WHAT IS CLAIMED:

1. A whole blood anticoagulant composition comprising one or more sodium salts, one or more magnesium salts, and one or more sugar alcohols.

2. The whole blood anticoagulant composition of claim 1, wherein the one or more sodium salts include sodium bicarbonate and sodium acetate, the one or more magnesium salts include magnesium citrate, and the one or more sugar alcohols include mannitol.

3. The whole blood anticoagulant composition of claim 2, further comprising sodium bisphosphate.

4. The whole blood anticoagulant composition of claim 1, further comprising at least one nucleobase-containing component.

5. The whole blood anticoagulant composition of claim 1, further comprising one or more sugars.

6. A whole blood anticoagulant composition comprising a first substance and a second substance, wherein the first substance includes a plurality of components, the plurality of components comprising one or more sodium salts, one or more magnesium salts, and one or more sugar alcohols.

7. The whole blood anticoagulant composition of claim 6, wherein the second substance includes a plurality of components, the plurality of components comprising citric acid, sodium bisphosphate, adenine, glucose and sodium citrate.

8. A whole blood storage system, comprising:

a first additive comprising one or more sodium salts, one or more magnesium salts, and one or more sugar alcohols; and

a second additive;

wherein upon the first additive and the second additive being combined with whole blood:

the coagulation capability of the whole blood is maintained or mostly maintained for at least about 2 weeks or at least about 3 weeks; or

the whole blood can be preserved for at least about weeks or at least about 3 weeks or at least about 4 weeks or at least about 5 weeks and red blood cells for at least about weeks or at least about 3 weeks or at least about 4 weeks or at least about 5 weeks or at least about 6 weeks.

9. The whole blood storage system of claim 8, wherein the one or more sodium salts include sodium bicarbonate, sodium acetate, and sodium bisphosphate, the one or more magnesium salts include magnesium citrate, and the one or more sugar alcohols include mannitol.

10. The whole blood storage system of claim 8, wherein the second additive comprises at least one of citric acid, sodium citrate, and dextrose; or wherein the second additive comprises CPDA-1 or CPDA-2.

11. The whole blood storage system of claim 8, wherein the first and second additives are stored separately prior to use.

12. The whole blood storage system of claim 11, wherein the first additive is stored in a first receptacle, and the second additive is stored in a second receptacle, wherein at least one of the first and second receptacles is suitable for whole blood storage.

13. The whole blood storage system of claim 12, wherein the first receptacle and the second receptacle are in fluid communication with one another via a fluid path, and wherein the system further comprises at least one leukoreduction filter in the fluid path.

14. The whole blood storage system of claim 8, further comprising: a centrifuge for separating RBCs and plasma from whole blood; and

a RBC storage receptacle connected to said centrifuge to receive RBCs separated from the whole blood; and a plasma storage receptacle connected to said centrifuge to receive plasma separated from the whole blood.

15. A method of storing whole blood, comprising:

adding whole blood to be collected into a first receptacle, the first receptacle containing a first additive;

transferring a second additive comprising one or more sodium salts, one or more magnesium salts, and one or more sugar alcohols from a second receptacle to the first receptacle;

wherein the transferring step occurs before or after the step of adding whole blood into the first receptacle.

16. The method of claim 15, wherein the one or more sodium salts include sodium bicarbonate, sodium acetate, and sodium bisphosphate, the one or more magnesium salts include magnesium citrate, and the one or more sugar alcohols include mannitol.

17. The method of claim 15, wherein the first additive and second additive combine to preserve any RBCs and maintain or mostly maintain coagulation capability of the whole blood for at least about 2 weeks or at least about 3 weeks.

18. The method of claim 17, further comprising separating RBCs from the whole blood.

19. The method of claim 18, further comprising storing the RBCs for a period of at least about 2 weeks or at least about 3 weeks or at least about 4 weeks or at least about 5 weeks or at least about 6 weeks.

20. The method of claim 15, further comprising passing the whole blood through at least one leukoreduction filter.