The Claims Defining the Invention are as Follows:

1. A method of deriving a physiological homeostatic operating set point of an individual comprising the steps of:

   a. obtaining a dataset of predetermined number of homeostatic measurements of the individual;

   b. fitting the dataset of predetermined number of homeostatic measurements according to a negative exponential decay function; and

   c. identifying and setting the physiological homeostatic operating set point unique to the individual as the point corresponding to the point of maximum curvature on the fitted negative exponential decay function.

2. A method according to claim 1, wherein each of the predetermined number of homeostatic measurements is a thyroid-stimulating hormone [TSH] level and a corresponding free thyroxin [FT4] level of the individual, the homeostatic measurements obtained under controlled predetermined measurement conditions.

3. A method according to claim 2, wherein the negative exponential decay function is mathematically expressed as the following formula:

$$[TSH] = \frac{S}{\exp(\varphi[FT4])}$$

   Wherein S is a multiplier parameter; ϕ is a rotational parameter; and exp denotes the exponential function.

4. A method according to claim 3, wherein the parameters S and ϕ are calculated from a first and a second homeostatic measurements of the individual according to the following formula:

$$\varphi = \left(\frac{1}{[FT4]_1 - [FT4]_2}\right) \ln\left(\frac{[TSH]_2}{[TSH]_1}\right)$$

$$S = [TSH]_1 \exp(\varphi[FT4]_1) = [TSH]_2 \exp(\varphi[FT4]_2)$$

where the subscript 1 and 2 denote the first and second homeostatic measurement respectively.

5. A method according to claim 3, wherein the physiological homeostatic operating set point of the individual is determined according to the following formula:

$$[FT4]_{SP} = \frac{\ln(S\varphi\sqrt{2})}{\varphi}$$

$$[TSH]_{SP} = \frac{1}{\varphi\sqrt{2}}$$

Where $[FT4]_{SP}$ and $[TSH]_{SP}$ denote the physiological homeostatic operating set point of the individual.

6. A method according to any one of the preceding claims, wherein the step of fitting the dataset of predetermined number of homeostatic measurements is based on interpolation, smoothing or extrapolation techniques.

7. A method according to any one of the preceding claims, the method further includes the step of filtering any outlier data from the dataset of predetermined number of homeostatic measurements before the step of fitting the dataset.

8. A method according to any one of the preceding claims, the method further includes a step of validating the fitted negative exponential decay function using a goodness of fit test (Rsq) comparing with at least three homeostatic measurements.

9. A method according to claim 4, wherein for any measurement subsequent to the second homeostatic measurement, the parameters S and ϕ are iteratively fine-tuned by using each subsequent homeostatic measurement with the first and second homeostatic measurements.

10. A method according to claim 3, wherein the point corresponding to the physiological homeostatic operating set point of the individual is where the value of the first derivative of TSH with respect to FT4 is

$$\frac{d[TSH]}{d[FT4]} = \frac{-1}{\sqrt{2}} = -0.707$$

11. A method according to claim 3, wherein the negative exponential decay function is modified to take into account hysteresis effect in accordance with the following mathematical expression:-

$$[TSH] = \frac{S}{\alpha S + \exp(\varphi[FT4])}$$

and the parameter α defines the maximum [TSH] secretion from anterior pituitary under conditions of complete hypothyroidism.

12. A method according to any one of the preceding claims, further comprising the step of validating the physiological homeostatic operating set point of the individual based on a control system model.

13. A method according to any one of claims 3 to 12, the method comprises an additional step of calculating the loop gain of the obtained physiological homeostatic operating set point mathematically expressed as:-

$$G_L = \frac{A\varphi}{e}$$

Where G_L is the calculated loop gain; e is the exponential constant $e \approx 2.718$; $A = \frac{[FT4]_{setpoint}}{0.632}$; and $[FT4]_{setpoint}$ is the obtained [FT4] level of the operating set point for the individual, and accepting the obtained physiological homeostatic operating set point if the calculated G_L is greater than 1.

14. A method according to claim 1, wherein the each of the predetermined number of homeostatic measurements comprises a thyroid-stimulating hormone (TSH) level and a corresponding triiodothyronine (T3) level .

15. A method according to claim 1 wherein each homeostatic measurement is obtained by measuring the amount of a homeostatic amino acid expression product with a detection reagent capable of hybridizing to the homeostatic amino acid expression product.

16. A method according to claim 15, wherein the detection reagent comprises an antibody and a detectable marker.

17. A method according to claim 16, wherein the antibody is capable of hybridizing to a thyroid-stimulating hormone.

18. A method according to claim 16, wherein the antibody is capable of hybridizing to a free thyroxin.

19. A computer readable medium containing software instructions that when executed by a computer cause the computer to perform the method as claimed in any of claims 1 to 14.

20. A system for deriving a physiological homeostatic operating set point of an individual comprising:-

a processing unit operable to obtain a dataset of predetermined number of homeostatic measurements of the individual and fit the dataset of predetermined number of homeostatic measurements according to a negative exponential decay function;

wherein the processing unit is further operable to identify and set the physiological homeostatic operating set point unique to the individual as the point corresponding to the point of maximum curvature on the fitted negative exponential decay function.

21. A system according to claim 20, wherein each of the predetermined number of homeostatic measurements is the thyroid-stimulating hormone (TSH) level and the corresponding free thyroxin (FT4) level when the individual is fully controlled under predetermined measurement conditions.

22. A system according to claim 21, wherein the negative exponential decay function is mathematically expressed as the following formula:

$$[TSH] = \frac{S}{\exp(\varphi[FT4])}$$

Wherein S is a multiplier parameter and ϕ is a rotational parameter; exp denotes the exponential constant $e \approx 2.718$.

23. A system according to claim 22, wherein the parameters S and ϕ are calculated from a first and a second homeostatic measurements of the individual according to the following formula:

$$\varphi = \left(\frac{1}{[FT4]_1 - [FT4]_2}\right) \ln\left(\frac{[TSH]_2}{[TSH]_1}\right)$$

$$S = [TSH]_1 \exp(\varphi[FT4]_1) = [TSH]_2 \exp(\varphi[FT4]_2)$$

where the subscript 1 and 2 denote the first and second homeostatic measurement respectively.

24. A system according to claim 22, wherein the point of maximum curvature corresponding to the physiological homeostatic operating set point of the individual is determined according to the following formula:

$$[FT4]_{SP} = \frac{\ln(S\varphi\sqrt{2})}{\varphi}$$

$$[TSH]_{SP} = \frac{1}{\varphi\sqrt{2}}$$

where $[FT4]_{SP}$ and $[TSH]_{SP}$ denote the physiological homeostatic operating set point of the individual.

25. A system according to claim 20, wherein the each of the predetermined number of homeostatic measurements comprises a thyroid-stimulating hormone (TSH) level and a corresponding triiodothyronine (T3) level.

26. A system according to any of claims 20 to 24, wherein the dataset is fitted based on non-linear regression or a non-linear method of least squares related to an exponential function.

27. A system according to any of claims 20 to 25, wherein the dataset is filtered to remove any outlier data from the dataset of predetermined number of homeostatic measurements before fitting.

28. A system according to any of claims 20 to 26, wherein the fitted negative exponential decay function is validated using a goodness of fit test (Rsq) comparing at least three distinctly separated sets of homeostatic measurements under predetermined and controlled conditions.

29. A system according to claim 23, wherein for any measurement subsequent to the second homeostatic measurement, the parameters S and ϕ are iteratively fine-tuned by using each subsequent distinctly separated sets of [FT4] and [TSH] measurements.

30. A system according to claim 22, wherein the point corresponding to the physiological homeostatic operating set point of the individual is where the value of the first derivative of TSH with respect to FT4 is:

$$\frac{d[TSH]}{d[FT4]} = \frac{-1}{\sqrt{2}} = -0.707$$

31. A system according to any of claims 20 to 29, further comprising validation of the obtained physiological homeostatic operating set point of the individual based on a control system model.

32. A system according to any of claims 30, the processing unit operable to calculate the loop gain of the obtained physiological homeostatic operating set point mathematically expressed as

$$G_L = \frac{A\varphi}{e}$$

Where G_L is the calculated loop gain; e is the exponential constant ≈ 2.718; $A = \frac{[FT4]_{setpoint}}{0.632}$; and $[FT4]_{setpoint}$ is the obtained [FT4] level of the operating set point for the individual; the processing unit operable to accept the obtained physiological homeostatic operating set point if the calculated G_L is greater than 1.

33. A system according to claim 22, wherein the negative exponential decay function is modified to take into account hysteresis effect in accordance with the following mathematical expression:-

$$[TSH] = \frac{S}{\alpha S + \exp(\varphi[FT4])}$$

and the parameter α defines the maximum [TSH] secretion from anterior pituitary under conditions of complete hypothyroidism.

34. A system according to claim 20 further comprising a means for obtaining a homeostatic measurement by measuring the amount of a homeostatic amino acid expression product with a detection reagent capable of hybridizing to the homeostatic amino acid expression product.

35. A system according to claim 34, wherein the detection reagent comprises an antibody and a detectable marker.

36. A system according to claim 35, wherein the antibody is capable of hybridizing to a thyroid-stimulating hormone.

37. A system according to claim 35, wherein the antibody is capable of hybridizing to a free thyroxin.

38. A system according to claim 20 further comprising a means of adjusting the homeostatic measurements of the individual to the calculated physiological homeostatic operating set point unique to the individual using a therapeutically effective amount of a compound able to adjust the homeostatic measurements of the individual.

39. A system according to claim 38 wherein the therapeutically effective amount of a compound comprises thyroxin.

40. A system according to claim 38 wherein the therapeutically effective amount of a compound comprises active iodothyronines or iodothyroacetic acids.

The Claims Defining the Invention are as Follows:

1. A method of deriving a physiological homeostatic operating set point of an individual comprising the steps of:

   a. obtaining a dataset of predetermined number of homeostatic measurements of the individual;

   b. fitting the dataset of predetermined number of homeostatic measurements according to a negative exponential decay function; and

   c. identifying and setting the physiological homeostatic operating set point unique to the individual as the point corresponding to the point of maximum curvature on the fitted negative exponential decay function.

2. A method according to claim 1, wherein each of the predetermined number of homeostatic measurements is a thyroid-stimulating hormone [TSH] level and a corresponding free thyroxin [FT4] level of the individual, the homeostatic measurements obtained under controlled predetermined measurement conditions.

3. A method according to claim 2, wherein the negative exponential decay function is mathematically expressed as the following formula:

$$[TSH] = \frac{S}{\exp(\varphi[FT4])}$$

   Wherein S is a multiplier parameter; ϕ is a rotational parameter; and exp denotes the exponential function.

4. A method according to claim 3, wherein the parameters S and ϕ are calculated from a first and a second homeostatic measurements of the individual according to the following formula:

$$\varphi = \left(\frac{1}{[FT4]_1 - [FT4]_2}\right) \ln\left(\frac{[TSH]_2}{[TSH]_1}\right)$$

$$S = [TSH]_1 \exp(\varphi[FT4]_1) = [TSH]_2 \exp(\varphi[FT4]_2)$$

where the subscript 1 and 2 denote the first and second homeostatic measurement respectively.

5. A method according to claim 3, wherein the physiological homeostatic operating set point of the individual is determined according to the following formula:

$$[FT4]_{SP} = \frac{\ln(S\varphi\sqrt{2})}{\varphi}$$

$$[TSH]_{SP} = \frac{1}{\varphi\sqrt{2}}$$

Where $[FT4]_{SP}$ and $[TSH]_{SP}$ denote the physiological homeostatic operating set point of the individual.

6. A method according to any one of the preceding claims, wherein the step of fitting the dataset of predetermined number of homeostatic measurements is based on interpolation, smoothing or extrapolation techniques.

7. A method according to any one of the preceding claims, the method further includes the step of filtering any outlier data from the dataset of predetermined number of homeostatic measurements before the step of fitting the dataset.

8. A method according to any one of the preceding claims, the method further includes a step of validating the fitted negative exponential decay function using a goodness of fit test (Rsq) comparing with at least three homeostatic measurements.

9. A method according to claim 4, wherein for any measurement subsequent to the second homeostatic measurement, the parameters S and ϕ are iteratively fine-tuned by using each subsequent homeostatic measurement with the first and second homeostatic measurements.

10. A method according to claim 3, wherein the point corresponding to the physiological homeostatic operating set point of the individual is where the value of the first derivative of TSH with respect to FT4 is

$$\frac{d[TSH]}{d[FT4]} = \frac{-1}{\sqrt{2}} = -0.707$$

11. A method according to claim 3, wherein the negative exponential decay function is modified to take into account hysteresis effect in accordance with the following mathematical expression:-

$$[TSH] = \frac{S}{\alpha S + \exp(\varphi[FT4])}$$

and the parameter α defines the maximum [TSH] secretion from anterior pituitary under conditions of complete hypothyroidism.

12. A method according to any one of the preceding claims, further comprising the step of validating the physiological homeostatic operating set point of the individual based on a control system model.

13. A method according to any one of claims 3 to 12, the method comprises an additional step of calculating the loop gain of the obtained physiological homeostatic operating set point mathematically expressed as:-

$$G_L = \frac{A\varphi}{e}$$

Where G_L is the calculated loop gain; e is the exponential constant $e \approx 2.718$; $A = \frac{[FT4]_{setpoint}}{0.632}$; and $[FT4]_{setpoint}$ is the obtained [FT4] level of the operating set point for the individual, and accepting the obtained physiological homeostatic operating set point if the calculated G_L is greater than 1.

14. A method according to claim 1, wherein the each of the predetermined number of homeostatic measurements comprises a thyroid-stimulating hormone (TSH) level and a corresponding triiodothyronine (T3) level .

15. A method according to claim 1 wherein each homeostatic measurement is obtained by measuring the amount of a homeostatic amino acid expression product with a detection reagent capable of hybridizing to the homeostatic amino acid expression product.

16. A method according to claim 15, wherein the detection reagent comprises an antibody and a detectable marker.

17. A method according to claim 16, wherein the antibody is capable of hybridizing to a thyroid-stimulating hormone.

18. A method according to claim 16, wherein the antibody is capable of hybridizing to a free thyroxin.

~~19. A method according to claim 1 further comprising the step of administering a therapeutically effective amount of a compound that is able to adjust the homeostatic measurements of the individual to the calculated physiological homeostatic operating set point unique to the individual.~~

~~20. A method according to claim 19 wherein the therapeutically effective compound comprises thyroxin.~~

~~21. A method according to claim 19 wherein the therapeutically effective amount of a compound comprises active iodothyronines or iodothyroacetic acids.~~

2219. A computer readable medium containing software instructions that when executed by a computer cause the computer to perform the method as claimed in any of claims 1 to 14.

2320. A system for deriving a physiological homeostatic operating set point of an individual comprising:-

a processing unit operable to obtain a dataset of predetermined number of homeostatic measurements of the individual and fit the dataset of predetermined number of homeostatic measurements according to a negative exponential decay function;

wherein the processing unit is further operable to identify and set the physiological homeostatic operating set point unique to the individual as the point corresponding to the point of maximum curvature on the fitted negative exponential decay function.

2421. A system according to claim 2320, wherein each of the predetermined number of homeostatic measurements is the thyroid-stimulating hormone (TSH) level and the corresponding free thyroxin (FT4) level when the individual is fully controlled under predetermined measurement conditions.

2522. A system according to claim 2421, wherein the negative exponential decay function is mathematically expressed as the following formula:

$$[TSH] = \frac{S}{\exp(\varphi[FT4])}$$

Wherein S is a multiplier parameter and ϕ is a rotational parameter; exp denotes the exponential constant $e \approx 2.718$.

2623. A system according to claim 2522, wherein the parameters S and ϕ are calculated from a first and a second homeostatic measurements of the individual according to the following formula:

$$\varphi = \left(\frac{1}{[FT4]_1 - [FT4]_2} \right) \ln\left(\frac{[TSH]_2}{[TSH]_1} \right)$$

$$S = [TSH]_1 \exp(\varphi[FT4]_1) = [TSH]_2 \exp(\varphi[FT4]_2)$$

where the subscript 1 and 2 denote the first and second homeostatic measurement respectively.

~~27~~24. A system according to claim ~~25~~22, wherein the point of maximum curvature corresponding to the physiological homeostatic operating set point of the individual is determined according to the following formula:

$$[FT4]_{SP} = \frac{\ln(S\varphi\sqrt{2})}{\varphi}$$

$$[TSH]_{SP} = \frac{1}{\varphi\sqrt{2}}$$

where $[FT4]_{SP}$ and $[TSH]_{SP}$ denote the physiological homeostatic operating set point of the individual.

~~28~~25. A system according to claim ~~21~~20, wherein the each of the predetermined number of homeostatic measurements comprises a thyroid-stimulating hormone (TSH) level and a corresponding triiodothyronine (T3) level.

~~29~~26. A system according to any of claims ~~23-~~20 to ~~27~~24, wherein the dataset is fitted based on non-linear regression or a non-linear method of least squares related to an exponential function.

~~30~~27. A system according to any of claims ~~23-~~20 to ~~28~~25, wherein the dataset is filtered to remove any outlier data from the dataset of predetermined number of homeostatic measurements before fitting.

3128. A system according to any of claims 23-20 to 2926, wherein the fitted negative exponential decay function is validated using a goodness of fit test (Rsq) comparing at least three distinctly separated sets of homeostatic measurements under predetermined and controlled conditions.

3229. A system according to claim 2623, wherein for any measurement subsequent to the second homeostatic measurement, the parameters S and ϕ are iteratively fine-tuned by using each subsequent distinctly separated sets of [FT4] and [TSH] measurements.

3330. A system according to claim 2522, wherein the point corresponding to the physiological homeostatic operating set point of the individual is where the value of the first derivative of TSH with respect to FT4 is:

$$\frac{d[TSH]}{d[FT4]} = \frac{-1}{\sqrt{2}} = -0.707$$

3431. A system according to any of claims 23-20 to 3229, further comprising validation of the obtained physiological homeostatic operating set point of the individual based on a control system model.

3532. A system according to any of claims 3330, the processing unit operable to calculate the loop gain of the obtained physiological homeostatic operating set point mathematically expressed as

$$G_L = \frac{A\varphi}{e}$$

Where G_L is the calculated loop gain; e is the exponential constant $\approx$ 2.718; $A = \frac{[FT4]_{setpoint}}{0.632}$; and $[FT4]_{setpoint}$ is the obtained [FT4] level of the operating set point for the individual; the processing unit operable to accept the obtained physiological homeostatic operating set point if the calculated G_L is greater than 1.

~~36~~33. A system according to claim ~~25~~22, wherein the negative exponential decay function is modified to take into account hysteresis effect in accordance with the following mathematical expression:-

$$[TSH] = \frac{S}{\alpha S + \exp(\varphi[FT4])}$$

and the parameter α defines the maximum [TSH] secretion from anterior pituitary under conditions of complete hypothyroidism.

~~37~~34. A system according to claim ~~23~~–20 further comprising a means for obtaining a homeostatic measurement by measuring the amount of a homeostatic amino acid expression product with a detection reagent capable of hybridizing to the homeostatic amino acid expression product.

~~38~~35. A system according to claim ~~37~~34, wherein the detection reagent comprises an antibody and a detectable marker.

~~39~~36. A system according to claim ~~38~~35, wherein the antibody is capable of hybridizing to a thyroid-stimulating hormone.

~~40~~37. A system according to claim ~~38~~35, wherein the antibody is capable of hybridizing to a free thyroxin.

~~41~~38. A system according to claim ~~23~~–20 further comprising a means of adjusting the homeostatic measurements of the individual to the calculated physiological homeostatic operating set point unique to the individual using a therapeutically effective amount of a compound able to adjust the homeostatic measurements of the individual.

~~42~~39. A system according to claim ~~41~~–38 wherein the therapeutically effective amount of a compound comprises thyroxin.

4340. A system according to claim 41 38 wherein the therapeutically effective amount of a compound comprises active iodothyronines or iodothyroacetic acids.