Title: CONTROLLED VOLUME INJECTION/ASPIRATION DEVICE

Abstract: A controlled volume injection/aspiration device includes a syringe having a body for containing a medicament, a needle and a piston slidably disposed within the body. A shell is provided for receiving the syringe body and a plunger rack is disposed within the shell. A manually operated control is disposed in an operative relationship with the plunger rack for moving the plunger rack in a stepwise forward direction causing the piston to eject discrete doses of medication from the syringe body through the needle. The manual operated control is also operative for moving the piston in a stepwise reverse direction causing the piston to aspirate fluid into the syringe body through the needle.
CONTROLLED VOLUME INJECTION/ASPIRATION DEVICE

The present application is a continuation of U.S. Provisional Patent Application Serial No. 60/463,638 filed April 16, 2003 which is incorporated herewith in its entirety by this specific reference.

The present invention is generally directed to a multiple dosage injection device and more particularly to a multiple dosage injection dispensing pen which is suitable for precise placement of desired amounts of BOTOX® to specific muscle tissue.

Current procedures for injection of BOTOX® utilize a syringe and the injection volume is controlled by a users' ability to stop on graduations indicated on a side of the syringe.

Local administration of a chemodenervating agent, such as botulinum toxin, often is performed through subcutaneous, intramuscular, paramuscular injection, or percutaneous installation. When the chemodenervating agent is injected by subcutaneous injection the agent reaches the muscle by perfusion.

Typically, a multiple number of small injections is utilized to treat a specific area with each injection being in the range of between about 5 microliters and about 1ml.
As hereinabove noted, heretofore procedures utilizing conventional syringes have difficulty in controlling small injectionable amounts with the consistency.

The present invention provides for a controlled volume injection/aspiration device for the effective administration of a chemodenervating agent, such as botulinum toxin, to a selected area.

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10 SUMMARY OF THE INVENTION

A controlled volume injector/withdrawal device in accordance with the present invention generally includes a syringe having a body for containing a medicament, a needle and a piston slidably disposed in the body.

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A shell is provided for receiving syringe body with a needle projecting from the shell. A plunger rack disposed within the shell is slidably for moving of the piston and a manually operated control is disposed in an operative relationship with the plunger rack for moving the plunger rack in a stepwise forward direction causing the piston to eject medication from the syringe body through the needle and a stepwise reverse direction causing the piston to aspirate fluid into the syringe body through the needle.

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25 More particularly, the device may include a window disposed in the shell for enabling observation of fluid aspirated into the syringe body. This feature enables the
user to determine needle placement by such aspiration. For example, if, upon aspiration, blood appears visible through the window the user physician would change placement of the needle tip in order to avoid injecting BOTOX® directly into a blood vessel.

More particularly, the control comprises an injecting pawl for engaging the plunger rack for moving the plunger rack in the stepwise forward direction and disengaging the plunger rack upon movement in the stepwise reverse direction.

In addition, a withdrawing pawl is provided for engaging the plunger rack for moving the plunger rack in the stepwise reverse direction and disengaging the plunger rack upon movement in the stepwise forward direction.

The control is configured, through rack and pawl sizing, for injecting medication in the range between about 5µl and about 1 ml.

Preferably, the control is configured for finger operation so that that entire injection and aspiration process can be carried out through a one handed operation. In addition, the syringe may be of conventional design or specific BOTOX® design and is removable from the shell. In that regard, the invention further includes separately the shell, plunger rack and manually operated control.
BRIEF DESCRIPTION OF THE DRAWINGS

The present invention may be more clearly understood with reference to the following detailed description in conjunction with the appended drawings of which:

Figure 1 is a perspective view of the controlled volume injection/withdrawal device in accordance with the present invention generally showing a needle projecting from a shell and a manually engagable trigger;

Figure 2 is a cross sectional view of the device shown in Figure 1 illustrating a syringe body disposed within the device shell with the needle projecting therefrom along with an operating control shown in a neutral position with injecting and withdrawing pawls for selectively engaging a plunger rack which operates a piston for both ejecting medicine from the syringe body and aspirating fluid into the syringe body;

Figure 3 is a view of the device shown in Figures 1 and 2 during an injecting procedure in which the trigger is moved in a forward direction and the injecting pawl engages the plunger rack for movement of the piston in a forward direction; and

Figure 4 is a view of the device similar to Figures 1-3 illustrating withdrawal or aspiration of fluid from a body (not shown) when the trigger is moved in a reverse direction and the withdrawing pawl engages the plunger rack.
DETAILED DESCRIPTION

With reference to Figure 1, there is shown a control volume injection/aspiration device 10 in accordance with the present invention generally showing a syringe 12 and needle 14 along with a shell for receiving a syringe body 20, see Figures 2-4.

As shown in Figures 2-4, the syringe 12 includes a piston 24 slidably disposed in the syringe body 24 for forcing medicament through the needle 14. A plunger rack 28 is slidably disposed within the shell 18 and coupled to the piston 24 at a front end 30 thereof.

A manually operated control 34 is disposed in an operative relationship with the plunger rack 28, as hereinafter described in greater detail, for moving the plunger rack 28 in a forward direction, indicated by arrow 38 in Figure 3, causing the piston 24 to eject discrete doses of medication from the syringe body 20 through the needle 14, and move the piston 24 in a reverse direction, indicated by the arrow 40, in Figure 4 to aspirate discrete quantities of fluid into the syringe body 20 through the needle 14.

A window 44 is provided in the shell 18 in order to observe withdrawn, or aspirated fluid from a body, not shown. As hereinafore noted, this reverse motion of the piston for aspirating fluids from a body prior to injection will give an
indication of proper placement of the needle for injection of the medicament, preferably botulinum toxin.

The operating control 34 includes a button 48 manually accessible from outside of the shell 18 and a control rod 50 an injecting pawl 54 is pivot 56 mounted to an end 58 of the rod and is limited in rotation so that forward motion of the button 48 from a neutral position, as shown in Figure 2, causes the injecting pawl 54 to engage plunger rack teeth 62.

Forward movement of the plunger rack 28 and piston 24 is limited to a discrete amount defined by the spacing between the button 48 and a front face 66 of the shell 18. Thus, movement of the button forward in a direction of the arrow 38 causes a limited or discrete movement of the plunger rack and piston thereby causing a discrete measured dose of medicament to be ejected through the needle 14.

Reverse movement of the button 48 and rod from the position shown in Figure 3 to a neutral position, shown in Figure 2, causes the injecting pawl to ride over the teeth 62. The injecting pawl 54 again engages the teeth 62 as the button 48 is moved forward again in the direction of arrow 38.

Thus, repeated discrete amounts of medicament can be injected into a selected area (not shown) of a patient (not shown). Such discrete doses are preferably within the range of about 5 microliters and about 1ml, with such doses being defined by the movement available by the button 48.
With reference to Figure 4, when the button 48 is moved in the direction of the arrow 40 past the neutral position, shown in Figure 2, the rod end engages a withdrawing pawl and engages the pawl 70 with the rack teeth 62 by rotation about a pivot 72. In this movement, the injecting pawl 54 is disengaged from the rack teeth 62. This movement causes withdrawal of the piston from the body 20 and aspiration of fluid through the needle 14 and into the syringe body 20 which may be observed through the window 44.

The injection/aspiration device 10 may be precharged with botulinum toxin and disposable or alternatively the syringe 12 may be removable from the shell 19. In this embodiment recharged syringes 12, along with needles, may be provided with the shell 18 and the operating control 34 utilized for subsequent multiple injections of botulinum toxin.

It should also be appreciated that the elements of the present invention may be formed from any suitable materials for use in medical applications.

Although there has been hereinabove described a specific controlled volume injection/aspiration device in accordance with the present invention for the purpose of illustrating the manner in which the invention may be used to advantage, it should be appreciated that the invention is not limited thereto. That is, the present invention may suitably comprise, consist of, or consist essentially of the recited
elements. Further, the invention illustratively disclosed herein suitably may be practiced in the absence of any element which is not specifically disclosed herein. Accordingly, any and all modifications, variations or equivalent arrangements which may occur to those skilled in the art, should be considered to be within the scope of the present invention as defined in the appended claims.
WHAT IS CLAIMED IS:

1. A controlled volume injection/aspiration device comprising:
   a syringe having a body for containing a medicament,
   a needle and a piston slidably disposed in said body;
   a shell for receiving the syringe body with said
   needle projecting from said shell;
   a plunger rack slidably disposed within said shell
   for moving said piston; and
   a manually operated control disposed in an operative
   relationship with said plunger rack for moving said plunger
   rack in a stepwise forward direction causing said piston to
   eject discrete doses of medication from said syringe body
   through said needle and in a stepwise reverse direction
   causing said piston to aspirate discrete quantities of fluid
   into said syringe body through said needle.

2. The device according to claim 1 further comprising a
   window disposed in said shell for enabling observation of
   fluid aspirated into the syringe body.

3. The device according to claim 1 wherein the control
   comprises an injecting pawl for engaging said plunger rack for
   moving said plunger rack in said stepwise forward direction
   and disengaging said plunger rack upon movement in said
   stepwise reverse direction.
4. The device according to claim 3 wherein the control comprises a withdrawing pawl for engaging said plunger rack for moving said plunger each in said stepwise reverse direction and disengaging said plunger each upon movement in said stepwise forward direction.

5. The device according to claim 1 wherein the control is configured for ejecting medicament in the range between about 5μl and about 1 ml.

6. The device according to claim 1 wherein the medicament comprises BOTOX®.

7. The device according to claim 1 wherein the control is configure for finger operation.

8. The device according to claim 1 wherein said syringe is removable from the said shell.
INTERNATIONAL SEARCH REPORT

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61M5/315

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61M BOIL

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WIPO Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
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| X        | US 2 892 457 A (HARRY STURTZ)  
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| Y        | DE 34 08 618 A (TEICHMANN HORST F)  
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Further documents are listed in the continuation of box C. Patent family members are listed in annex.

* A document claiming the general state of the art which is not considered to be of particular relevance.
* E earlier document but published on or after the international filing date.
* L document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified).
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**X** document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone.

**Y** document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more cited documents, such combination being obvious to a person skilled in the art.

**X** document member of the same patent family.

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Name and mailing address of the ISA  
European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epc nl,  
Fax (+31-70) 340-3016  

Authorized officer: Björklund, A

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