CLAIMS

1. A lyophilized formulation of a drug substance, wherein:

(i) the drug substance comprises:

(a) an isolated cystathionine β-synthase (CBS) protein comprising SEQ ID NO: 1; and

(b) a PEG molecule covalently bound to the CBS protein; and

(ii) wherein, upon reconstitution of the lyophilized formulation to a reconstituted liquid formulation, the reconstituted liquid formulation comprises:

(a) the drug substance in a concentration of about 20-30 mg/ml;

(b) about 15mM of potassium phosphate; and

(c) about 8% (w/v) trehalose.

2. The lyophilized formulation of claim 1, wherein the PEG molecule is ME-200GS.

3. A reconstituted liquid formulation comprising:

(i) a drug substance in an amount of about 25 mg, wherein the drug substance comprises:

(a) an isolated cystathionine β-synthase (CBS) protein comprising SEQ ID NO: 1; and

(b) a PEG molecule covalently bound to the CBS protein; and

(ii) about 15mM of potassium phosphate;

(iii) about 8% (w/v) trehalose; and

(iv) 1mL of water.

4. The reconstituted liquid formulation of claim 3, wherein the PEG molecule is ME-200GS.

5. Use of the lyophilized formulation of claim 1 or 2 or reconstituted liquid formulation of claim 3 or 4 in the manufacture of a medicament for the treatment of homocystinuria in a subject.

6. The use of claim 5, wherein a therapeutically effective amount of the lyophilized formulation or reconstituted liquid formulation is to be administered to the subject at a dosage selected from the range of about 0.25mg/kg to about 10mg/kg.

7. The use of claim 6, wherein the dosage is about 0.33mg/kg.

8. The use of claim 6, wherein the dosage is about 0.66mg/kg.

9. The use of claim 6, wherein the dosage is about 1.0mg/kg.

10. The use of claim 6, wherein the dosage is about 1.5mg/kg.

11. The lyophilized formulation of claim 1 or 2 or reconstituted liquid formulation of claim 3 or 4 for use in a method of decreasing the level of homocysteine (Hcy) in a subject.

12. The lyophilized formulation or reconstituted liquid formulation for use of claim 11, wherein the level of Hcy is: less than about 80μM following administration; is reduced by up to 10%, up to 20%, up to 30%, up to 40%, up to 50%, up to 60%, up to 70%, up to 80%, or up to 90% following administration; or is within the range of about 10μM to about 20μM, is less than 10μM, or is about 55μM following administration.

13. The lyophilized formulation or reconstituted liquid formulation for use of claim 11 or claim 12, wherein a therapeutically effective amount of the lyophilized formulation or reconstituted liquid formulation is to be administered to the subject at a dosage selected from: the range of about 0.25mg/kg to about 10mg/kg; about 0.33mg/kg; about 0.66mg/kg; about 1.0mg/kg; about 1.5mg/kg; about 7.0mg/kg; about 10mg/kg; and less than 10mg/kg.

14. The lyophilized formulation or reconstituted liquid formulation for use of any one of claims 11-13, wherein at least one selected from the group consisting of: pyridoxine, vitamin B6, and betaine is to be administered to the subject.

15. The lyophilized formulation or reconstituted liquid formulation for use of any one of claims 11-14, wherein the subject is on a methionine (Met)-restricted diet.

16. The lyophilized formulation or reconstituted liquid formulation for use of any one of claims 11-15, further comprising an anti-platelet agent to be administered.

17. The lyophilized formulation or reconstituted liquid formulation for use of any one of claims 11-16, wherein formulation is: (i) to be administered about once every 3 days, about once per day, or about once per week; or (ii) to be repeatedly administered for about 6 weeks, for about 3 months, for about 6 months, for longer than 6 months, or for the remaining lifespan of the subject.

18. The lyophilized formulation of claim 1 or 2 or reconstituted liquid formulation of claim 3 or 4 for use in a method of increasing the level of cysteine (Cys) in a subject.

19. The lyophilized formulation of claim 1 or 2 or reconstituted liquid formulation of claim 3 or 4 for use in a method of increasing the level of cystathionine (Cth) in a subject.

20. Use of the lyophilized formulation of claim 1 or 2 or reconstituted liquid formulation of claim 3 or 4 in the manufacture of a medicament for the treatment, alleviation, or prevention of negative clinical outcomes associated with the ocular system, skeletal system, vascular system, and/or central nervous system of a subject.

21. The lyophilized formulation of claim 1 or 2 or reconstituted liquid formulation of claim 3 or 4 for use in a method of treating homocystinuria in a subject.