

IONIC LIQUID FORMULATIONS FOR TREATING INFLAMMATORY AND AUTOIMMUNE DISEASES

CROSS-REFERENCE

[0001] This application claims the benefit of U.S. Provisional Patent Application No. 63/184,333 filed on May 05, 2021, the entire contents of which are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

[0002] Inflammatory and autoimmune diseases are diseases characterized by a hyperactive immune system. Despite advances, there remains a need for novel treatments for inflammatory and autoimmune diseases.

SUMMARY OF THE INVENTION

[0003] Provided herein, in some aspects, *inter alia*, is a composition comprising a therapeutic agent and at least one ionic liquid, wherein the therapeutic agent comprises an antibody or an antibody reagent.

[0003a] In one aspect, provided herein is a composition comprising a therapeutic agent and at least one ionic liquid, wherein the therapeutic agent comprises an antibody or an antibody reagent; and wherein the at least one ionic liquid comprises an anionic component selected from the group consisting of malonic acid, 3-phenylpropanoic acid, mandelic acid, DL-2-phenylpropionic acid, glycolic acid, malic acid, tartaric acid, 3-(4-hydroxyphenyl)propionic acid, decanoic acid, lactic acid, cinnamic acid, acetic acid, citric acid, phosphoric acid, 2-octenoic acid, citronellic acid, succinic acid, salicylic acid, and benzoic acid.

[0003b] In one aspect, provided herein is a pharmaceutical composition comprising the composition as described herein, and a pharmaceutically acceptable excipient.

[0003c] In one aspect, provided herein is a use of a pharmaceutical composition comprising the composition as described herein in the manufacture of a medicament for treating a disease or a disorder in a subject in need thereof, wherein the pharmaceutical composition comprises a therapeutically effective amount of the composition.

[0003d] In one aspect, provided herein use of the composition as described herein for enhancing delivery of a therapeutic agent into a systemic circulation in a subject in need thereof, wherein the therapeutic agent is formulated as the composition; and optionally, wherein the subject has a disease or a disorder.

[0003e] In one aspect, the pharmaceutical composition comprising the composition as described herein for use in therapy.

[0004] In some embodiments, the at least one ionic liquid comprises choline as a cation

component.

[0005] In some embodiments, the at least one ionic liquid comprises an anionic component selected from the group consisting of malonic acid, 3-phenylpropanoic acid, mandelic acid, DL-2-phenylpropionic acid, glycolic acid, malic acid, tartaric acid, 3-(4-hydroxyphenyl)propionic acid, decanoic acid, lactic acid, cinnamic acid, acetic acid, citric acid, phosphoric acid, 2-octenoic acid, citronellic acid, succinic acid, salicylic acid, and benzoic acid.

[0006] In some embodiments, the at least one ionic liquid comprises a cationic component and an anionic component in the molar ratio of 1:1, 1:2, 1:3, 1:4, 2:1, 3:1, or 4:1.

[0007] In some embodiments, the at least one ionic liquid comprises choline-3-phenylpropanoic acid in the molar ratio of 1:1, choline-glycolic acid in the molar ratio of 1:1, choline-glycolic acid in the molar ratio of 2:1, choline-glycolic acid in the molar ratio of 1:2, choline-malic acid in the molar ratio of 2:1, choline-malic acid in the molar ratio of 1:1, choline-tartaric acid in the molar ratio of 2:1, choline-lactic acid in the molar ratio of 1:1, choline-cinnamic acid in the molar ratio of 1:1, choline-citric acid in the molar ratio of 3:1, choline-succinic acid in the molar ratio of 2:1, or any combination thereof.

[0008] In some embodiments, the composition comprises a first ionic liquid and a second ionic liquid, wherein the first ionic liquid and the second ionic liquid are different.

[0009] In some embodiments, the first ionic liquid comprises choline as a cation component, the second ionic liquid comprises choline as a cation component, or a combination thereof.