CLAIMS

1. A method for measuring cellular responses to differential stimuli using optical and/or fluidic forces, wherein the method comprises:

receiving a selection of an initial samples comprising biological cells treated with varying known levels of stimuli or analyte,

performing optical force-based measurements on the samples,

developing a response metric (RM) to describe the cellular response to the stimuli based on one or more optical or fluidic force-based parameters.

2. The method of claim 1, wherein the response metric is used to measure the response of additional unknown samples.

3. The method of claim 1, further comprising analyzing dilutions of the sample until an accurate measurement of the infectivity is determined, based upon having an RM that falls within the acceptable target value range.

4. The method of claim 1, wherein the samples measured are cell nuclei, mitochondria, or other sub-cellular component or fraction.

5. The method of claim 1, where the optical and fluidic forces are based on laser force cytology.

6. The method of claim 1 further comprising:

comparing the response metric of an initial sample to a target value

selecting a second sample based on the results of the first and an algorithm governing the expected or known response

comparing the response metric of the second sample to a target value

selecting subsequent samples in a similar manner until a sample matching the target response metric or other defined endpoint is identified.

7. The method of claim 5, wherein the optical force-based measurements utilize laser force cytology to assess parameters comprising linear velocity, size, perimeter, size (area, diameter, volume, etc.), number of trapped cells per sample, number of beam

ejected cells per sample, number of aggregates (based upon size and/or shape or other parameters), number of debris-sized particles (based upon size and/or shape or other parameters), normalized velocity, minimum x position, optical retention time, optical trapping time, optical force, optical torque, orientation, optical and fluidic dynamics, effective refractive index, eccentricity, minor axis, major axis, deformability, eccentricity deformability, minor and major axis deformability, elongation factor, compactness factor, circularity factor, images including greyscale features, whole images, image components or image derived parameters, morphology characteristics, or other laser force cytology derived parameters.

8. The method of claim 1, wherein the biological cell comprises plant cells (algal cells or others), prokaryotic cells (bacteria), eukaryotic cells, yeast, fungus, mold cells, red blood cells, neurons, egg cell (ovum), spermatozoa, white blood cells, basophils, neutrophils, eosinophils, monocytes, lymphocytes, macrophages, platelets, vesicles, exosomes, stromal cells, multicellular constructs such as spheroids, mesenchymal cells, and induced pluripotent stem cells (iPSC).

9. The method claim 1, wherein the analyte comprises a virus.

10. The method claim 1, wherein the analyte comprises a bacterium.

11. The method of claim 1, wherein the analyte is a virus and a neutralizing serum containing antibodies (neutralization assay).

12. The method of claim 1, wherein the analyte is a bacterium and a neutralizing serum containing antibodies.

13. The method of claim 1, wherein the analyte is a toxin and antibodies in sera capable (or not) of neutralizing the toxin.

14. The method of claim 1, wherein the analyte is a virus and an antiviral compound or material.

15. The method of claim 1, wherein the cells are present in a monolayer, suspension or embedded in a matrix.

16. The method of claim 1, wherein the cells are suspended by alginate, gelatin, or other similar semi-solid suspension.

17. The method of claim 1, wherein the cells are sampled from an ongoing process and analyzed directly with no further incubation.

18. The method of claim 1, further comprising calibration objects.

19. The method of claim 18, wherein the calibration objects comprise beads, particles, biologics, lipids, vesicles, live cells, or fixed cells.

20. The method of claim 19, wherein beads or particles, comprise organic materials, polymers, metals, alloys, glass, sapphire, or diamond.

21. The method of claim 18, wherein the calibration objects are in spherical or non-spherical shapes sized from nanometers to millimeters.

22. The method of claim 18, wherein the calibration objects are mixed with one or more samples and analyzed at the same time.

23. The method of claim 18, wherein the calibration objects can be differentiated from cell samples based on brightfield image analysis of the cells, fluorescence measurements, or one or more optical force-based measurements.