

WHAT IS CLAIMED IS:

1. An apparatus for injecting a therapeutic agent into a therapeutic device to treat an eye, the therapeutic device being at least partially implanted in the eye, the apparatus comprising:
 - an injector configured to inject a therapeutic fluid into a first chamber of the therapeutic device with at least partial separation between a fluid contained in the therapeutic device from the therapeutic fluid injected from the injector, the injector comprising:
 - a first lumen;
 - a second lumen surrounding at least a portion of the first lumen; and
 - a second chamber configured to be in fluid communication with the therapeutic device via the second lumen;
 - wherein injection of the therapeutic agent into the therapeutic device via the first lumen removes fluid from the therapeutic device into second chamber via the second lumen.

2. The apparatus of claim 1, wherein the injector is configured to inject the therapeutic fluid at a flow rate so as to provide the at least partial separation.

3. The apparatus of claim 2, the injector comprises one or more of a structure resistant to flow, a restriction, a porous structure, a sintered porous structure, or a mechanism to inject the agent at the rate sufficient to provide the at least partial separation.

4. The apparatus of claim 3, wherein the implantable device comprises a porous structure configured to release the therapeutic agent from the first chamber, the porous structure having a resistance to flow and wherein the injector structure resistant to flow comprises a resistance to flow proportional to the resistance to flow of the porous structure such that a portion of the therapeutic fluid passes through the porous structure.

5. The apparatus of claim 1, wherein the fluid of the implantable device comprises a remaining portion of a first amount of first therapeutic agent of a first therapeutic fluid placed in the therapeutic device and components of the vitreous humor of the eye.

6. The apparatus of claim 5, wherein the remaining portion of the first therapeutic fluid placed in the implantable device comprises a remaining amount of the therapeutic agent and wherein the remaining amount of the therapeutic agent corresponds to no more than about half of a first amount of the first therapeutic agent so as to provide the density difference.

7. The apparatus of claim 1, wherein the first lumen extends to a first opening and the second lumen extends to a second opening, the first opening spaced apart from the second opening to encourage the at least partial separation.

8. The apparatus of claim 7, wherein the first opening is located distal to the second opening such that the therapeutic fluid is passed to a distal portion of the first chamber and the fluid of the implantable therapeutic device is received within proximal portion of the first chamber to encourage the at least partial separation.

9. The apparatus of claim 7, wherein the second chamber comprises a container to receive the fluid of the therapeutic device received through the second lumen and wherein the container comprises a vent to pass air displaced from the container and wherein the vent is fluidically coupled to the second opening so as to define a flow path extending from the opening to the vent and wherein the flow path comprises a resistance to flow so as to encourage the at least partial separation.

10. The apparatus of claim 9, wherein the flow path comprises one or more structures to inhibit flow of the fluid of the therapeutic device, the one or more structures comprising one or more of a size of the second opening, a restriction along the flow path or a porous structure along the flow path.

11. The apparatus of claim 9, wherein the injector further comprises a porous structure comprising a plurality of interconnecting channels, wherein the plurality of interconnecting channels is located along the flow path on a downstream portion of the container.

12. The apparatus of claim 11, wherein the injector porous structure comprises a resistance to liquid flow greater than a porous structure of the implantable therapeutic device such that the

therapeutic fluid is passed through the porous structure of the implantable therapeutic device when the fluid of the implantable therapeutic device contacts the injector porous structure located along the flow path on the downstream portion of the container.

13. The apparatus of claim 1, the second lumen is coupled to a vent and the vent comprises a resistance to flow to pressurize the first chamber and pass a portion of the therapeutic fluid through the porous structure when the fluid of the implantable therapeutic device passes through the vent.

14. The apparatus of claim 1, wherein the injector comprises a double lumen needle having the first needle having a first lumen extending along a first axis and a second needle having the second lumen extending along the first needle such that the second needle is substantially concentric with the first axis.

WHAT IS CLAIMED IS:

1. An apparatus for injecting a therapeutic agent into a therapeutic device to treat an eye, the therapeutic device being at least partially implanted in the eye, the apparatus comprising:
an injector comprising:
an exchange needle configured to penetrate the therapeutic device implanted in the eye, the exchange needle comprising:
a first lumen having a first opening out from the first lumen; and
a second lumen surrounding at least a portion of the first lumen and having a second opening into the second lumen,
wherein the first lumen is longer than the second lumen such that the first opening from the first lumen is located distal to the second opening into the second lumen; and
a chamber configured to be in fluid communication with the second lumen;
wherein injection of an amount of the therapeutic agent into the therapeutic device via the first lumen displaces an amount of pre-existing fluid from the therapeutic device into the chamber via the second lumen.
2. The apparatus of claim 1, wherein the injector is configured to inject the therapeutic fluid at a flow rate that inhibits mixing of the amount of therapeutic fluid with the amount of pre-existing fluid.
3. The apparatus of claim 2, the injector comprises one or more of a structure resistant to flow, a restriction, a porous structure, a sintered porous structure, or a mechanism to inject the agent at the flow rate.
4. The apparatus of claim 3, wherein the implantable device comprises a porous structure configured to release the therapeutic agent from the therapeutic device, the porous structure having a resistance to flow and wherein the injector structure resistant to flow comprises a resistance to flow proportional to the resistance to flow of the porous structure such that a portion of the therapeutic fluid passes through the porous structure of the implantable therapeutic device.
5. The apparatus of claim 1, wherein the amount of pre-existing fluid comprises a remaining portion of therapeutic agent placed in the therapeutic device and components of the vitreous humor of the eye.
6. The apparatus of claim 1, wherein the first opening is spaced apart from the second opening to encourage at least partial separation between the amount of therapeutic fluid from the amount of pre-existing fluid.
7. The apparatus of claim 6, wherein the chamber comprises a container to receive the amount of pre-existing fluid of the therapeutic device received through the second lumen and wherein the container comprises a vent to pass air displaced from the container and wherein the vent is fluidically coupled to the second opening so as to define a flow path extending from the second opening to the vent and wherein the flow path comprises a resistance to flow so as to encourage at least partial separation between the amount of therapeutic fluid from the amount of pre-existing fluid.

8. The apparatus of claim 7, the wherein the flow path comprises one or more structures to inhibit flow of the amount of pre-existing fluid of the therapeutic device, the one or more structures comprising one or more of a size of the second opening, a restriction along the flow path or a porous structure along the flow path.

9. The apparatus of claim 7, wherein the injector further comprises a porous structure comprising a plurality of interconnecting channels, wherein the plurality of interconnecting channels is located along the flow path on a downstream portion of the container.

10. The apparatus of claim 9, wherein the injector porous structure comprises a resistance to liquid flow greater than a porous structure of the implantable therapeutic device such that the therapeutic fluid is passed through the porous structure of the implantable therapeutic device when the fluid of the implantable therapeutic device contacts the injector porous structure located along the flow path on the downstream portion of the container.

11. The apparatus of claim 1, the second lumen is coupled to a vent and the vent comprises a resistance to flow to pressurize the first chamber and pass a portion of the therapeutic fluid through the porous structure when the fluid of the implantable therapeutic device passes through the vent.

12. The apparatus of claim 1, wherein the exchange needle comprises a double lumen needle having a first needle having the first lumen extending along a first axis and a second needle having the second lumen extending along the first needle such that the second needle is substantially concentric with the first axis.

13. The apparatus of claim 1, further comprising a second chamber configured to be in fluid communication with the first lumen and configured to hold the amount of the therapeutic fluid; and a piston moveable within the second chamber.

14. The apparatus of claim 13, wherein distal movement of the piston within the second chamber creates an internal pressure in the second chamber that is greater than atmospheric pressure causing the amount of the therapeutic fluid from the first chamber to enter into the therapeutic device via the first lumen such that the amount of therapeutic fluid entering the therapeutic device displaces the amount of pre-existing fluid from the therapeutic device into the chamber via the second lumen.

15. The apparatus of claim 1, wherein the first lumen is in a fixed position relative to the second lumen.