Claims

1. An apparatus for concentrating cells and remove media from a cell culture device comprising:

a gas delivery component that is capable of connecting to a filter that is connected to a gas permeable cell culture device including a gas permeable bottom cell growth surface and a media removal conduit including a media removal opening at a distance from said gas permeable bottom, said media removal opening capable of being moved to a different distance from said gas permeable bottom, said gas delivery component capable of delivering gas into said gas permeable cell culture device by way of said filter and serves to pressurize the internal volume of the cell culture device,

a fluid detection component that is capable of determining when the fluid moving within a media removal conduit that is connected to said gas permeable cell culture device changes from liquid to gas, said fluid detection component capable of sending a signal to a fluid flow control component that is capable of terminating fluid flow through said media removal conduit.

2. A method of using the device of claim 1 comprising:

reducing the volume of liquid media in a gas permeable cell culture device that contains cells and media in order to increase the concentration of cells per milliliter of media by connecting said gas delivery component to a filter that is connected to said gas permeable cell culture device, connecting said first fluid detection component to said media removal conduit, initiating gas delivery from said gas delivery component, whereby gas moves into said cell culture device, the gas pressurizes the cell culture device and displaces media from said cell culture device through said media removal opening into a media collection vessel connected to said media removal conduit, said fluid detection component determines when the fluid that is moving through said media removal conduit that is located at a distance from the bottom of the gas permeable culture device has changed from liquid to gas and upon making that determination said fluid detection component sends a signal to said fluid flow control component, and upon said fluid flow control component receiving said signal said flow control component terminates the flow of fluid through said media removal conduit; and

removing cells from said gas permeable cell culture device by decreasing the distance said media removal opening is located from the bottom of the gas permeable culture device, initiating gas delivery from said gas delivery component whereby gas moves into said cell culture device and pressurizes the cell culture device and the gas displaces media from said cell culture device into a cell collection

vessel connected to said media removal conduit, said fluid detection component determining when the fluid that is moving through said media removal conduit has changed from liquid to gas and upon making that determination, said fluid detection component sends a signal to said fluid flow control component, and upon receiving said signal said flow control component terminates the flow of fluid through said media removal conduit.

3. The method of claim 2 wherein after said flow control component has terminated the flow of fluid through said cell removal conduit, said cell culture device is vented to atmosphere.

4. The method of claim 3 wherein after said cell culture device is vented to atmosphere said flow control component is opened to allow the flow of media through said media removal conduit, media is moved through said media removal conduit into said cell culture device, said flow control component is closed, said media within said cell culture device is agitated to move cells into said media.

5. The method of claim 4 wherein gas is delivered from said gas delivery component into said cell culture device and pressurizes said cell culture device and displaces media and cells from said cell culture device into a cell collection vessel connected to said media removal conduit, said fluid detection component determines when the fluid that is moving through said media removal conduit that is located at a distance from the bottom of the gas permeable culture device has changed from liquid to gas and upon making that determination said fluid detection component sends a signal to said fluid flow control component, and upon said fluid flow control component receiving said signal said flow control component terminates the flow of fluid through said media removal conduit.

6. A method of reducing the volume of media in a gas permeable cell culture device that contains cells and media comprising:

reducing the volume of media in order to increase the concentration of cells per milliliter of media by connecting a gas delivery component that serves to pressurize the cell culture device to a filter that is connected to a cell culture device that has a gas permeable bottom and contains a first volume of media and cells residing on a growth surface, said cell culture device including a media removal conduit with a media removal opening located at a distance from the bottom of said cell culture device, initiating gas and delivering gas from said gas delivery component, whereby gas moves into said cell culture device and pressurizes the cell culture device, the gas displaces media from said cell culture device into a media collection vessel by way of said media removal conduit, leaving a residual volume of media and cells within said cell culture device, and the concentration of cells in the residual volume, as determined by cells per milliliter, has increased by the ratio of the first volume of media divided by the residual volume of media.

7. The method of Claim 2 and Claim 6 wherein prior to reducing the volume of media, the distance of the media removal opening from the bottom of said cell culture device is in the range of 1.0 cm to 25 cm.

8. The method of Claim 2 and Claim 6 wherein prior to reducing the volume of media, the distance of the media removal opening from the bottom of said cell culture device is in the range of 1.0 cm to 20 cm.

9. The method of Claim 2 and Claim 6 wherein prior to reducing the volume of media, the distance of the media removal opening from the bottom of said cell culture device is in the range of 1.0 cm to 15 cm.

10. The method of Claim 2 and Claim 6 wherein prior to reducing the volume of media, the distance of the media removal opening from the bottom of said cell culture device is in the range of 2.0 cm to 10 cm.

11. The method of Claim 2 and Claim 6 wherein the growth surface is hydrophobic.

12. The method of Claim 2 and Claim 6 wherein the growth surface is silicone.

13. The method of Claim 12 wherein the silicone has a thickness between 0.001 inches and 0.024 inches.

14. The method of Claim 2 and Claim 6 wherein the cells are non-adherent cells.

15. The method of Claim 14 wherein the cells include T cells.

16.The method of Claim 15 wherein the T cells include CAR T.

17. The device of Claim 1 wherein said gas delivery component is a diaphragm pump.

18. The method of Claim 2 wherein after decreasing the distance of said media removal opening, the distance between said bottom and said media removal opening is from 0.20 cm to 1.0 cm.