

What is claimed is:

1. A method for characterizing the effect of an agent on cells comprising:
 - a) contacting samples of a population of cells with a series of different concentrations of an agent;
 - b) measuring each of two or more phenotypic parameters in individual cells of the population for each sample and for each exposure concentration;
 - c) obtaining a distribution of measured values for the cells for each parameter and each exposure;
 - d) obtaining a distribution of measured values for the cells not exposed to the compound;
 - e) calculating dissimilarities between the distribution obtained in step d) and each of the distributions obtained in step c);
 - f) combining the calculated dissimilarities to form a multiparametric response tensor;wherein the multiparametric response tensor is a fingerprint characteristic of the effect of the agent on the cells which can be directly compared to other fingerprints generated the same way.
2. A method according to claim 1, wherein the method is used to generate and store fingerprints.
3. A method according to claim 1, wherein the method is used to make comparisons of fingerprints.
4. A method according to claim 3, wherein the comparisons are used to predict *in vivo* effects.
5. A method according to any one of the preceding claims, wherein the phenotypic parameters are measured in the individual cells by cell cytometry.
6. A method according to any one of the preceding claims, wherein the phenotypic parameters include any two or more of cell viability, cell cycle stage, mitochondrial membrane integrity, mitochondrial toxicity, glutathione concentration, reactive oxygen species, reducing species, cytoplasmic membrane permeability, DNA damage, a stress response marker, an inflammatory response marker, an apoptosis marker and a lipid peroxidase.
7. A method according to any one of the preceding claims, wherein the phenotypic parameters include any one or more of NF κ B, caspase, ERK, SAPK, P13K, AKT, a Bcl-1 family protein, p38, ATM, GSK3B and ribosomal S6 kinase.

8. A method according to any one of the preceding claims, wherein one of the phenotypic parameters is cell cycle.

9. A method according to claim according to any one of the preceding claims, wherein each population of cells is functionally labeled with a plurality of fluorescence dyes and the phenotypic parameters are detected and quantitated in terms of spectral emission signal(s) that are generated when said populations of labeled cells are subjected to cytometric analysis.

10. The method according to any one of the preceding claims, wherein a phenotypic parameter is cell cycle and it is quantitated in terms of any one or more of the HOECHST 33342, DRAQ5, YO-PRO-1 IODIDE, DAPI, CYTRAK ORANGE, cyclin or phosphorylated histone protein.