activity, do not inhibit urothelial response as measured by intercontraction intervals but can lead to urinary retention.

Accordingly, there remains a need for more and better treatment options for lower urinary tract disorders, including overactive bladder, detrusor instability, and urinary incontinence. Desirably, such treatments would address one or more of the problems associated with systemic administration of drugs and with highly invasive and expensive surgical procedures. Desirably, the treatment would also avoid or lessen the need for painful injections and repeated self-catheterization.

Brief Summary

In one aspect, the present invention refers to use of trospium in the manufacture of a medicament for the treatment of bladder dysfunction in a patient, wherein the medicament is to be locally administered into the bladder of a patient to achieve a sustained concentration of trospium in urine in the bladder sufficient to produce a continuous therapeutic concentration of trospium in bladder tissue, wherein the medicament is to be administered at a mean average amount of from 0.075 mg/day to 150 mg/day of trospium for a treatment period from 1 day to 180 days, wherein the sustained concentration of trospium in urine in the bladder is from 0.05 µg/ml to 100 µg/ml continuously over the treatment period. In yet another aspect, the present invention refers to a medical device comprising a housing configured for intravesical insertion; and a dosage form comprising trospium or a pharmaceutically acceptable salt of trospium, wherein the housing holds the dosage form and is configured to release the trospium into the bladder in an amount sufficient to produce a continuous concentration of trospium in urine in the bladder of from 0.05 µg/ml to 100 µg/ml over a treatment period of at least 1 day for the treatment of bladder dysfunction. In one example, a medicament is provided which

includes trospium for use in the treatment of bladder dysfunction by locally administering the trospium into the bladder of a patient to achieve a sustained concentration of trospium in urine in the bladder sufficient to produce a therapeutic concentration of trospium in bladder tissue. In examples of the medicament, the trospium is in the form of trospium chloride or another pharmaceutically acceptable salt of trospium. The locally administering into the patient's bladder is at a mean average amount of from 0.075 mg/day to about 150 mg/day of trospium for a treatment period of up to 180 days. In an example, the locally administering into the patient's bladder is at a mean average amount of 0.15 mg/day to 15 mg/day of trospium. In some examples, the treatment period is from 1 day to 90 days or from 1 day to 60 days.

In a particular example, the trospium is delivered into the bladder from an intravesical drug delivery device which releases trospium into the urine in the bladder over the treatment period. The device may release the trospium continuously over the period. In one example, the intravesical drug delivery device includes a housing which contains and controllably releases the trospium and which is elastically deformable between a retention shape configured to retain the device in a patient's bladder and a deployment shape for passage of the device through the patient's urethra. The trospium contained in the housing may be in a non-liquid form, such as tablets, granules, semisolids, capsules, or combinations thereof.

In another example, the trospium is delivered to the bladder from a coating substance, such as a mucoadhesive formulation, applied onto the bladder wall, wherein the coating substance continuously releases trospium into the urine in the bladder over a

sustained period. In still another example, the step of locally administering includes pumping a liquid form of the trospium into the bladder through a urethral catheter which is deployed into the bladder.

In another example, a method is provided for administering trospium to a patient in need of treatment of bladder dysfunction. The method includes locally administering trospium into the bladder of a patient to achieve a sustained concentration of trospium in urine in the bladder sufficient to produce a therapeutic concentration of trospium in bladder tissue. The method may further include administering a second therapeutic agent to the patient. The second therapeutic agent may also be administered intravesically or it may be administered by other routes.

In another example, there is provided the use of trospium in the manufacture of a medicament for the treatment of bladder dysfunction in a patient, wherein the medicament is to be locally administered into the bladder of a patient to achieve a sustained concentration of trospium in urine in the bladder sufficient to produce a therapeutic concentration of trospium in bladder tissue.

In yet another example, a drug delivery device is provided which is configured to release trospium when the drug delivery device is inserted into the bladder. In one embodiment, the device includes a housing configured for intravesical insertion, and a dosage form which comprises a pharmaceutically acceptable salt of trospium, wherein the housing holds the dosage form and is configured to release the trospium into the bladder in amount therapeutically effective for the treatment of bladder dysfunction. In one example, the device is configured to release a mean average amount of from 0.075 mg/day to about 150 mg/day of trospium for a treatment period of up to 180 days. For example, the device may be configured to release at a mean average amount of 0.15 mg/day to 15 mg/day of trospium. In some embodiments, the treatment period is from 1 day to 90 days or from 1 day to 60 days.

In some examples, the bladder dysfunction is selected from urinary frequency, urgency, nocturia, urge-incontinence associated with detrusor instability, urge syndrome, and detrusor hyperreflexia.

Brief Description of the Drawings

FIGS. 1A-1B illustrate one embodiment of an intravesical drug delivery device that may be used for administering trospium as described herein.

FIGS. 2A-2B illustrate another embodiment of an intravesical drug delivery device that may be used for administering trospium as described herein.

FIGS. 3A-3C illustrate still another embodiment of an intravesical drug delivery device that may be used for administering trospium as described herein.

I claim:

1. Use of trospium in the manufacture of a medicament for the treatment of bladder dysfunction in a patient, wherein the medicament is to be locally administered into the bladder of a patient to achieve a sustained concentration of trospium in urine in the bladder sufficient to produce a continuous therapeutic concentration of trospium in bladder tissue,

   wherein the medicament is to be administered at a mean average amount of from 0.075 mg/day to 150 mg/day of trospium for a treatment period from 1 day to 180 days,

   wherein the sustained concentration of trospium in urine in the bladder is from 0.05 μg/ml to 100 μg/ml continuously over the treatment period.

2. The use of claim 1, further comprising at least a second therapeutic agent to be administered to the patient.

3. The use of claim 2, wherein the second therapeutic agent is to be administered intravesically.

4. The use of claim 1, wherein the trospium is in the form of trospium chloride or another pharmaceutically acceptable salt of trospium.

5. A medical device comprising:
   a housing configured for intravesical insertion; and
   a dosage form comprising trospium or a pharmaceutically acceptable salt of trospium,

   wherein the housing holds the dosage form and is configured to release the trospium into the bladder in an amount sufficient to produce a continuous concentration of trospium in urine in the bladder of from 0.05 μg/ml to 100 μg/ml over a treatment period of at least 1 day for the treatment of bladder dysfunction.

6. The device of claim 5, wherein the device is configured to release at a mean average amount of from 0.075 mg/day to 150 mg/day of trospium for a treatment period of from 1 day to 180 days.

7. The device of claim 6, wherein the device is configured to release at a mean average amount of 0.15 mg/day to 15 mg/day of trospium.

8. The device of claim 5, wherein the treatment period is from 1 day to 90 days.

9. The device of claim 5, wherein the treatment period is from 1 day to 60 days.

10. The use of claim 1, wherein the sustained concentration of trospium in urine in the bladder is from 0.1 μg/ml to 100 μg/ml continuously over the treatment period.

11. The use of claim 1, wherein the sustained concentration of trospium in urine in the bladder is from 10 μg/ml to 100 μg/ml continuously over the treatment period.

12. The use of claim 1, wherein the sustained concentration of trospium in urine in the bladder is from 1 μg/ml to 10 μg/ml continuously over the treatment period.

13. The use of claim 1, wherein the treatment is for overactive bladder.

14. The use of claim 1, wherein the locally administering into the patient's bladder is at a mean average amount of 0.15 mg/day to 15 mg/day of trospium.

15. The use of claim 1, wherein the treatment period is from 1 day to 90 days.

16. The use of claim 1, wherein the treatment period is from 1 day to 60 days.

17. The use of claim 1, wherein the trospium is delivered into the bladder from an intravesical drug delivery device which releases trospium into the urine in the bladder.

18. The use of claim 17, wherein the intravesical drug delivery device continuously releases trospium into the urine in the bladder over the treatment period.

19. The use of claim 17 or 18, wherein the intravesical drug delivery device comprises a housing which contains and controllably releases trospium and is elastically deformable between a retention shape configured to retain the device in a patient's

bladder and a deployment shape for passage of the device through the patient's urethra.

20. The use of claim 19, wherein the trospium contained in the housing is in a non-liquid form.

21. The use of claim 20, wherein the non-liquid form is selected from the group consisting of tablets, granules, semisolids, capsules, and combinations thereof.

22. The device of claim 5, wherein the continuous concentration of trospium in urine in the bladder is from 0.1 μg/ml to 100 μg/ml continuously over the treatment period.

23. The device of claim 5, wherein the continuous concentration of trospium in urine inthe bladder is from 10 μg/ml to 100 μg/ml continuously over the treatment period.

24. The device of claim 5, wherein the continuous concentration of trospium in urine in the bladder is from 1 μg/ml to 10 μg/ml continuously over the treatment period.

25. The device of claim 5, wherein the housing is configured to continuously release trospium into the urine in the bladder over the treatment period.

26. The device of claim 5, wherein the device is elastically deformable between a retention shape configured to retain the device in a patient's bladder and a deployment shape for passage of the device through the patient's urethra.

27. The device of claim 5, wherein the trospium contained in the housing is in a non-liquid form.

28. The device of claim 27, wherein the non-liquid form is selected from the group consisting of tablets, granules, semisolids, capsules, and combinations thereof.