ADHESIVE AND PERIPHERAL SYSTEMS AND METHODS FOR MEDICAL DEVICES

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of U.S. application Ser. No. 14/679,796 filed on Apr. 6, 2015, which is a divisional of U.S. application Ser. No. 13/372,164 filed on Feb. 13, 2012, which is a continuation of U.S. application Ser. No. 11/704,897 filed on Feb. 9, 2007, now U.S. Pat. No. 8,113,244, which claims priority from the following U.S. Provisional Patent Applications, all of which are hereby incorporated herein by reference in their entireties:

[0002] Ser. No. 60/772,313 for "Portable Injection System" filed Feb. 9, 2006;

[0003] Ser. No. 60/789,243 for "Method of Volume Measurement for Flow Control" filed Apr. 5, 2006; and

[0004] Ser. No. 60/793,188 for "Portable Injection and Adhesive System" filed Apr. 19, 2006.

Each of the above-identified applications is hereby incorporated by reference herein in its entirety.

[0005] This application may also be related to one or more of the following U.S. patent applications, all of which are hereby incorporated herein by reference in their entireties:

[0006] Nonprovisional application Ser. No. 11/704,899 for "Fluid Delivery Systems and Methods";

[0007] Nonprovisional application Ser. No. 11/704,896 for "Pumping Fluid Delivery Systems and Methods Using Force Application Assembly";

[0008] Nonprovisional application Ser. No. 11/704,886 for "Patch-Sized Fluid Delivery Systems and Methods"; and

[0009] Provisional Application No. 60/889,007 for "Two-Stage Transcutaneous Inserter".

FIELD OF THE INVENTION

[0010] This application relates generally to adhesive and peripheral systems and methods for medical devices.

BACKGROUND

[0011] Many potentially valuable medicines or compounds, including biologicals, are not orally active due to poor absorption, hepatic metabolism or other pharmacokinetic factors. Additionally, some therapeutic compounds, although they can be orally absorbed, are sometimes required to be administered so often it is difficult for a patient to maintain the desired schedule. In these cases, parenteral delivery is often employed or could be employed.

[0012] Effective parenteral routes of drug delivery, as well as other fluids and compounds, such as subcutaneous injection, intramuscular injection, and intravenous (IV) administration include puncture of the skin with a needle or stylet. Insulin is an example of a therapeutic fluid that is self-injected by millions of diabetic patients. Users of parenterally delivered drugs would benefit from a wearable device that would automatically deliver needed drugs/compounds over a period of time.

[0013] To this end, there have been efforts to design portable devices for the controlled release of therapeutics. Such devices are known to have a reservoir such as a cartridge, syringe, or bag, and to be electronically controlled. These devices suffer from a number of drawbacks including the malfunction rate. Reducing the size, weight and cost of these devices is also an ongoing challenge.

SUMMARY OF THE INVENTION

[0014] In one embodiment of the invention, a repeater system is provided for controlling a medical device. Such a system may include a repeater and a user interface. The repeater may include circuitry (i) for, over a given range, receiving signals from at least one wearable medical device, (ii) for, over the given range, transmitting signals to the wearable medical device, (iii) for, over a longer range exceeding the given range, transmitting the received signals to a user interface located remotely from the patient, and (iv) for, over the longer range, receiving signals from the user interface. The user interface may include circuitry (i) for receiving signals from the repeater, and (ii) for transmitting signals to the repeater. The medical devices may be wearable or implanted devices.

[0015] In some embodiments, the user interface's circuitry may also provide for the reception of signals directly from the wearable device and the transmission of signals directly to the wearable device. Also, the repeater's circuitry may be adapted to receive signals from multiple medical devices.

[0016] In some embodiments, the repeater may include one or more of the following: memory for logging received data, a processor for analyzing received data for the presence of a fault condition, and an alarm for notifying a user of the presence of a fault condition. The fault condition may include an occurrence of an event wherein the repeater is separated from the wearable medical device by more than the given range.

[0017] In one embodiment of the invention, a repeater is adapted to control a patch-sized pump worn on a subject for delivering fluid to the subject. In this embodiment, the repeater may have circuitry (i) for, over a given range, receiving signals from the pump, the received signals containing data relating to a volume of fluid delivered by the pump and relating to an alarm condition, and (ii) for, over a longer range exceeding the given range, transmitting the received signals to an interface for monitoring the volume of fluid delivered and the alarm condition. Such a repeater's circuitry may also provide for, over the longer range, receiving control signals from the interface, the control signals containing control information for controlling the pump, and for, over the given range, transmitting the control signals to the pump.

[0018] Such a repeater may have the characteristics of the repeater described above in connection with the repeater system. In addition to or in instead of having an alarm for an occurrence of an event wherein the repeater is separated from the wearable medical device by more than the given range, the repeater may also include an alarm for a flow occlusion or an air bubble detected in the pump.

[0019] In another embodiment of the invention, an adhesive patch system is provided for affixation of an object to a human body. Such an adhesive patch system may include two sets of adhesive members. In a first set of three or more members, each member includes an adhesive material on at least one side so as to attach to the body upon application of pressure, the members disposed around a central region. Similarly, in the second set of three or more members, each member includes an adhesive material on at least one side so as to attach to the body upon application of pressure, the members disposed around the central region. The members