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 in the manufacture of a medicament for treating a disease or disorder, wherein the pharmaceutical composition comprises (i) whole blood 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 pharmaceutical composition is to be parenterally administered to a patient in need thereof to treat the disease or the disorder, and wherein the disease or the disorder is selected from the group consisting of: cancer, sickle cell disease, pulmonary hypertension, and an ischemic condition.

In another aspect, the present disclosure refers to a use of a pharmaceutical composition in the manufacture of a medicament for treating a disease or a disorder involving an infection, wherein the pharmaceutical composition comprises (i) whole blood and (ii) imipenem, and wherein the pharmaceutical composition is to be parenterally administered to a patient in need thereof.
In another aspect, the present disclosure refers to a pharmaceutical composition for treating cancer in a patient in need thereof and formulated for parenteral administration, the pharmaceutical composition comprising:(i) whole blood; and (ii) a therapeutic agent selected from the group consisting of: a platinum-based antineoplastic compound and an anti-mitotic agent, and wherein the cancer is selected from the group consisting of: ovarian cancer, breast cancer, lung cancer, Kaposi sarcoma, cervical cancer, pancreatic cancer, head and neck cancer, brain cancer, neuroblastoma, and colorectal cancer.

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.

Claims:

1. Use of a pharmaceutical composition in the manufacture of a medicament for treating a disease or a disorder,

wherein the pharmaceutical composition comprises

(i) whole blood 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 pharmaceutical composition is to be parenterally administered to a patient in need thereof to treat the disease or the disorder, and

wherein the disease or the disorder is selected from the group consisting of: cancer, sickle cell disease, pulmonary hypertension, and an ischemic condition.

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

3. The use of claim 1 or 2, wherein the disease or the disorder is cancer.

4. The use of any one of claims 1-3, wherein the therapeutic agent is the 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 the 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 disease or the disorder comprises sickle cell disease, pulmonary hypertension, or the ischemic condition.

10. Use of a pharmaceutical composition in the manufacture of a medicament for treating a disease or a disorder involving an infection,

wherein the pharmaceutical composition comprises

(i) whole blood and

(ii) imipenem, and

wherein the pharmaceutical composition is to be parenterally administered to a patient in need thereof.

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

12. The use of claim 10 or 11, wherein the pharmaceutical composition is to be intravenously administered.

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 1-14, wherein the pharmaceutical composition is prepared by mixing the whole blood and the therapeutic agent, wherein

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

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

16. The use of any one of claims 1-14 and 16, wherein the pharmaceutical composition further comprises an anticoagulant,
wherein the anticoagulant comprises one or more of heparin and a citrate salt, and wherein the anticoagulant is present in the pharmaceutical composition in an amount ranging from 0.1% wt/wt to 15% wt/wt.

17. The use of any one of claims 1-14 and 16-17, wherein the therapeutic agent is present at a concentration of at least 10 μg/mL in the pharmaceutical composition.

18. The use of any one of claims 1-14 and 16-18, wherein the whole blood comprises at least 30% wt/wt of the pharmaceutical composition or is in a range from 60% wt/wt to 99% wt/wt of the pharmaceutical composition.

19. The use of any one of claims 1-14 and 16-19, wherein an aliquot of the whole blood is to be obtained from the patient and is used to prepare the pharmaceutical composition.

20. The use of any one of claims 1-14 and 16-20, wherein the patient is an adult human.

21. The use of any one of claims 1-14 and 16-21, 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.

22. A pharmaceutical composition for treating cancer in a patient in need thereof, the pharmaceutical composition comprising:

whole blood and a therapeutic agent,

wherein the therapeutic agent is selected from the group consisting of: a platinum-based antineoplastic compound and an anti-mitotic agent, and

wherein the cancer is selected from the group consisting of: ovarian cancer, breast cancer, lung cancer, Kaposi sarcoma, cervical cancer, pancreatic cancer, head and neck cancer, brain cancer, neuroblastoma, and colorectal cancer.

23. A pharmaceutical composition for treating cancer in a patient in need thereof and formulated for parenteral administration, the pharmaceutical composition comprising:

(i) whole blood; and

(ii) a therapeutic agent selected from the group consisting of: a platinum-based antineoplastic compound and an anti-mitotic agent, wherein the cancer is selected from the group consisting of: ovarian cancer, breast cancer, lung cancer, Kaposi sarcoma, cervical cancer, pancreatic cancer, head and neck cancer, brain cancer, neuroblastoma, and colorectal cancer.

24. The pharmaceutical composition of claim 22 or 23, wherein the whole blood comprises erythrocyte cells, and 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.

25. The pharmaceutical composition of any one of claims 22-24, wherein the pharmaceutical composition further comprises an anticoagulant, and 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 0.1% wt/wt to 15% wt/wt.

26. The pharmaceutical composition of any one of claims 22-25, wherein the therapeutic agent is present at a concentration of at least 10 μg/mL in the pharmaceutical composition.

27. The pharmaceutical composition of any one of claims 22-26, wherein the whole blood comprises at least 30% wt/wt of the pharmaceutical composition.

28. The pharmaceutical composition of any one of claims 22-27, wherein the whole blood is autologous whole blood.

29. The pharmaceutical composition of claim 22 or 23, wherein the anti-mitotic agent is paclitaxel.

30. The pharmaceutical composition of claim 22 or 23, wherein the platinum-based antineoplastic compound is selected from the group consisting of: cisplatin, carboplatin, and oxaliplatin.

31. The use of any one of claims 1-21, wherein the whole blood is autologous whole blood.

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

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

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