CLAIMS

The invention claimed is:

1. An *in vitro* assay method for determining whether a parameter was diminished or enhanced by a cell culture response to a test compound, comprising:

applying a dynamic fluid including the test compound to a dynamic dosing well of a fluidics device, wherein the fluidics device includes a plurality of dynamic wells each containing a cell culture therein positioned downstream from the dynamic dosing well and in fluid communication therewith;

applying a control fluid not including the test compound to a control dosing well of the fluidics device, wherein the fluidics device further includes a plurality of control wells each containing a cell culture therein positioned downstream from the control dosing well and in fluid communication therewith;

performing a dynamic bioassay to measure the parameter of at least one of the plurality of wells and determining a dynamic value;

performing a control bioassay to measure the parameter of at least one of the plurality of control wells and determining a controlvalue;

comparing the dynamic value to the control value for determining whether the parameter was diminished or enhanced by the cell culture response to the test compound.

2. The method of claim 1, comprising:

applying a static fluid including the test compound to a static well;

performing a static bioassay to measure the parameter of the static well and determining a static value;

comparing the dynamic value to the static value for determining whether the parameter was diminished or enhanced by the cell culture response to the test compound.

3. The method of claim 2, further comprising:

wherein the dynamic value includes a dynamic effective concentration at a percentage X (ECx) for the parameter, wherein $0 \leq X \leq 100$;

wherein the static value includes a static ECx for the parameter; and

wherein a lower value of the at least one dynamic ECx relative to the static ECx is predictive of the cell culture response to the test compound enhancing the parameter

and a higher value of the at least one dynamic ECx relative to the static ECx is predictive of the cell culture response to the test compound diminishing the parameter.

4. The method of claim 3, wherein an effect detection reagent is present in the plurality of dynamic wells having a cell culture therein, and wherein determination of the dynamic ECx includes detection of the effect detection reagent.

5. The method of claim 2, further comprising:

removing a portion of the dynamic fluid from at least one stop well, the stop well being one of the plurality of dynamic wells; and

applying a stop to the at least one stop well for controlling the flow of the dynamic fluid in preparation for the dynamic bioassay.

6. The method of claim 2, wherein the performing of any one or more of the bioassays includes removing an aliquot of the respective fluid from the respective well at one or more time periods.

7. The method of claim 2, wherein the applying of the dynamic fluid and/or the control fluid is repeated using a specific volume at determined intervals over a specified period of time.

8. The method of claim 7, wherein the applying of the dynamic fluid and/or the control fluid is performed automatically by a robotic liquid handling apparatus or by using a piston assembly nestably engaged with the fluidics device.

9. The method of claim 7, further comprising syphoning the respective fluid from the downstream well furthest from the respective dosing well when the applying of the dynamic fluid and/or the control fluid is repeated.

10. The method of claim 9, where the syphoning the respective fluid is performed automatically by a robotic liquid handling apparatus.

11. The method of claim 2, further comprising:

applying a tracing fluid having a known concentration of a detectable tracing

compound to a tracing dosing well of the fluidics device, wherein the fluidics device further includes a plurality of tracing wells each containing a cell culture therein positioned downstream from the tracing dosing well and in fluid communication therewith;

determining the concentration of the tracing compound as a standard curve to calculate a concentration of the test compound in each of the plurality of dynamic wells.

12. The method of claim 1, further comprising:

wherein the dynamic value includes a dynamic effective concentration at a percentage X (ECx) for the parameter, wherein $0 \leq X \leq 100$;

wherein the control value includes a static ECx for the parameter; and

wherein a lower value of the at least one dynamic ECx relative to the control ECx is predictive of the cell culture response to the test compound enhancing the parameter and a higher value of the at least one dynamic ECx relative to the control ECx is predictive of the cell culture response to the test compound diminishing the parameter.

13. The method of claim 12, wherein an effect detection reagent is present in the plurality of dynamic wells having a cell culture therein, and wherein determination of the dynamic ECx includes detection of the effect detection reagent.

14. The method of claim 1, further comprising:

removing the dynamic fluid, or a portion thereof, from at least one stop well, the stop well being one of the plurality of dynamic wells; and

applying a stop to the at least one stop well for controlling the flow of the dynamic fluid in preparation for the dynamic bioassay.

15. The method of claim 1, wherein the performing of any one or more of the bioassays includes removing an aliquot of the respective fluid from the respective well at one or more time periods.

16. The method of claim 1, wherein the applying of the dynamic fluid and/or the control fluid is repeated using a specific volume at determined intervals over a specified period of time.

17. The method of claim 16, wherein the applying of the dynamic fluid and/or the control fluid is performed automatically by a robotic liquid handling apparatus or by using a piston assembly nestably engaged with the fluidics device.

18. The method of claim 16, further comprising syphoning the respective fluid from the downstream well furthest from the respective dosing well when the applying of the dynamic fluid and/or the control fluid is repeated.

19. The method of claim 18, where the syphoning the respective fluid is performed automatically by a robotic liquid handling apparatus.

20. The method of claim 1, further comprising:

applying a tracing fluid having a known concentration of a detectable tracing compound to a tracing dosing well of the fluidics device, wherein the fluidics device further includes a plurality of tracing wells each containing a cell culture therein positioned downstream from the tracing dosing well and in fluid communication therewith;

determining the concentration of the tracing compound as a standard curve to calculate a concentration of the test compound in each of the plurality of dynamic wells.