-oxidizing phytocannabinoid, such as cannabidiol.

14. The combination according to any one of claims 1 to 9, further comprising a radio-imaging contrast agent, such as barium sulfate or a gadolinium- or iodine-based contrast agent.
- 5 15. The combination according to any one of claims 1 to 14, comprising:
- a) about 2.0 g of ascorbic acid, about 1.2 g of N-acetyl cysteine, about 0.6 g of alpha-lipoic acid, about 0.5 g of quercetin, about 30 mg of beta-carotene, and about 400 µg of folic acid;
 - b) about 0.8 g of ascorbic acid, about 0.6 g of N-acetyl cysteine, about 0.5 to about 10 0.6 g of alpha-lipoic acid, about 0.5 g of quercetin, about 15 mg of beta-carotene, and about 200 µg to about 400 µg of folic acid, and optionally about 130 mg of potassium iodide; or
 - c) about 1.0 g of ascorbic acid, about 0.6 g of N-acetyl cysteine, about 0.3 g of alpha-lipoic acid, about 0.25 g of quercetin, about 15 mg of beta-carotene, and about 200 µg of folic acid.
- 15 16. The combination according to any one of claims 1 to 15, further comprising Coenzyme Q10 (CoQ10), for example in an amount from about 100 mg to about 500 mg.
17. The combination according to claim 16, wherein the flavonoid and the CoQ10 are 20 in a mass/mass ratio from about 5:1 to about 1:5, such as about 1:1.
18. The combination according to any one of claims 1 to 17, further comprising a tocopherol, such as Vitamin E, for example in an amount from about 100 mg to about 500 mg.
- 25 19. The combination according to claim 18, wherein the flavonoid and the tocopherol, for example Vitamin E, are in a mass/mass ratio from about 5:1 to about 1:5, such as about 1:1.
- 30 20. The combination according to any one of claims 1 to 19, further comprising selenium, selenomethionine, selenocysteine, a selenate salt, or any combination thereof for example in an amount from about 20 µg to about 500 µg.

21. The combination according to claim 20, wherein the flavonoid and the selenium, selenomethionine, selenocysteine, a selenate salt, or any combination thereof are in a mass/mass ratio from about 10,000:1 to about 100:1, such as about 2000:1.
- 5 22. The combination according to any one of claims 1 to 21, further comprising Vitamin B, such as Vitamin B12, for example in an amount from about 10 µg to about 250 µg.
23. The combination according to claim 22, wherein the flavonoid and the Vitamin B, 10 for example Vitamin B12, are in a mass/mass ratio from about 20,000:1 to about 100:1, such as about 4,000:1.
24. The combination according to any one of claims 1 to 14, comprising:
quercetin; Coenzyme Q10; alpha-lipoic acid; Vitamin E; and ascorbic acid,
15 ascorbate, or both ascorbic acid and ascorbate; and
optionally folic acid, folate, methylfolate, Vitamin B12, or any combination thereof;
optionally beta-carotene, lutein, astaxanthin, zeaxanthin or any combination thereof;
optionally selenium, selenomethionine, selenocysteine, a selenate salt, or any
20 combination thereof;
optionally iodide, such as potassium iodide.
25. The combination according to claim 24, comprising:
about 200 mg of quercetin;
25 about 200 mg of Coenzyme Q10;
about 200 mg of alpha-lipoic acid;
about 200 mg of Vitamin E;
about 200 mg of ascorbic acid or ascorbate, or a combination thereof;
about 4 mg of astaxanthin;
30 about 2.5 mg of zeaxanthin;
about 400 µg of folic acid, folate, methylfolate, or a combination thereof;
about 100 µg of selenium; and
about 50 µg of Vitamin B12.

26. The combination according to any one of claims 1 to 25, wherein the combination is formulated for oral administration, transdermal administration, or is formulated for a mixture of oral and transdermal administration.

5 27. The combination according to claim 26 wherein the formulation for oral administration is: a powder, a tablet, a capsule, an edible gel, a potable liquid, or any combination thereof.

28. The combination according to claim 27 wherein the formulation for oral
10 administration is a combination of:
an aqueous-based edible gel or potable liquid comprising one or more water-soluble components, such as the ascorbic acid or ascorbate, the N-acetyl cysteine, and/or the folic acid, folate or methylfolate, and
a substantially water-free powder, substantially water-free edible gel or substantially
15 water-free potable liquid comprising the flavonoid, and optionally the alpha-lipoic acid and/or the carotenoid.

29. The combination according to claim 27 wherein the formulation for oral
administration is a water-dispersible powder, an effervescent tablet, or a potable liquid
20 formulated to be mixed with a water-based drink.

30. The combination according to claim 26 wherein the formulation for transdermal administration is a topical cream or ointment, or a transdermal patch.

25 31. The combination according to any one of claims 26 to 30 wherein the combination formulated for a mixture of oral and transdermal administration comprises (i) an oral formulation that includes one or more water-soluble components, such as the ascorbic acid or ascorbate, the N-acetyl cysteine, and/or the folic acid, folate, or methylfolate, and (ii) a transdermal formulation that includes the flavonoid, and optionally the alpha-lipoic
30 acid and/or the carotenoid.

32. The combination according to claim 24 or 25, wherein the combination is formulated for oral administration as a powder, one or more tablets, or one or more capsules.

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33. The combination according to claim 32, wherein the combination is formulated for oral administration of two to five capsules; for example wherein the combination is formulated for oral administration of three capsules, each capsule comprising:
- about 67 mg of quercetin;
 - 5 about 67 mg of Coenzyme Q10;
 - about 67 mg of alpha-lipoic acid;
 - about 67 mg of Vitamin E;
 - about 67 mg of ascorbic acid or ascorbate, or a combination thereof;
 - about 1.3 mg of astaxanthin;
 - 10 about 0.83 mg of zeaxanthin;
 - about 133 µg of folic acid, folate, methylfolate, or a combination thereof;
 - about 33 µg of selenium; and
 - about 17 µg of Vitamin B12.
- 15 34. The combination according to any one of claims 1 to 33, for use in mitigating or preventing: nuclear DNA damage, mitochondrial DNA damage, lipid peroxidation, protein carbonylation, or any combination thereof in a subject caused by oxidative stress.
- 20 35. The combination for use according to claim 34, wherein the nuclear DNA damage, the mitochondrial DNA damage, the lipid peroxidation, or the protein carbonylation is found in epithelial cells of the subject, such as in cardiovascular epithelial cells or corneal epithelial cells; connective tissue cells of the subject; muscle tissue cells of the subject; nerve cells of the subject; or any combination thereof.
- 25 36. The combination for use according to claim 35, wherein the epithelial cells are cardiovascular epithelial cells or corneal epithelial cells.
- 30 37. The combination for use according to any one of claims 34 to 36, wherein the oxidative stress is from exposure to ionizing radiation, such as from a medical imaging procedure, release of nuclear material, or air travel, or from skin inflammation induced by exposure to UV radiation.
- 35 38. The combination for use according to any one of claims 34 to 36, wherein the oxidative stress is from an elevated exposure to a reactive oxygen species from smoking or vaping a tobacco- or cannabis-product.

39. Use of the combination according to any one of claims 1 to 33, for mitigating or preventing nuclear DNA damage, mitochondrial DNA damage, lipid peroxidation, protein carbonylation, or any combination thereof in a subject caused by oxidative stress.

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40. The use according to claim 39, wherein the nuclear DNA damage, the mitochondrial DNA damage, the lipid peroxidation, or the protein carbonylation is found in epithelial cells of the subject; connective tissue cells of the subject; muscle tissue cells of the subject; nerve cells of the subject; or any combination thereof.

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41. The use according to claim 40, wherein the epithelial cells are cardiovascular epithelial cells or corneal epithelial cells.

42. The use according to any one of claims 39 to 41, wherein the oxidative stress is from exposure to ionizing radiation, such as from a medical imaging procedure, release of nuclear material, or air travel, or from skin inflammation induced by exposure to UV radiation.

43. The use according to any one of claims 39 to 41, wherein the oxidative stress is from an elevated exposure to a reactive oxygen species from smoking or vaping a tobacco- or cannabis-product.

44. A method of mitigating or preventing nuclear DNA damage, mitochondrial DNA damage, lipid peroxidation, protein carbonylation, or any combination thereof in a subject caused by oxidative stress, the method comprising administering to the subject the combination according to any one of claims 1 to 33.

45. The method according to claim 44, wherein the nuclear DNA damage, the mitochondrial DNA damage, the lipid peroxidation, or the protein carbonylation is found in epithelial cells of the subject; connective tissue cells of the subject; muscle tissue cells of the subject; nerve cells of the subject; or any combination thereof.

46. The method according to claim 45, wherein the epithelial cells are cardiovascular epithelial cells or corneal epithelial cells.

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47. The method according to any one of claims 44 to 46, wherein the oxidative stress is from exposure to ionizing radiation, such as from a medical imaging procedure, release of nuclear material, or air travel, or from skin inflammation induced by exposure to UV radiation.
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48. The method according to any one of claims 44 to 46, wherein the oxidative stress is from an elevated exposure to a reactive oxygen species from smoking a tobacco- or cannabis-product.
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49. The method according to any one of claims 44 to 46, wherein the oxidative stress is from exposure to ionizing radiation due to air travel, and the method comprises administering to the subject the combination according to any one of claims 17 to 19 every about 6 to about 12 hours, for example starting at from 0 to about 4 hours before flight.
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50. The method according to claim 49, wherein the combination comprises about 0.5 g of quercetin, about 2.0 g of ascorbic acid, about 1.2 g of N-acetyl cysteine, about 0.6 g of alpha-lipoic acid, about 30 mg of beta-carotene, and about 400 µg of folic acid.
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51. The method according to claims 44 to 46, wherein the oxidative stress is from exposure to a low-level of ionizing radiation, and the method comprises administering to the subject a combination that comprises about 0.5 g of quercetin, about 0.80 g of ascorbic acid, about 0.60 g of N-acetyl cysteine, about 0.50 g of alpha-lipoic acid, about 15 mg of beta-carotene, and about 400 µg of folic acid.
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