the present disclosure. The present disclosure having been generally described is explained in more detail in the aspects and examples below and in the detailed description.

In one aspect, the present disclosure refers to a use of a pharmaceutical composition that comprises (i) a blood product and (ii) a therapeutic agent selected from the group consisting of a platinum-based antineoplastic compound, an anti-mitotic agent, and an anti-microbial agent, in the manufacture of a medicament for administering a therapeutic agent to a patient, wherein the medicament is to be parenterally administered to the patient, wherein the blood product is whole blood.

In another aspect, the present disclosure refers to a use of a pharmaceutical composition that comprises (i) a blood product and (ii) a therapeutic agent that is an anti-microbial agent, to thereby treat the disease or disorder involving infection, in the manufacture of a medicament for treating a disease or disorder involving infection in a patient, wherein the medicament is to be parenterally administered to the patient, wherein the blood product is whole blood.

In a further aspect, the present disclosure refers to a pharmaceutical composition, comprising a blood product and one or more therapeutic agents, wherein the therapeutic agent is selected from the group consisting of a platinum-based antineoplastic compound, an anti-mitotic agent, and an anti-microbial agent, and wherein the blood product is whole blood.

In another aspect, the present disclosure refers to a pharmaceutical composition formulated for parenteral administration, the pharmaceutical composition comprising:

(i) a blood product; and

(ii) a therapeutic agent selected from the group consisting of a platinum-based antineoplastic compound, an anti-mitotic agent, and and anti-microbial agent, wherein the blood product is whole blood.

The present disclosure also provides a method for administering a therapeutic agent to a patient. The method comprises parenterally administering to a patient in need thereof a pharmaceutical composition that comprises (i) a blood product and (ii) a therapeutic agent selected from the group consisting of an anthracycline anti-cancer agent, a topoisomerase inhibitor, an oxazaphosphinanyl anti-cancer agent, a nitro-aryl anti-cancer agent, a thiol-reactive functional-group agent, a nitric oxide modulator, a platinum-based antineoplastic compound, acrylamide, acrylonitrile, bis(4-fluorobenzyl)trisulfide, a cardiac glycoside, an anti-mitotic agent, a nucleoside analog, an EGFR inhibitor, and an anti-microbial agent. The blood product may be an erythrocyte cell, or may be whole blood. Desirably, the pharmaceutical composition can be administered by intravenous administration. Exemplary anthracycline anti-cancer agents include doxorubicin and epirubicin.

The present disclosure also provides a method for administering a therapeutic agent to a patient. The method comprises parenterally administering to a patient in need thereof a pharmaceutical composition that comprises (i) a blood product and (ii) a therapeutic agent selected from the group consisting of an anthracycline anti-cancer agent, a topoisomerase inhibitor, an oxazaphosphinanyl anti-cancer agent, a nitro-aryl anti-cancer agent, a thiol-reactive functional-group agent, a nitric oxide modulator, a platinum-based antineoplastic compound, acrylamide, acrylonitrile, bis(4-fluorobenzyl)trisulfide, a cardiac glycoside, an anti-mitotic agent, a nucleoside analog, and an anti-microbial agent. The blood product may be an erythrocyte cell, or may be whole blood. Desirably, the pharmaceutical composition can be administered by intravenous administration. Exemplary anthracycline anti-cancer agents include doxorubicin and epirubicin.

The present disclosure further provides a method for administering a therapeutic agent to a patient. The method comprises parenterally administering to a patient in need thereof a pharmaceutical composition that comprises (i) a blood product and (ii) a therapeutic agent selected from the group consisting of an anthracycline anti-cancer agent, a topoisomerase inhibitor, an oxazaphosphinanyl anti-cancer agent, a nitro-aryl anti-cancer agent, a thiol-reactive functional-group agent, a nitric oxide modulator, a platinum-based antineoplastic compound, acrylamide, acrylonitrile, bis(4-fluorobenzyl)trisulfide, a cardiac glycoside, an anti-mitotic agent, and an anti-microbial agent. The blood product may be an erythrocyte cell, or may be whole blood. Desirably, the pharmaceutical composition can be administered by intravenous administration. Exemplary anthracycline anti-cancer agents include doxorubicin and epirubicin.

Claims:

1. Use of a pharmaceutical composition that comprises
   (i) a blood product and
   (ii) a therapeutic agent selected from the group consisting of a platinum-based antineoplastic compound, an anti-mitotic agent, and an anti-microbial agent, in the manufacture of a medicament for administering a therapeutic agent to a patient, wherein the medicament is to be parenterally administered to the patient,
   wherein the blood product is whole blood.

2. The use of claim 1, wherein the blood product comprises erythrocyte cells.

3. The use of claim 1 or 2, wherein the patient suffers from cancer.

4. The use of any one of claims 1-3, wherein the therapeutic agent is an anti-mitotic agent.

5. The use of claim 4, wherein the anti-mitotic agent is paclitaxel.

6. The use of claim 3, wherein the cancer is

   (a) a solid tumor, wherein the solid tumor is a sarcoma or carcinoma;
   (b) brain cancer, bladder cancer, breast cancer, cervical cancer, cholangiocarcinoma, colon cancer, colorectal cancer, endometrial cancer, esophageal cancer, lung cancer, liver cancer, melanoma, ovarian cancer, pancreatic cancer, prostate cancer, rectal cancer, renal cancer, stomach cancer, testicular cancer, uterine cancer, or Kaposi's sarcoma;
   (c) a leukemia or lymphoma;
   (d) breast cancer, bladder cancer, or Kaposi's sarcoma; or
   (e) lymphoma or acute lymphocytic leukemia.

7. The use of any one of claims 1-3 and 6, wherein the therapeutic agent is a platinum-based antineoplastic compound.

8. The use of claim 7, wherein

the platinum-based antineoplastic compound is selected from the group consisting of cisplatin, carboplatin, and
oxaliplatin.

9. The use of any one of claims 1-8, wherein the patient suffers from sickle cell disease, pulmonary hypertension, or an ischemic condition.

10. Use of a pharmaceutical composition that comprises
(i) a blood product and
(ii) a therapeutic agent that is an anti-microbial agent, to thereby treat the disease or disorder involving infection, in the manufacture of a medicament for treating a disease or disorder involving infection in a patient, wherein the medicament is to be parenterally administered to the patient,
wherein the blood product is whole blood.

11. The use of claim 10, wherein the blood product comprises erythrocyte cells.

12. The use of claim 10 or 11, wherein the parenterally administering is intravenous administration.

13. The use of any one of claims 10-12, wherein
(a) the disease or disorder involving infection is sepsis;
(b) the disease or disorder involving infection is an infectious disease that affects macrophages,wherein the infectious disease that affects macrophages is mycoplasma tuberculosis, mycoplasma seprae, leprosy, zika virus infection, Q fever, HIV, leishmaniasis, toxoplasmosis, babesia, or bartonella infection; or
(c) the disease or disorder involving infection is a microbial infection.

14. The use of claim 13, wherein the microbial infection is
(a) an infection with a virus, wherein the virus is hepatitis C virus, hepatitis B virus, hepatitis A virus, dengue virus, west nile virus, yellow fever virus, Japanese encephalitis virus, St. Louis encephalitis virus, human immunodeficiency virus (HIV), zika virus, Ebola virus, Marburg virus, chikungunya virus, Semliki forest virus, pichinde virus, influenza A virus, respiratory syncytial virus, vaccinia virus, herpes simplex virus type 1, herpes simplex virus type 2, human cytomegalovirus, rabies virus, paramyxovirus, varicella-zoster virus, human T cell lymphocytic virus, human herpes virus-6, human herpes virus-7, or human herpes virus-8;
(b) an intracellular infection with a microbial species, wherein the microbial species is *Mycobacterium tuberculosis, Mycobacterium leprae, Mycobacterium bovis, Klebsiella*

pneumonia, Salmonella, Chlamydia muridarum, Chlamydia pneumonia, Burkholderia cenocepacia, Staphylococcus aureus, Coxiella burnetti, or *Shigella flexneri;*

(c) antibiotic resistant, wherein the antibiotic resistant microbial infection is methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin intermediate resistant *Staphylococcus aureus* (VISA), vancomycin resistant *Staphylococcus aureus* (VRSA), vancomycin-resistant *Enterococci* (VRE), antibiotic resistant *Neisseria gonorrhoeae*, carbapenem-resistant *Enterobacteriaceae* (CRE), VRE endocarditis, pan-resistant *Acinetobacter*, drug resistant *Escherichia coli*, chronic osteomyelitis, extensively drug resistant tuberculosis, Shiga toxin-producing *Escherichia coli*, antimicrobial-resistant sepsis, or multi-drug resistant *Pseudomonas*;

(d) *Toxoplasma gondii* infection or *Leishmania amazonensis* infection;

(e) malaria; or

(f) infection with *Histoplasma capsulatum* or *Candida albicans*.

15. The use of any one of claims 1-3 and 10-14, wherein the therapeutic agent is an anti-microbial agent, wherein the anti-microbial agent is an antibiotic, an antiviral

wherein the antibiotic is vancomycin or imipenem.

16. The use of any one of claims 1-15, wherein the pharmaceutical composition is prepared by mixing the blood product and the therapeutic agent wherein

(a) the pharmaceutical composition is incubated for about 30 minutes to about 240 minutes at a temperature that ranges from about 18°C to about 25°C after mixing before being administered to the patient, or

(b) the pharmaceutical composition is incubated for over 4 hours at a refrigerated condition, or for up to about 60 minutes at about 37°C, after mixing before being administered to the patient.

17. The use of any one of claims 1-16, wherein the pharmaceutical composition further comprises an anticoagulant

wherein the anticoagulant comprises one or more of heparin and a citrate salt, wherein the anticoagulant is present in the pharmaceutical composition in an amount ranging from about 0.1% wt/wt to about 15% wt/wt.

18. The use of any one of claims 1-17, wherein the pharmaceutical composition contains at least one therapeutic agent at a concentration of at least 10 μg/mL.

19. The use of any one of claims 1-18, wherein the blood product constitutes at least 30% wt/wt of the pharmaceutical composition or from about 60% wt/wt to about 99% wt/wt of the pharmaceutical composition.

20. The use of any one of claims 1-19, wherein an aliquot of whole blood is to be obtained from the patient, and said aliquot is used to prepare the pharmaceutical composition for administration to the patient.

21. The use of any one of claims 1-20, wherein the patient is an adult human.

22. The use of any one of claims 1-21, wherein the patient does not suffer from anemia or have reduced blood volume, or the patient has at least 95% of the amount of their average daily blood volume.

23. A pharmaceutical composition, comprising a blood product and one or more therapeutic agents, wherein the therapeutic agent is selected from the group consisting of a platinum-based antineoplastic compound, an anti-mitotic agent, and an anti-microbial agent, and wherein the blood product is whole blood.

24. A pharmaceutical composition formulated for parenteral administration, the pharmaceutical composition comprising:

    (i) a blood product; and
    (ii) a therapeutic agent selected from the group consisting of a platinum-based antineoplastic compound, an anti-mitotic agent, and an anti-microbial agent, wherein the blood product is whole blood.

25. The pharmaceutical composition of claim 23 or 24, wherein the blood product comprises erythrocyte cells, wherein the erythrocyte cells have not undergone any manipulation selected from the group consisting of genetic modification, electroporation, conjugation through biotin, conjugation to a cell-penetrating peptide, conjugation to hemoglobin, dimethyl sulfoxide osmotic pulse, endocytosis and hypotonic preswelling, hypotonic dilution, and hypo-osmotic dialysis.

26. The pharmaceutical composition of any one of claims 23-25, wherein the pharmaceutical composition further comprises an anticoagulant, wherein the anticoagulant comprises one or more of heparin and a citrate salt or the anticoagulant is present in the pharmaceutical composition in an amount ranging from about 0.1% wt/wt to about 15% wt/wt.

27. The pharmaceutical composition of any one of claims 23-26, wherein the pharmaceutical composition contains at least one therapeutic agent at a concentration of at least 10 μg/mL.

28. The pharmaceutical composition of any one of claims 23-27, wherein the blood product constitutes at least 30% wt/wt of the pharmaceutical composition.

29. The pharmaceutical composition of any one of claims 23-28, wherein the whole blood is autologous whole blood.

31. The pharmaceutical composition of claim 23 or 24, wherein the anti-microbial agent is an antibiotic selected from vancomycin and imipenem.

32. The pharmaceutical composition of claim 23 or 24, wherein the anti-mitotic agent is paclitaxel.

33. The pharmaceutical composition of claim 23 or 24, wherein the platinum-based antineoplastic compound is selected from the group consisting of cisplatin, carboplatinum and oxaliplatin.

34. The use of claim any one of claims 1-22, wherein the whole blood is autologous whole blood.

35. The use of claim 4, wherein the anti-mitotic agent is paclitaxel, and the cancer is selected from the group consisting of ovarian cancer, breast cancer, lung cancer, Kaposi sarcoma, cervical cancer, or pancreacic cancer.

36. The use of claim 7, wherein the platinum-based antineoplastic compound is carboplatin, and the cancer is selected from the group consisting of ovarian cancer, lung cancer, head and neck cancer, brain cancer, and neuroblastoma.

37. The use of claim 7, wherein the platinum-based antineoplastic compound is oxaliplatin, and the cancer is colorectal cancer.