[0004] Thus, there is a need for devices, systems, and methods that can reduce or eliminate the pain and other side effects related to the delivery of medication to the patient's vasculature while allowing for reduced administration periods.

Summary

[0005] Systems, apparatus, and methods for extracorporeal medication infusion are described herein. In some embodiments, an extracorporeal blood device may include a venous or arterial blood line for removing blood from a patient, treating the blood with a medication, and returning the treated blood to the patient via a filter. For example, in some embodiments, a method includes coupling a patient access subassembly to a patient. The patient access subassembly can be fluidically coupled to a first fluid reservoir containing a first substance and a second fluid reservoir containing a second substance via an assembly. Cells can be drawn through the patient access subassembly, through the assembly, and into the first fluid reservoir such that the cells and the first substance form a third substance. The assembly can be manipulated such that the first fluid reservoir is fluidically isolated from the patient access subassembly and such that the first fluid reservoir is in fluidic communication with the second fluid reservoir. A portion of the third substance can then be transferred from the first fluid reservoir through the assembly and into the second fluid reservoir such that the portion of the third substance and the second substance form a fourth substance. The fourth substance can be transferred from the second fluid reservoir through the assembly and into the first fluid reservoir such that the remainder of the third substance and the fourth substance form a fifth substance. The assembly can be manipulated such that the first fluid reservoir is in fluid communication with the patient access subassembly. The fifth substance can be transferred from the first fluid reservoir through the assembly, through the patient access subassembly, and into the patient. A third fluid reservoir containing a saline solution can be fluidically coupled to the assembly. The assembly can be manipulated such that the third fluid reservoir is in fluid communication with the patient access subassembly via the assembly. At least a portion of the saline solution can be transferred from the assembly to the patient access subassembly.

[0005a] According to a first aspect, there is provided a method, wherein: a patient access subassembly is to be coupled to a patient, the patient access subassembly fluidically coupled to a first fluid reservoir containing a first substance and a second fluid reservoir containing a second substance via an assembly; cells are to be drawn through the patient access subassembly, through the assembly, and into the first fluid reservoir such that the cells and the first substance form a

third substance; the assembly is manipulated such that the first fluid reservoir is fluidically isolated from the patient access subassembly and such that the first fluid reservoir is in fluidic communication with the second fluid reservoir; a portion of the third substance is transferred from the first fluid reservoir through the assembly and into the second fluid reservoir such that the portion of the third substance and the second substance form a fourth substance; the fourth substance is transferred from the second fluid reservoir through the assembly and into the first fluid reservoir such that the remainder of the third substance and the fourth substance form a fifth substance; the assembly is manipulated such that the first fluid reservoir is in fluid communication with the patient access subassembly; the fifth substance is to be transferred into the patient, wherein the fifth substance is first transferred from the first fluid reservoir through the assembly and through the patient access subassembly into the patient; a third fluid reservoir containing a saline solution is fluidically coupled to the assembly; the assembly is manipulated such that the third fluid reservoir is in fluid communication with the patient access subassembly via the assembly; and at least a portion of the saline solution is transferred from the assembly to the patient access subassembly.

[0005b] According to a second aspect, there is provided a kit, including: a first assembly including a first fluid reservoir, a second fluid reservoir, a valve assembly, and a first tube, the first fluid reservoir, the second fluid reservoir, and the first tube fluidically coupled to the valve assembly, the valve assembly configured to selectively allow fluid communication between the first fluid reservoir and the second fluid reservoir and between the first fluid reservoir and the first tube; a second assembly including a patient access port fluidically coupled to a second tube, the second tube configured to be fluidically coupled to the valve assembly of the first assembly via a first flow path including a third tube and via a second flow path via the first tube such that the valve assembly can be in fluid communication with the patient access port via the first tube and via the second tube; and a third fluid reservoir configured to be coupled to the valve assembly such that the valve assembly can selectively allow fluid communication between the third fluid reservoir and the first tube.

[0005c] According to a third aspect, there is provided a method, including: fluidically coupling a first coupling member of a first subassembly to a valve assembly of a second subassembly, the second subassembly including a first fluid reservoir and a second fluid reservoir fluidically coupled to the valve subassembly, the first fluid reservoir selectively fluidically coupled to the second fluid reservoir via the valve assembly, the first subassembly including a patient access port, a first coupling member, and a second coupling member, the first coupling member and the second

coupling member to be in fluid communication with the patient access port, the first coupling member coupled to the valve assembly such that the first fluid reservoir of the second subassembly is to be in selective fluid communication with the patient access port via a first flow path; fluidically coupling the second coupling member of the first subassembly to the valve assembly such that the first fluid reservoir is to be in selective fluid communication with the patient access port via a second flow path different from the first flow path; coupling a third fluid reservoir to the valve assembly such that the third fluid reservoir is to be in selective fluid communication with the patient access port via the second flow path.

[0005d] According to a fourth aspect, there is provided an apparatus, including: a patient access subassembly; a first fluid reservoir configured to contain a first fluid substance; a second fluid reservoir configured to contain a second fluid substance; and an assembly having a first configuration in which the patient access subassembly is in fluid communication with the first fluid reservoir via a first tube, a second configuration in which the first fluid reservoir is in fluid communication with the second fluid reservoir, and a third configuration in which the first fluid reservoir is in fluid communication with the patient access subassembly via a second tube, the first fluid reservoir fluidically isolated from the first tube in the third configuration.

[0005e] According to a fifth aspect, there is provided an apparatus, including: a patient access subassembly configured to provide access to a blood vessel of a patient; a first fluid reservoir configured to contain a first fluid substance; a second fluid reservoir configured to contain a second fluid substance; and an assembly including a first valve, a second valve, and a third valve, the first fluid reservoir in selective fluid communication with the second fluid reservoir via the first valve and the second valve, the patient access subassembly in selective fluid communication with the first fluid reservoir via the first valve, the third valve configured to couple to a third fluid reservoir such that the third fluid reservoir is in selective fluid communication with the patient access subassembly via the first valve and the second valve.