CLAIMS

WHAT IS CLAIMED IS:

1. Use of a therapeutic composition in the manufacture of a medicament for reducing progression to post-thrombotic syndrome (PTS) in a subject,

wherein the therapeutic composition comprises an anti-inflammatory agent and a therapeutic dosage of the anti-inflammatory agent ranges from about 0.1 mg per cm of a thrombosed segment to about 10 mg per cm of the thrombosed segment, and

wherein the therapeutic composition is to be delivered into a perivascular tissue at or near the thrombosed segment using a therapeutic delivering catheter, and

wherein the therapeutic delivering catheter is to be advanced within a lumen of a vein affected by DVT to or near the thrombosed segment of the vein, and

wherein the vein is identified in the subject affected by deep vein thrombosis (DVT) currently or previously and/or is at risk for progressing to PTS.

2. The use of claim 1, wherein the anti-inflammatory agent comprises a glucocorticoid.

3. The use of claim 2, wherein the glucocorticoid comprises dexamethasone.

4. The use of claim 3, wherein the vein affected by DVT comprises a plurality of thrombotic segments.

5. The use of claim 4, wherein the therapeutic composition is to be delivered to the plurality of thrombosed segments.

6. The use of claim 1, wherein the vein affected by DVT has undergone a catheter-directed thrombolysis or thrombectomy (CDT) previously.

7. The use of claim 1, wherein the vein affected by DVT has undergone an endovascular procedure previously, wherein the endovascular procedures comprises one or more of venous valve repair, venous bypass, and venous stents.

8. The use of claim 1, wherein a total dosage of the anti-inflammatory agent delivered into the vein affected by DVT ranges between about 1 mg and about 100 mg.

9. The use of claim 1, wherein a therapeutic concentration of the anti-inflammatory agent delivered into the vein affected by DVT ranges between about 0.1 mg/ml to about 10 mg/ml.

10. The use of claim 9, wherein a volume of the anti-inflammatory agent delivered into the vein affected by DVT ranges between about 0.01 ml per cm of the thrombosed vein to about 100 ml per cm of the thrombosed vein.

11. The use of claim 1, wherein a level of one or more inflammatory biomarkers decreases after the delivery of a therapeutic composition into a perivascular tissue at or near the thrombosed segment.

12. The use of claim 11, wherein the one or more inflammatory biomarkers comprises one or more of IL-1β, IL-2, IL-6, IL-8, IL-10, IFN-α, IFN-γ, ICAM-1, TNF-α, CRP, D-dimer, fibrinogen, MCP-1, IL-1Ra, IL-1α, MMP-1, MMP-2, MMP-8, MMP-9, TIMP, ICAM-1, VCAM-1, and soluble P-selectin.

13. The use of claim 11 or 12, wherein the level of one or more inflammatory biomarkers is measured from a sample from whole blood, plasma, serum, or perivascular tissue.

14. The use of claim 1, wherein a level of one or more anti-inflammatory biomarkers increases after the delivery of a therapeutic composition into a perivascular tissue at or near the thrombosed segment.

15. The use of claim 1, wherein the reduction in progression to PTS is assessed by maintenance or an increase in patency of the thrombosed segment.

16. The use of claim 15, wherein the maintenance or the increase in patency lasts for at least 5 weeks, 3 months, 6 months, 12 months, 18 months, or 24 months.

17. The use of claim 1, wherein the reduction in progression to PTS is assessed by a decrease or a lack of increase in rethrombosis in the thrombosed segment.

18. The use of claim 17, the decrease or the lack of increase in rethrombosis lasts for at least 5 weeks, 3 months, 6 months, 12 months, 18 months, or 24 months.

19. The use of claim 1, wherein the reduction in progression to PTS is assessed by a decrease or a lack of increase in venous reflux.

20. The use of claim 19, wherein the decrease or the lack of increase in venous reflux lasts for at least 5 weeks, 3 months, 6 months, 12 months, 18 months, or 24 months.

21. The use of claim 1, wherein the reduction in progression to PTS is assessed by a decrease or a lack of increase in fibrosis and stiffness of wall and valve of the vein affected by DVT.

22. The use of claim 1, wherein the reduction in progression to PTS is assessed by a decrease or a lack of increase in a symptom of PTS, wherein the symptom of PTS comprises one or more of pain, cramps, heaviness, pruritus, paresthesia, edema, skin induration, hyperpigmentation, venous ectasia, redness, and pain during calf compression.

23. The use of claim 1, wherein the reduction in progression to PTS is assessed by a decrease or a lack of increase in a Villalta score or a VCSS score.

24. The use of claim 1, wherein the vein affected by DVT currently or previously and/or is at risk for progressing to PTS is identified by fluordeoxyglucose-positron emission tomography (FDG-PET).

25. The use of claim 1, wherein the reduction in progression to PTS is assessed by FDG-PET scanning of the perivascular tissue.

26. The use of claim 25, wherein an increase in a residual local metabolic activity detected by FDG-PET indicates progression to PTS.

27. The use of claim 1, wherein the therapeutic composition comprises one or more component for extended release, sustained release, or controlled release.

28. A system for use in reducing progression to post-thrombotic syndrome (PTS) in a subject affected by deep vein thrombosis (DVT) currently or previously and/or is at risk for progressing to PTS, the system comprising:

a therapeutic composition comprising an anti-inflammatory agent;

a catheter configured to be placed within a vein affected by deep vein thrombosis (DVT) in the subject, wherein the catheter is to be advanced within a lumen of the vein affected by DVT to or near the thrombosed segment of the vein;

an expandable element at a distal end of the catheter, wherein the expandable element is inflatable from an involuted contracted configuration; and

an injection needle coupled to the expandable element,

wherein expanding the expandable element advances the injection needle in a direction transverse to a longitudinal axis of the catheter to puncture wall of the vein at or near a thrombosed segment of the vein, and

wherein, when the needle has punctured the wall of the vein, the needle delivers an amount of the therapeutic composition to a perivascular tissue at or near a thrombosed segment

of the vein, the amount being therapeutic to reducing progression to PTS, wherein the therapeutic dosage of the anti-inflammatory agent ranges from about 0.1 mg per cm of the thrombosed segment to about 10 mg per cm of the thrombosed segment.

29. The system of claim 28, wherein the expandable element is expandable to a circumference to fill a lumen of the vein, wherein the circumference is larger than 2 mm.