What is claimed is:

1. A stable liquid pharmaceutical formulation of a recombinant von Willebrand Factor (rVWF) comprising: (a) a rVWF; (b) a buffering agent; (c) one or more salts; (d) optionally a stabilizing agent; and (e) optionally a surfactant;

wherein said rVWF comprises a polypeptide selected from the group consisting of:

a) the amino acid sequence set out in SEQ ID NO: 3;

b) a biologically active analog, fragment or variant of a);

c) a polypeptide encoded by the polynucleotide set out in SEQ ID NO: 1;

d) a biologically active analog, fragment or variant of c); and

e) a polypeptide encoded by a polynucleotide that hybridizes to the polynucleotide set out in SEQ ID NO: 1 under moderately stringent hybridization conditions;

wherein said buffer is comprised of a pH buffering agent in a range of about 0.1 mM to about 500 mM and wherein the pH is in a range of about 2.0 to about 12.0;

wherein said salt is at a concentration of about 1 to 500 mM;

wherein said stabilizing agent is at a concentration of about 0.1 to 1000 mM; and

wherein said surfactant is at a concentration of about 0.01 g/L to 0.5 g/L.

2. The formulation of claim 1 wherein the rVWF comprises the amino acid sequence set out in SEQ ID NO: 3.

3. The formulation of claim 1 wherein the buffering agent is selected from the group consisting of sodium citrate, glycine, histidine, Tris and combinations of these agents.

4. The formulation of claim 3 wherein the buffering agent is sodium citrate at a concentration of 15 mM..

5. The formulation of claim 1 wherein pH is in the range of 6.0-8.0.

6. The formulation of claim 5 wherein pH is in the range of 6.5-7.3.

7. The formulation of claim 4 wherein the pH is 7.0.

8. The formulation of claim 1 wherein the buffering agent is citrate and the pH is 7.0.

9. The formulation of claim 1 wherein the salt is selected from the group consisting of calcium chloride, sodium chloride and magnesium chloride.

10. The formulation of claim 9 wherein the salt is at a concentration range of 0.5 to 300 mM.

11. The formulation of claim 10 wherein the salt is calcium chloride at a concentration of 10 mM.

12. The formulation of claim 1 wherein the rVWF comprises the amino acid sequence set out in SEQ ID NO: 3; wherein the buffering agent is citrate and the pH is 7.0; and wherein the salt is calcium chloride at a concentration of 10 mM.

13. The formulation of claim 1 wherein the rVWF comprises the amino acid sequence set out in SEQ ID NO: 3; wherein the buffering agent is sodium citrate at a concentration of 15 mM and the pH is 7.0; and wherein the salt is calcium chloride at a concentration of 10 mM and NaCl at a concentration of 100 mM.

14. The formulation of claim 3 wherein the one or more buffering agents is histidine and Tris at a concentration of 3.3 mM each.

15. The formulation of claim 3 wherein the pH is 7.0.

16. The formulation of claim 9 wherein the one or more salts is sodium chloride at a concentration of 30 mM and calcium chloride at a concentration of 0.56 mM.

17. The formulation of claim 1 wherein the stabilizing agent is selected from the group consisting of mannitol, lactose, sorbitol, xylitol, sucrose, trehalose, mannose, maltose, lactose, glucose, raffinose, cellobiose, gentiobiose, isomaltose, arabinose, glucosamine, fructose and combinations of these stabilizing agents.

18. The formulation of claim 17 wherein the stabilizing agents are trehalose at a concentration of 7.8 mM and mannitol at a concentration of 58.6 mM.

19. The formulation of claim 1 wherein the surfactant is selected from the group consisting of digitonin, Triton X-100, Triton X-114, TWEEN-20, TWEEN-80 and combinations of these surfactants.

20. The formulation of claim 1 wherein the surfactant is TWEEN-80 at 0.03 g/L.

21. The formulation of claim 1 wherein the rVWF comprises amino acid sequence set out in SEQ ID NO: 3; wherein the buffering agents are histidine at a concentration of 3.3 mM and Tris at a concentration of 3.3 mM at pH 7.0; wherein the salts are sodium chloride at a concentration of 30 mM and calcium chloride at a concentration of 0.56 mM; wherein the stabilizing agents are trehalose at a concentration of 7.8 mM and mannitol at a concentration of 58.6 mM.; and wherein the surfactant is TWEEN-80 at 0.03 g/L.

CLAIMS

1. A stable liquid pharmaceutical formulation of a recombinant von Willebrand Factor (rVWF) comprising: (a) a rVWF; (b) a buffering agent; (c) one or more salts;

wherein said rVWF in the pharmaceutical formulation causes agglutination of stabilized platelets in the presence of ristocetin, is stable for at least 26 weeks at 4°C and comprises a polypeptide that has a molecular weight of 250 kDa selected from the group consisting of:

a) the amino acid sequence set out in SEQ ID NO: 3;

b) a biologically active analog or variant of a);

c) a polypeptide encoded by the polynucleotide set out in SEQ ID NO: 1;

d) a biologically active analog or variant of c); and

e) a polypeptide encoded by a polynucleotide that hybridizes to the polynucleotide set out in SEQ ID NO: 1 under moderately stringent hybridization conditions;

wherein said buffering agent is citrate at a concentration of 0.1 mM to 500 mM,

wherein the pH is in a range of 3.0 to 9.0; and wherein said salt is at a concentration of 0.5 mM to 500 mM.

2. The formulation of claim 1, wherein the rVWF retains at least 50% agglutination ability of stabilized platelets in the presence of ristocetin at 26 weeks compared to the same material measured at the commencement of storage.

3. The formulation of claim 1, wherein the formulation does not include glutathione.

4. The formulation of any one of claims 1 to 3, wherein the rVWF comprises the amino acid sequence set out in SEQ ID NO: 3.

5. The formulation of any one of claims 1 to 4, wherein the buffering agent is at a concentration range of 0.5 mM to 100 mM.

6. The formulation of any one of claims 1 to 5, wherein the buffering agent is at a concentration range of 1 mM to 50 mM.

7. The formulation of any one of claims 1 to 6, wherein the buffering agent is at a concentration range of 5 mM to 30 mM.

8. The formulation of any one of claims 1 to 7, wherein the buffering agent is at a concentration of 15 mM.

9. The formulation of any one of claims 1 to 3, wherein a first buffering agent and a second buffering agent are each at a concentration of 3.3 mM.

10. The formulation of any one of claims 1 to 9, wherein the salt is at a concentration range of 0.5 to 300 mM.

11. The formulation of any one of claims 1 to 10, wherein the salt is at a concentration range of 1 mM to 100 mM.

12. The formulation of any one of claims 1 to 11, wherein the salt is at a concentration range of 10 mM to 50 mM.

13. The formulation of any one of claims 1 to 12, wherein the salt is at a concentration of 10 mM.

14. The formulation of any one of claims 1 to 13, wherein a first salt is at a concentration of 10 mM and a second salt is at a concentration of 100 mM.

15. A stable liquid pharmaceutical formulation of a recombinant von Willebrand Factor (rVWF) comprising: (a) a rVWF; (b) a buffering agent; and (c) one or more salts,

wherein said rVWF in the pharmaceutical formulation causes agglutination of stabilized platelets in the presence of ristocetin is stable for at least 26 weeks at 4°C and comprises a polypeptide that has a molecular weight of approximately 250 kDa selected from the group consisting of:

a) the amino acid sequence set out in SEQ ID NO: 3;

b) a biologically active analog or variant of a);

c) a polypeptide encoded by the polynucleotide set out in SEQ ID NO: 1;

d) a biologically active analog or variant of c); and

e) a polypeptide encoded by a polynucleotide that hybridizes to the polynucleotide set out in SEQ ID NO: 1 under moderately stringent hybridization conditions;

wherein the buffering agent is citrate at a concentration of 15 mM, wherein the pH is in a range of 3.0 to 9.0; and wherein a first salt is sodium chloride at a concentration of 100 mM and a second salt is calcium chloride at a concentration of 10 mM.

16. The formulation of any one of the preceding claims, wherein the buffering agent is sodium citrate.

17. The formulation of any one of the preceding claims, wherein the pH is in the range of 5,5 to 8.5.

18. The formulation of any one of the preceding claims, wherein the pH is in the range of 6.0 to 8.0.

19. The formulation of any one of the preceding claims, wherein the pH is in the range of 6.5 to 7.5.

20. The formulation of any one of the preceding claims, wherein the pH is 7.0.

21. The formulation of claim 19, wherein a first salt is at a concentration of 30 mM and a second salt is at a concentration of 0.56 mM.