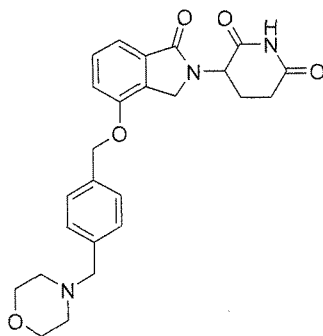


MA, Teirstein AS, Moller DR, Lower EE. Thalidomide for chronic sarcoidosis. Chest. 2002 Jul;122(1):227-32).

[0009] There remains a need for prophylactic or therapeutic drugs that can be used to treat or prevent immune-related and inflammatory diseases, including lupus, scleroderma, lupus pernio, sarcoidosis, Sjögren syndrome, ANCA-induced vasculitis, anti-phospholipid syndrome and myasthenia gravis.

5. SUMMARY

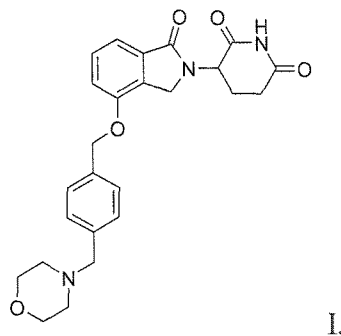
[0010] Provided herein are methods of treating, managing, ameliorating and/or preventing diseases, disorders and/or conditions associated with immune-related and inflammatory diseases comprising administering a therapeutically effective amount of a compound of formula I



Compound I,

or a pharmaceutically acceptable salt, solvate, hydrate, stereoisomer, tautomer or racemic mixtures thereof.

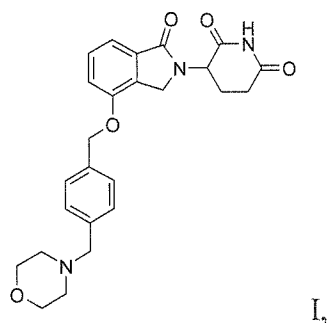
[0010a] In one aspect, there is provided a compound for use in treating, preventing or managing an immune-related disease or an inflammatory disease, wherein the compound corresponds to formula I



or a pharmaceutically acceptable salt, solvate, hydrate, stereoisomer, tautomer or racemic mixture thereof.

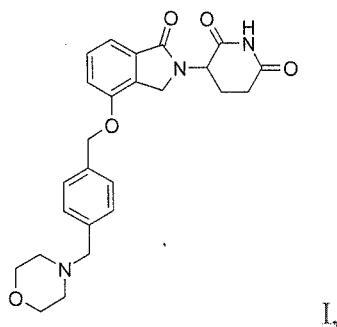
[0010b] In another aspect, there is provided a compound for use in reducing, inhibiting or preventing a symptom of systemic lupus erythematosus, wherein the symptom is selected from the group consisting of joint pain, joint swelling, arthritis, chest pain

when taking a deep breath, fatigue, fever with no other cause, general discomfort, uneasiness, hair loss, mouth sores, swollen lymph nodes, sensitivity to sunlight, skin rash, headaches, numbness, tingling, seizures, vision problems, personality changes, abdominal pain, nausea, vomiting, abnormal heart rhythms, coughing up blood and difficulty breathing, patchy skin color and Raynaud's phenomenon, and wherein the compound corresponds to formula I



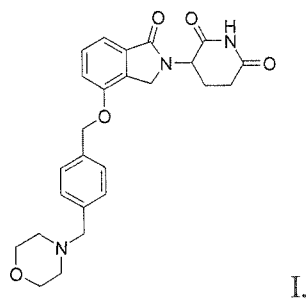
or a pharmaceutically acceptable salt, solvate, hydrate, stereoisomer, tautomer or racemic mixture thereof.

[0010c] In another aspect, there is provided a compound for use in reducing, inhibiting or preventing a symptom of scleroderma, wherein the symptom is selected from the group consisting of (i) gradual hardening, thickening, and tightening of the skin; (ii) skin discoloration; (iii) numbness of extremities; (iv) shiny skin; (v) small white lumps under the surface of the skin that erupt into a chalky white fluid; (vi) Raynaud's esophagaeal dysfunction; (vii) telangiectasia; (viii) pain and/or stiffness of the joints; (ix) swelling of the hands and feet; (x) itching of the skin; (xi) stiffening and curling of the fingers; (xii) ulcers on the outside of certain joints, such as knuckles and elbows; (xiii) digestive problems, such as heartburn, difficulty in swallowing, diarrhea, irritable bowel, and constipation; (xiv) fatigue and weakness; (xv) shortness of breath; (xvi) arthritis; (xvii) hair loss; (xviii) internal organ problems; (xix) digital ulcers; and (xx) digital auto-amputation, and wherein the compound corresponds to formula I



or a pharmaceutically acceptable salt, solvate, hydrate, stereoisomer, tautomer or racemic mixture thereof.

[0010d] In another aspect, there is provided a compound for use in improving the modified Rodnan skin score, reducing or improving the skin thickness, reducing or improving skin induration, improving the pulmonary function, improving the dermatology quality of life index, improving the carbon monoxide diffusing capacity, improving the Mahler Dyspnea index, improving the Saint George's Respiratory Questionnaire score, improving the UCLA scleroderma clinical trial consortium gastrointestinal tract score, improving flow-mediated dilatation or improving or increasing the six minute walk distance of a patient having scleroderma, wherein the compound corresponds to compound I having formula:



or a pharmaceutically acceptable salt, solvate, hydrate, stereoisomer, tautomer or racemic mixture thereof.

[0010e] In another aspect, there is provided a compound for use in modulating activity of a B cell comprising contacting the cell with an effective amount of the compound, wherein the compound is (S)-3-[4-(4-morpholin-4-ylmethylbenzyloxy)-1-oxo-1,3-dihydro-isoindo-2-yl]piperidine-2,6-dione or a pharmaceutically acceptable salt, solid form, solvate, hydrate, tautomer, stereoisomer or racemate thereof.

[0010f] In another aspect, there is provided a compound for use in modulating activity of a T cell comprising contacting the cell with an effective amount of the compound, wherein the compound is (S)-3-[4-(4-morpholin-4-ylmethylbenzyloxy)-1-oxo-1,3-dihydro-isoindo-2-yl]piperidine-2,6-dione or a pharmaceutically acceptable salt, solid form, solvate, hydrate, tautomer, stereoisomer or racemate thereof.

[0010g] In another aspect, there is provided a method of identifying a subject who is likely to be responsive to a treatment of a disease, disorder, or condition with a treatment compound, comprising:

a) determining the level of a biomarker in a biological sample obtained from the subject, wherein the biomarker is CD44, CD83 or combination thereof; and

b) comparing the level of the biomarker in the biological sample from the subject to a reference level of the biomarker;

wherein the subject is likely to be responsive to the treatment if the level of the biomarker in the biological sample obtained from the subject is altered as compared to the reference level of the biomarker.

[0010h] In another aspect, there is provided a method of identifying a subject who is likely to be responsive to a treatment of a disease, disorder, or condition with a treatment compound, comprising:

a) determining the level of a biomarker in a biological sample obtained from the subject, wherein the biomarker is CD44, CD83 or combination thereof;

b) determining the level of the biomarker in a control sample; and

c) comparing the level of the biomarker in the biological sample from the subject to the level of the biomarker in the control sample;

wherein the subject is likely to be responsive to the treatment if the level of the biomarker in the biological sample from the subject is altered as compared to the level of the biomarker in the control sample.

[0010i] In another aspect, there is provided a method of predicting the responsiveness of a subject to a treatment of a disease, disorder, or condition with a treatment compound, comprising:

a) determining the level of a biomarker in a biological sample obtained from the subject, wherein the biomarker is CD44, CD83 or combination thereof; and

b) comparing the level of the biomarker in the biological sample to a reference level of the biomarker;

wherein the difference between the level of the biomarker in the biological sample from the subject and the reference level of the biomarker correlates with the responsiveness of the subject to the treatment.

[0010j] In another aspect, there is provided a method of predicting the responsiveness of a subject to a treatment of a disease, disorder, or condition with a treatment compound, comprising:

a) determining the level of a biomarker in a biological sample obtained from the subject, wherein the biomarker is CD44, CD83 or combination thereof;

b) determining the level of the biomarker in a control sample; and

c) comparing the level of the biomarker in the biological sample from the subject to the level of the biomarker in the control sample;

wherein the difference between the level of the biomarker in the biological sample from the subject and the level of the biomarker in the control sample correlates with the responsiveness of the subject to the treatment.

[0010k] In another aspect, there is provided a method of monitoring the efficacy of a treatment of a disease, disorder, or condition in a subject treated with a treatment compound, comprising:

a) determining the level of a biomarker in a first biological sample that had been obtained from the subject, wherein the biomarker is the CD44, CD83 or combination thereof;

b) determining the level of the biomarker in a second biological sample that had been obtained from the subject after administration of the treatment compound, and

c) comparing the levels of the biomarker in the first and second biological samples; wherein the subject is responsive to the treatment if the level of the biomarker in the second biological sample of the subject is altered as compared to the level of the biomarker in the first biological sample of the subject.

[0010l] In another aspect, there is provided a method of monitoring the compliance of a subject with a treatment of a disease, disorder, or condition with a treatment compound, comprising:

a) determining the level of a biomarker in a biological sample that had been obtained from the subject, wherein the biomarker is CD44, CD83 or combination thereof; and

b) comparing the level of the biomarker with the level of the biomarker in a control untreated sample from the subject;

wherein the change in the level of the biomarker in the biological sample in comparison with the level of the biomarker in the control sample indicates the compliance of the subject with the treatment.

[0011] In one embodiment, the compound is 3-[4-(4-morpholin-4-ylmethyl-benzyloxy)-1-oxo-1,3-dihydro-isoindol-2-yl]-piperidine-2,6-dione.

[0012] In one embodiment, the compound is a pharmaceutically acceptable salt of 3-[4-(4-morpholin-4-ylmethyl-benzyloxy)-1-oxo-1,3-dihydro-isoindol-2-yl]-piperidine-2,6-dione.

[0013] In one embodiment, the compound is 3-[4-(4-morpholin-4-ylmethyl-benzyloxy)-1-oxo-1,3-dihydro-isoindol-2-yl]-piperidine-2,6-dione hydrochloride.

[0014] In one embodiment, the compound is (S)-3-[4-(4-morpholin-4-ylmethyl-benzyloxy)-1-oxo-1,3-dihydro-isoindol-2-yl]-piperidine-2,6-dione, having the following structure: