

CLAIMS:

1. A method of treating cancer in a patient, comprising:
 - placing a device comprising a plurality of microneedles on the skin of the patient proximate to a first position under the skin of the patient, wherein the first position is proximate to lymph vessels and/or lymph capillaries in the patient's lymphatic system, and wherein the microneedles have a surface comprising nanotopography;
 - inserting the plurality of microneedles into the patient to a depth whereby at least the epidermis is penetrated and an end of at least one of the microneedles is proximate to the first position; and
 - administering via the plurality of microneedles to the first position an effective amount of an anti-PD-1 therapeutic agent or an effective amount of an anti-PD-L1 therapeutic agent to treat cancer in a patient.
2. A method of preventing or reducing cancer metastasis in a patient, comprising:
 - locating at least one lymph node in the patient that intervenes in the lymphatic system between a solid cancer tumor and a draining duct;
 - placing a device comprising a plurality of microneedles on the skin of the patient proximate to a first position under the skin of the patient located between the intervening lymph node and the solid cancer tumor, wherein the first position is proximate to lymph vessels and/or lymph capillaries in the patient's lymphatic system, and wherein the microneedles have a surface comprising nanotopography;
 - inserting the plurality of microneedles into the patient to a depth whereby at least the epidermis is penetrated and an end of at least one of the microneedles is proximate to the first position; and
 - administering via the plurality of microneedles to the first position a therapeutically effective amount of an anti-PD-1 therapeutic agent or an

anti-PD-L1 therapeutic agent that is effective for preventing or reducing cancer metastasis in the patient.

3. A method of preventing or reducing cancer metastasis in a patient, comprising:
- 5 locating a solid cancer tumor in the patient;
 locating at least one lymph node in the patient that intervenes in the lymphatic
 system between the solid cancer tumor and a draining duct;
 placing a device that comprises a plurality of microneedles on the skin of the
 patient at a first location on the skin of the patient that is proximate to
10 lymph capillaries and/or lymph vessels that flow into the intervening
 lymph node, wherein the microneedles have a surface comprising
 nanotopography;
 inserting the plurality of microneedles into the patient to a depth whereby at
 least the epidermis is penetrated; and
15 administering via the plurality of microneedles to the lymph capillaries and/or
 lymph vessels that flow into the intervening lymph node a
 therapeutically effective amount of an anti-PD-1 therapeutic agent or an
 anti-PD-L1 therapeutic agent that is effective in preventing or reducing
 cancer metastasis in the patient.
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4. The method of any one of claims 1-3, wherein the cancer comprises a tumor.
5. The method of any one of claims 1-3, wherein the lymph node is a tumor draining
lymph node.
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6. The method of any one of claims 1-3, wherein the cancer is a cancer susceptible to
treatment with an anti-PD-1 therapeutic agent or anti-PD-L1 therapeutic agent.
7. The method of any one of claims 1-3, wherein bioavailability of the anti-PD-1
30 therapeutic agent or the anti-PD-L1 therapeutic agent is up to 10%, 15% 20%, 25%,
 30%, 35%, 40%, 45%, or 50%.

8. The method of any one of claims 1-3, wherein a serum Tmax of the anti-PD-1 therapeutic agent or the anti-PD-L1 therapeutic agent is from 10 to 100 hours.
9. The method of any one of claims 1-3, wherein a serum Cmax of the anti-PD-1 therapeutic agent or the anti-PD-L1 therapeutic agent is decreased up to 1.5-fold, 2-fold, 2.5-fold, 3-fold, 3.5-fold, or 4-fold, as compared to a serum Cmax following a therapeutically equivalent amount of the anti-PD-1 therapeutic agent or the anti-PD-L1 therapeutic agent administered by an intravenous delivery route.
10. The method of any one of claims 1-3, wherein a serum AUC_{0-t} of the anti-PD-1 therapeutic agent or the anti-PD-L1 therapeutic agent is decreased up to 1.5-fold, 2-fold, 2.5-fold, 3-fold, 3.5-fold, or 4-fold as compared to a serum AUC_{0-t} following a therapeutically equivalent amount of the anti-PD-1 therapeutic agent or the anti-PD-L1 therapeutic agent administered by an intravenous delivery route.
11. The method of any one of claims 1-3, wherein delivery of the anti-PD-1 therapeutic agent or the anti-PD-L1 therapeutic agent to one or more lymph nodes is increased up to 1.5-fold, 2-fold, 2.5-fold, 3-fold, 3.5-fold, or 4-fold as compared to delivery to one or more lymph nodes of a therapeutically equivalent amount of the anti-PD-1 therapeutic agent or the anti-PD-L1 therapeutic agent administered by an intravenous delivery route.
12. The method of any one of claims 1-3, wherein levels of the anti-PD-1 therapeutic agent or anti-PD-L1 therapeutic agent in one or more systemic organs is decreased 10-75% over a period of time as compared to levels in one or more systemic organs following a therapeutically equivalent amount of the anti-PD-1 therapeutic agent or the anti-PD-L1 therapeutic agent administered by an intravenous delivery route over a same period of time.
13. The method of claim 12, wherein the organ is a liver or a kidney.
14. The method of claim 12, wherein the period of time is up to 12 hours, 24 hours, 36 hours, 48 hours, 60 hours, or 72 hours.

15. The method of any one of claims 1-3, wherein the anti-PD-1 therapeutic agent or the anti-PD-L1 therapeutic agent is at least 90%, 95%, 99%, or 99.9% cleared from the patient's serum by 28 days after administration.
- 5 16. The method of any one of claims 1-3, wherein the administering results in an undetectable primary tumor and/or an undetectable secondary tumor.
17. The method of claim 16, wherein an incidence or probability of an undetectable primary tumor and/or an undetectable secondary tumor is at least 30%, 40%, 50%, 60%, 70%,
10 80%, 90%, 95%, or 99%.
18. The method of any one of claims 1-3, wherein exposure of the anti-PD-1 therapeutic agent or the anti-PD-L1 therapeutic agent to T-cells in the patient's lymphatic system is increased up to 1.5-fold, 2-fold, or 2.5-fold, as compared to exposure to T-cells in the patient's lymphatic system following a therapeutically equivalent amount of the anti-PD-1 therapeutic agent or the anti-PD-L1 therapeutic agent administered by an intravenous delivery route.
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19. The method of any one of claims 1-3, wherein exposure of the anti-PD-1 therapeutic agent or the anti-PD-L1 therapeutic agent to one or more solid cancer tumors in the patient's lymphatic system is increased up to 1.5-fold, 2-fold, or 2.5-fold, as compared to exposure to one or more solid cancer tumors in the patient's lymphatic system following a therapeutically equivalent amount of the anti-PD-1 therapeutic agent or the anti-PD-L1 therapeutic agent administered by an intravenous delivery route.
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20. The method of any one of claims 1-3, wherein tumor-infiltrating lymphocytes are increased up to 1.5-fold, 2-fold, or 2.5-fold as compared to tumor-infiltrating lymphocytes following a therapeutically equivalent amount of the anti-PD-1 therapeutic agent or the anti-PD-L1 therapeutic agent administered by an intravenous delivery route.
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21. The method of any one of claims 1-3, wherein incidence or severity of one or more immune-related Adverse Events is reduced as compared to one or more immune-related Adverse Events following a therapeutically equivalent amount of the anti-PD-1 therapeutic agent or the anti-PD-L1 therapeutic agent administered by an intravenous delivery route.