CLAIMS

1. A method for determining the effect of at least one selected ~~administered~~ treatment of a metabolic, anabolic, catabolic, genetic and/or medical condition already administered to a patient, said method comprising the procedures of:

acquiring volatile organic compound (VOC) emission data of pre-treatment target cells cultures;

producing a pre-treatment target cells VOC profile from said VOC emission data of said pre-treatment target cells cultures;

producing a~~n~~ massive cell death (MCD) target cells VOC profile by:

(a) inducing massive cell death on non-treated target cells cultures thereby producing post-MCD target cells cultures; and

(b) acquiring post-MCD target cells cultures VOC emission data relating to the target cells;

applying said at least one selected treatment ~~at least~~ to target cells cultures;

for each selected treatment, acquiring VOC emission data of post-treatment target cells cultures; and

determining the effect of said selected treatment, said treatment is determined as effective when:

(a) concentration values from said VOC emission data of pre-treatment target cells cultures, of VOCs associated with said pre-treatment target cells VOC profile, are greater than concentration values from said VOC emission data of post-treatment target cells cultures, of VOCs associated with said pre-treatment target cells VOC profile; and

(b) concentration values from said VOC emission data of post-treatment target cells cultures, of VOCs associated

with said MCD target cells VOC profile, emitted by said post-treatment target cell cultures, are greater than concentration values from said VOC emission data of pre-treatment target cells cultures, of VOCs associated with said MCD target cells VOC profile, emitted by said pre-treatment target cell cultures.

2. The method according to claim 1, wherein said pre-treatment target VOC profile is produced by comparing said pre-treatment target cells cultures VOC emission data from the target cells with the pre-treatment healthy cells cultures VOC emission data from the healthy cells.

3. The method according to claim 1, where producing said MCD target cells VOC profile further includes the sub-procedures of:

comparing said pre-treatment target cells cultures VOC emission data relating to the target cells with said post-MCD target cells cultures VOC emission data relating to the target cells.

4. The method according to claim 3, wherein said MCD is induced in way that does not generate residual VOC artifacts.

5. The method according to claim 4, wherein said MCD is induced by applying one of flash freeze and ultra violet light to the target cells cultures.

6. The method according to claim 1, wherein determining the effect of each of said at least one selected treatment on said target cells includes the sub-procedures of:

determining said concentration values of the VOCs in said pre-treatment target cells VOC profile from said pre-treatment target cells cultures VOC emission data;

determining said concentration values of the VOCs in said MCD target cells VOC profile from said pre-treatment target cells cultures VOC emission data;

determining said concentration values of the VOCs in said pre-treatment target cells VOC profile from said post-treatment target cells cultures VOC emission data; and

determining said concentration values of the VOCs in said MCD target cells VOC profile from said post-treatment target cells cultures VOC emission data.

7. The method according to claim 6, wherein when said at least one selected treatment includes at least two treatments, the treatment which said concentration levels of VOCs in said MCD target cells VOC profile exhibit the largest increase, and in which said concentration levels of VOCs in the pre-treatment target cells VOC profile exhibit the largest reduction is selected as the optimal treatment from said at least two treatments.

8. The method according to claim 1, further includes the procedures of:

acquiring pre-treatment healthy cells cultures VOC emission data relating to healthy cells;

determining a pre-treatment healthy cells VOC profile by comparing said pre-treatment target cells cultures VOC emission data from said target cells cultures with said pre-treatment healthy cells cultures VOC emission data from said healthy cells cultures; and

producing a MCD healthy cells VOC profile.

9. The method according to claim 8, where producing said MCD healthy cells VOC profile includes the sub-procedures of:

inducing massive cell death on the healthy cells cultures;

acquiring post-MCD healthy cells cultures VOC emission data relating to the healthy cells;

comparing said pre-treatment healthy cells cultures VOC emission data relating to the healthy cells with said post-MCD healthy cell cultures VOC emission data relating to the healthy cells.

10. The method according to claim 8, wherein said treatment is further determined as effective when:

(a) concentration values from said post-treatment healthy cells cultures VOC emission data, of the VOCs in said pre-treatment healthy cells VOC profile, remain unchanged relative to concentration values from said pre-treatment healthy cells cultures VOC emission data, of VOCs associated with said pre-treatment healthy cells VOC profile; and

(b) concentration values from said post-treatment healthy cells cultures VOC emission data, of VOCs associated with said MCD healthy cells VOC profile remain unchanged relative to concentration values from said pre-treatment healthy cells cultures VOC emission data, of VOCs in said MCD healthy cells VOC profile.

11. The method according to claim 6, wherein when said at least one selected treatment includes at least two treatments, and wherein the treatment in which said concentration levels of VOCs in said pre-treatment healthy cells VOC profile and said concentration levels in said MCD healthy cells VOC profile exhibits the least change is

selected as the optimal treatment from said at least two selected treatments.

12. The method according to claim 1, further including the procedure of determining said treatment resistance potential and said mutation rate of at least one mutation and/or pathogen.

13. The method according to claim 12, wherein determining treatment resistance potential and at least one mutation rate includes the sub-procedures of:

determining said concentration values of VOCs in said pre-treatment target cells VOC profile from said pre-treatment target cells VOC emission data;

filtering said post-treatment target VOC emission data with said MCD target cells VOC profile to alleviate cell death related VOCs;

determining said concentration values of the VOCs in said pre-treatment target cells VOC profile from the filtered post-treatment target cells cultures VOC emission data;

comparing said concentration values of the VOCs in said pre-treatment target cells VOC profile before said at least one selected treatment and during and/or after said at least one selected treatment, to determined said treatment resistance potential; and

filtering the filtered post-treatment target cells cultures VOC emission data further with the pre-treatment target cells VOC profile;

comparing the twice filtered post-treatment target cells cultures VOC emission data with stored Dynamic Differential VOC profiles to determine at least one mutation rate differential VOC profile or profiles of at least one mutation or pathogens; and

determining the concentration values of the VOCs in said identified stored Dynamic Differential VOC profile or profiles from the twice filtered post treatment target cells cultures VOC emission data.

14. The method according to claim 13, wherein said at least one selected treatment is determined as effective when the concentration values of the VOCs in the pre-treatment target cells VOC profile reduce, and when no stored Dynamic Differential VOC profiles are identified from said twice filtered post-treatment target cells cultures VOC emission data.

15. The method according to claim 13, wherein when said at least one selected treatment includes at least two treatments, and wherein said treatment, in which said concentration levels of said VOCs in said pre-treatment target cells VOC profile, exhibits the highest change, and no stored Dynamic Differential VOC profiles are identified, or exhibits the least change in the concentration levels of the VOCs in the identified stored Dynamic Differential VOC profiles, is selected as the optimal treatment from the selected treatments.

16. The method according to claim 13, wherein said Dynamic Differential VOC profile relates to at least one of:

the range of VOC emission data of each healthy cells VOC profile and target cells VOC profile; and

the range between healthy cells and target cells VOC profiles.

17. A method for determining the efficacy of a treatment of a metabolic, anabolic, catabolic, genetic and/or medical condition already administered to a patient, comprising the procedures of:

acquiring pre-treatment patient volatile organic compound (VOC) emission data of the VOCs emitted from at least one of breath samples and body fluid samples prior to at least one selected phase of said treatment;

acquiring VOC emission data of pre-treatment target cells cultures;

producing a predicted massive cell death (MCD) target cells VOC profile by:

(a) inducing massive cell death on non-treated target cells cultures thereby producing post-MCD target cells cultures;

(b) acquiring VOC emission data of said post-MCD target cells cultures; and

(c) predicting the concentration levels of the VOCs in the breath and/or body fluids employing a diffusion model;

~~applying the selected treatment to said patient;~~

acquiring post-treatment patient VOC emission data of the VOCs emitted from at least one of breath samples and body fluid samples that were acquired during and/or after at least one selected phase of said treatment; and

determining the efficacy of the selected treatment, said treatment is determined as effective when concentration values of the VOCs in said predicted MCD target cells VOC profile during and/or after said selected phase of said treatment from said post-treatment patient VOC emission data associated with at least one of breath samples and body fluid samples, are greater than concentration values of the VOCs in said predicted MCD target cells VOC profile before said selected phase of said treatment from said pre-treatment patient VOC emission data associated with at least one of breath samples and body fluid samples.

18. The method according to claim 17, further include the procedures of:

producing a pre-treatment target cells VOC profile from said VOC emission of said pre-treatment target cells cultures;

applying said at least one selected treatment ~~at least~~ to target cells cultures;

producing a predicted treatment-induced MCD target cells VOC profile by:

(a) acquiring VOC emission data of the VOCs associated with said post-MCD target cells cultures; and

(b) predicting the concentration levels of the VOCs in the breath and/or body fluids employing a diffusion model,

wherein said treatment is further determined as effective when concentration values of the VOCs associated with said predicted treatment-induced MCD target cells VOC profile, from said post-treatment patient VOC emission data associated with at least one of breath samples and body fluid samples are greater than concentration values of the VOCs associated with said predicted treatment-induced MCD target cells VOC profile, from said pre-treatment patient VOC emission data associated with at least one of breath samples and body fluid samples.

19. The method according to claim 17, wherein said procedure of determining individual personal treatment efficacy includes the procedures of:

producing a pre-treatment target cells VOC profile from said VOC emission of said pre-treatment target cells cultures;

producing an MCD target cells VOC profile by:

(a) inducing massive cell death on non-treated target cells cultures thereby producing post-MCD target cells cultures; and

(b) acquiring VOC emission data of said post-MCD target cells cultures;

applying said at least one selected treatment ~~at least~~ to target cells cultures;

for each selected treatment, acquiring VOC emission data of post-treatment target cells cultures,

wherein said treatment is further determine as effective when concentration values from said VOC emission data of pre-treatment target cells cultures, of VOCs associated with said pre-treatment target cells VOC profile, are greater than concentration values from said VOC emission data of post-treatment target cells cultures, of VOCs associated with said pre-treatment target cells VOC profile.

20. The method according to claim 17, wherein said procedure of determining individual personal treatment efficacy includes the sub-procedures of:

determining at least one of dynamic treatment resistance potential differential VOC profiles and at least one mutation rate differential VOC profile of at least one mutation and/or pathogen, from stored Dynamic Differential VOC profiles and the post-treatment patient VOC emission data; and

determining concentration values of the VOCs in said dynamic patient treatment resistance potential differential VOC profile and in said mutation rate differential VOC profile from said pre-treatment target cells cultures VOC emission data; and

determining concentration values of the VOCs in said dynamic patient treatment resistance potential differential VOC profile and in said mutation rate differential VOC profile from said post-treatment patient VOC emission data.

21. The method according to claim 20, wherein said treatment is determined as effective when concentration values of the VOCs in said dynamic patient treatment resistance potential differential VOC profile and in said mutation rate differential VOC profile during and/or after said at least one phase of said treatment, remain un-changed relative to the concentration values of said VOCs before said at least one phase of said treatment.

22. The method according to claim 17, further including the procedures of:

applying said at least one selected treatment at least to healthy cells cultures;

producing a predicted treatment-induced MCD healthy cells VOC profile by:

(a) acquiring VOC emission data of the VOCs associated with treated healthy cells cultures; and

(b) predicting the concentration levels of said VOCs in the breath and/or body fluids employing a diffusion model,

wherein said treatment is determined as effective when the concentration values of from said post-treatment patient VOC emission data associated with at least one of breath samples and body fluid samples of VOCs in said predicted treatment-induced MCD healthy cells VOC profile remain unchanged to concentration values from said pre-treatment patient VOC emission data associated with at least one of breath samples and body fluid samples, of VOCs in said predicted treatment-induced MCD healthy cells VOC profile.

23. The method according to claim 22, wherein said procedure of determining individual personal treatment efficacy includes the sub-procedures of:

determining concentration values of the VOCs in said pre-treatment healthy cells VOC profile relating to said healthy cells, before said at least one phase of said treatment from said pre-treatment healthy cells cultures VOC emission data;

determining concentration values of said VOCs in said pre-treatment healthy cells VOC profile relating to said healthy cells, during and/or after said at least one phase of said treatment from said post-treatment patient VOC emission data;

determining concentration values of the VOCs in said predicted treatment-induced MCD healthy cells VOC profile, before said at least one phase of said treatment from said pre-treatment healthy cells cultures VOC emission data;

determining concentration values of the VOCs in said predicted treatment-induced MCD healthy cells VOC profile, during and/or after said at least one phase of said treatment from said post-treatment patient VOC emission data;

determining concentration values of the VOCs in said predicted MCD healthy cells VOC profile, before said at least one phase of said treatment from said pre-treatment healthy cells cultures VOC emission data; and

determining concentration values of the VOCs in said predicted MCD healthy cells VOC profile, during and/or after said at least one phase of said treatment from said post-treatment patient VOC emission data.

24. The method according to claim 17, wherein prior to said procedure of determining a pre-treatment target cells VOC profile and pre-treatment healthy cells VOC profile, said method further includes the procedures of:

acquiring at least one of breath samples and body fluid samples from said patient, prior to administering said treatment;

acquiring VOC emission data of the VOCs emitted in said at least one of breath samples and body fluid samples;

acquiring from said patient target cells samples and healthy cells samples of the same cell type as said target cells, prior to administering said treatment;

producing two sets of target cell cultures from the target cells samples and two sets of healthy cells cultures from the healthy cells samples; and

acquiring pre-treatment target cells cultures VOC emission data relating to said both target cells cultures sets and pre-treatment healthy cells cultures VOC emission data relating to said both healthy cells cultures sets, prior to administering said treatment.

25. The method according to claim 24, wherein after said procedure of determining a pre-treatment VOC profile and prior to said procedure of producing a predicted treatment-induced target MCD VOC profile, said method further includes the procedures of:

applying the selected treatment to the cells in a first one of said sets of target cells cultures and to a first one of said sets of healthy cells cultures;

acquiring post-treatment VOC emission data relating to said target cells cultures and to said healthy cells cultures after the application of said treatment;

inducing massive cell death to the cells in a second one of said sets target cells cultures and to a second one of said sets of healthy cells cultures; and

acquiring post-MCD VOC emission data relating to said second set target cells cultures and to said second set healthy cells cultures, after the induction of MCD.

26. The method according to claim 17, wherein said at least one phase of said treatment is determined as effective when no new mutations are identified,

wherein new mutation is identified by attempting to identify a stored Dynamic Differential VOC profile which corresponds to said the post-treatment patient VOC emission data.

27. The method according to claim 26, wherein prior to said attempt to identify a new mutation, said post-treatment patient VOC emission data is filtered with said pre-treatment target cells VOC profile, with said treatment induced MCD target cells VOC profile, and with said MCD target cells VOC profile thereby alleviating information relating to the VOCs which result from said treatment.

28. A method for determining the efficacy of a treatment already administered to a patient comprising the procedures of:

acquiring at least one of breath and body fluid samples prior to at least one phase of said treatment;

acquiring volatile organic compound (VOC) emission data of the VOCs emitted by said at least one of breath samples and body fluid samples acquired prior to said at least one phase of said treatment;

identifying a stored Dynamic Differential VOC profile which corresponds to the acquired VOC emission data, thereby associating a pathological condition with said VOC emissions data;

acquiring at least one of breath and body fluid samples during and/or after said at least one phase of said treatment;

acquiring VOC emission data of the VOCs emitted in said at least one of breath samples and body fluid samples acquired ~~during and/or~~ after said at least one phase of said treatment; and

classifying the efficacy of the treatment at least by comparing the concentration values of the VOCs in said identified Dynamic Differential VOC profile acquired before said at least one phase of said treatment with concentration values of the VOCs in said identified Dynamic Differential VOC profile acquired ~~during and/or~~ after said at least one phase of said treatment,

wherein said at least one phase of said treatment is classified as successful when the concentration levels of the VOCs related to said target cells VOC profile in said Dynamic Differential VOC profile ~~during and/or~~ after said selected phase of said treatment are reduced relative to the concentration values of the VOCs in said identified dynamic differential VOC profile before the treatment; and

wherein said stored Dynamic Differential VOC profile relates to a range of VOC emission data associated with said pathological condition.

29. The method according to claim 28, wherein said treatment is further classified as successful when no new mutation was detected.

30. The method according to claim 29, wherein a new mutation is detected by comparing said VOC emission data acquired before said at least one phase of said treatment with the VOC emission data acquired during and/or after said at least one phase of said treatment, with other stored dynamic differential VOC profiles.

31. A method for determining the effect of at least one selected treatment of a metabolic, anabolic, catabolic, genetic and/or medical condition

already administered to a patient, said method comprising the procedures of:

acquiring volatile organic compound (VOC) emission data of pre-treatment target cells cultures;

producing a pre-treatment target cells VOC profile from said VOC emission of said pre-treatment target cells cultures;

producing a~~n~~ massive cell death (MCD) target cells VOC profile by:

(a) inducing massive cell death on non-treated target cells cultures thereby producing post-MCD target cells cultures; and

(b) acquiring VOC emission data of said post-MCD target cells cultures;

applying said at least one selected treatment ~~at least~~ to target cells cultures;

for each selected treatment, acquiring VOC emission data of post-treatment target cells cultures;

determining the effect of said selected treatment, said treatment is determine as effective when the ratio between concentration values from the VOC emission data of post-treatment target cells cultures, of VOCs associated with the MCD VOC profile, emitted by the post-treatment target cell cultures and the concentration values from the VOC emission data of post-treatment target cells cultures, of VOCs associated with the pre-treatment target cells VOC profile is larger than the ratio between the concentration values from the VOC emission data of pre-treatment target cells cultures, of VOCs associated with the MCD VOC profile and concentration values from the VOC emission data of pre-treatment target cells cultures, of VOCs associated with the pre-treatment target cells VOC profile.