Summary

[0005] In some examples provided herein is a cassette for use in an automated cell engineering system, comprising a cellular sample input, a cell separation filter fluidly connected to the cellular sample input, a cell culture chamber fluidly connected to the cell separation filter, and a cellular sample output fluidly connected to the cell culture chamber. Suitably, the cassette does not include a centrifuge following the cell separation filter.

[0005a] In one aspect, the present disclosure refers to a cassette for use in an automated cell engineering system, comprising:

(a) a cellular sample input;
(b) a cell separation filter fluidly connected to the cellular sample input;
(c) a cell culture chamber fluidly connected to the cell separation filter; and
(d) a cellular sample output fluidly connected to the cell culture chamber,
wherein the cassette does not include a centrifuge following the cell separation filter;
wherein the cassette further comprises a pH sensor, a glucose sensor, an oxygen sensor, a carbon dioxide sensor, and/or an optical density sensor; and
wherein the cassette further comprises one or more sampling ports.

[0006] In additional examples, a cassette for use in an automated cell engineering system, comprising a cellular sample input, a cell separation filter fluidly connected to the cellular sample input, the cell separation filter including a matrix which captures immune cells, a cell culture chamber for carrying out activation, transduction and/or expansion of the immune cells having a chamber volume that is configured to house the immune cells, a back flush system fluidly connected to the cell separation filter, and a cellular sample output fluidly connected to the cell culture chamber. Suitably, the cassette does not include a centrifuge following the cell separation filter.

[0006a] In another aspect, the present disclosure refers to a cassette for use in an automated cell engineering system, comprising:

(a) a cellular sample input;

(b) a cell separation filter fluidly connected to the cellular sample input, the cell separation filter including a matrix which captures immune cells;

(c) a cell culture chamber for carrying out activation, transduction and/or expansion of the immune cells having a chamber volume that is configured to house the immune cells;

(d) a back flush system fluidly connected to the cell separation filter; and

(e) a cellular sample output fluidly connected to the cell culture chamber,

wherein the cassette does not include a centrifuge following the cell separation filter; and

wherein the cassette is pre-filled with culture media, cell wash media, and back flush media.

[0007] In additional examples, provided herein is a method of preparing a target cell population for automated processing, the method comprising introducing a cellular sample containing the target cell population into a cassette of an automated cell engineering system, passing the cellular sample through a cell separation filter, capturing the target cell population from the cellular sample onto a matrix of the cell separation filter, back flushing the cell separation filter, and transferring the target cell population from the cell separation filter, so that the target cell population can undergo automated processing.

[0007a] In another aspect, the present disclosure refers to a method of preparing a target cell population for automated processing, the method comprising:

(a) introducing a cellular sample containing the target cell population into a cassette of an automated cell engineering system;

(b) passing the cellular sample through a cell separation filter preferably via gravity filtration;

(c) passing unwanted waste from the cellular sample through the cell separation filter and into a waste collection chamber;

(d) capturing the target cell population from the cellular sample onto a matrix of the cell separation filter;

(e) washing the captured target cell population on the cell separation filter;

(f) back flushing the cell separation filter;

(g) transferring the target cell population from the cell separation filter, so that the target cell population can undergo automated processing; and

(h) collecting the target cell population from the cassette following the automated processing, and

wherein the method excludes centrifugation following the transferring of the target cell population from the cell separation filter.

[0008] Also provided herein is an automated cell engineering system, comprising an enclosable housing, a cassette contained within the enclosable housing, the cassette comprising a cellular sample input, a cell separation filter fluidly connected to the cellular sample input, a cell culture chamber fluidly connected to the cell separation filter, and a cellular sample output fluidly connected to the cell culture chamber, wherein the cassette does not include a centrifuge following the cell separation filter, and a user interface for receiving input from a user.

[0008a] In another aspect, the present disclosure refers to an automated cell engineering system, comprising:

(a) an enclosable housing;

(b) a cassette contained within the enclosable housing, the cassette comprising:

i. a cellular sample input;

ii. a cell separation filter fluidly connected to the cellular sample input;

iii. a cell culture chamber fluidly connected to the cell separation filter; and

iv. a cellular sample output fluidly connected to the cell culture chamber, wherein the cassette does not include a centrifuge following the cell separation filter;

(c) a user interface for receiving input from a user, and

(d) a computer control system, wherein the user interface is coupled to the computer control system to provide instructions to the automated cell engineering system,

wherein the cassette further comprises one or more of a pH sensor, a glucose sensor, an oxygen sensor, a carbon dioxide sensor, and/or an optical density sensor; and

wherein the cassette further comprises one or more sampling ports.

CLAIMS

1. A cassette for use in an automated cell engineering system, comprising:

    (a) a cellular sample input;

    (b) a cell separation filter fluidly connected to the cellular sample input;

    (c) a cell culture chamber fluidly connected to the cell separation filter; and

    (d) a cellular sample output fluidly connected to the cell culture chamber,

    wherein the cassette does not include a centrifuge following the cell separation filter;

    wherein the cassette further comprises a pH sensor, a glucose sensor, an oxygen sensor, a carbon dioxide sensor, and/or an optical density sensor; and
    wherein the cassette further comprises one or more sampling ports.

2. The cassette of claim 1, wherein the cell separation filter includes a matrix which captures a cell population, preferably wherein the cell population is target cells.

3. The cassette of any one of claims 1-2, further comprising a cell wash system, a back flush system, a waste collection chamber, and/or a target cell population holding chamber following the cell separation filter.

4. The cassette of claim 1, further comprising one or more fluidics pathways, wherein the fluidics pathways provide recirculation, removal of waste and homogenous gas exchange and distribution of nutrients to the cell culture chamber without disturbing cells within the cell culture chamber.

5. The cassette of claim 1, wherein the cassette is pre-filled with culture media, cell wash media, and back flush media, wherein the back flush media contains an anticoagulant.

6. A cassette for use in an automated cell engineering system, comprising:
   (a) a cellular sample input;
   (b) a cell separation filter fluidly connected to the cellular sample input, the cell separation filter including a matrix which captures immune cells;
   (c) a cell culture chamber for carrying out activation, transduction and/or expansion of the immune cells having a chamber volume that is configured to house the immune cells;
   (d) a back flush system fluidly connected to the cell separation filter; and
   (e) a cellular sample output fluidly connected to the cell culture chamber,

   wherein the cassette does not include a centrifuge following the cell separation filter; and
   wherein the cassette is pre-filled with culture media, cell wash media, and back flush media.

7. The cassette of claim 6, further comprising a cell wash system, a waste collection chamber, and/or an immune cell holding chamber.

8. The cassette of any one of claims 6-7, further comprising one or more fluidics pathways connected to the cell culture chamber, wherein the fluidics pathways provide recirculation, removal of waste and homogenous gas exchange and distribution of nutrients to the cell culture chamber without disturbing immune cells within the cell culture chamber, wherein preferably one or more of the fluidic pathways comprise a silicon-based tubing component that allows oxygenation through the tubing component.

9. A method of preparing a target cell population for automated processing, the method comprising:

(a) introducing a cellular sample containing the target cell population into a cassette of an automated cell engineering system;

(b) passing the cellular sample through a cell separation filter preferably via gravity filtration;

(c) passing unwanted waste from the cellular sample through the cell separation filter and into a waste collection chamber;

(d) capturing the target cell population from the cellular sample onto a matrix of the cell separation filter;

(e) washing the captured target cell population on the cell separation filter;

(f) back flushing the cell separation filter;

(g) transferring the target cell population from the cell separation filter, so that the target cell population can undergo automated processing; and

(h) collecting the target cell population from the cassette following the automated processing, and

wherein the method excludes centrifugation following the transferring of the target cell population from the cell separation filter.

10. The method of claim 9, wherein the transferring comprises transferring the target cell population to a target cell population holding chamber, a transduction system, a system for transfection, preferably an electroporation system, or a cell culture chamber, so that the target cell population can undergo automated processing.

11. An automated cell engineering system, comprising:

(a) an enclosable housing;

(b) a cassette contained within the enclosable housing, the cassette comprising:

i. a cellular sample input;

ii. a cell separation filter fluidly connected to the cellular sample input;

iii. a cell culture chamber fluidly connected to the cell separation filter; and

iv. a cellular sample output fluidly connected to the cell culture chamber, wherein the cassette does not include a centrifuge following the cell separation filter;

(c) a user interface for receiving input from a user, and

(d) a computer control system, wherein the user interface is coupled to the computer control system to provide instructions to the automated cell engineering system,

wherein the cassette further comprises one or more of a pH sensor, a glucose sensor, an oxygen sensor, a carbon dioxide sensor, and/or an optical density sensor; and

wherein the cassette further comprises one or more sampling ports.

12. The automated cell engineering system of claim 11, wherein the cell separation filter of the cassette includes a matrix which captures a cell population, wherein the cell population is target cells.

13. The automated cell engineering system of any one of claims 11-12, wherein the cassette further comprises a cell wash system, a back flush system, a waste collection chamber, and optionally a target cell population holding chamber following the cell separation filter.

14. The automated cell engineering system of claim 11, wherein the cassette further comprises one or more fluidics pathways, wherein the fluidics pathways provide recirculation, removal of waste and homogenous gas exchange and distribution of nutrients to the cell culture chamber without disturbing cells within the cell culture chamber.

15. The automated cell engineering system of claim 11, wherein the cassette is pre-filled with culture media, cell wash media, and back flush media, preferably wherein the backflush media contains an anticoagulant.