Claims

What is claimed is:

1. A method for detecting an inflammatory response modification in an individual, the method comprising:

    - obtaining a plurality of sensor readings from an individual over a period of time;

    - computing over the period of time at least a subset of the plurality of sensor readings into a plurality of timestamped records; and

    - by applying an inflammatory response variability model on the plurality of timestamped records, identifying an indicator of variation for one or more values for at least one inflammatory biomarker for the individual.

2. The method of claim 1, wherein the indicator relates to a medical condition and the method further comprises indicating a likelihood of deterioration in the medical condition in the individual from the indicator when the inflammatory response variability model indicates a valid increase of the one or more values or a valid decrease of the one or more values.

3. The method of claim 2, wherein the individual is asymptomatic for the medical condition when the plurality of sensor readings is obtained, and the method further comprises predicting a likelihood of the future occurrence of the medical condition or one or more symptoms thereof in the individual from the indicator when the inflammatory response variability model indicates a valid increase of the one or more values.

4. The method of any one of claims 2 to 3, wherein the medical condition is one or more of a respiratory disease an infectious disease, an autoimmune disease, a metabolic syndrome, a sterile inflammation, an exercise induced inflammation, a drug induced inflammation, sarcopenia, a preoperative inflammation, hypertension, a human immunodeficiency virus (HIV) infection, chronic obstructive pulmonary disease (COPD), allergy, asthma, arteriosclerosis and Alzheimer's disease wherein examples of the respiratory disease include COVID-19, Influenza, RSV, Rhinovirus (common cold), COPD, etc.

5. The method of any one of claims 1 to 4, wherein obtaining the plurality of sensor readings is performed during free-living baseline period of the individual, the method further comprising establishing a baseline pattern for the individual from the plurality of timestamped records obtained thereduring wherein, optionally, establishing the baseline pattern for the individual is repeated after a buffer period of at least 1 day following the identifying of the indicator of variation.

6. The method of any one of claims 1 to 5, further comprising selecting the subset of plurality of sensor readings from a set of sensor values of defined nature expected by the inflammatory response variability model, the set of one or more sensor values of defined nature being determined from a correlation factor with the at least one inflammatory biomarker, wherein, optionally,

the set of sensor values of defined nature is selected from the list consisting of:

- {minimal heat rate variability measured during a night (hrv_min)}; standard {deviation of heart rate during the night (hr_std)}; and {mean breathing rate during the night (breath_average)}; or

The set of sensor values of defined nature is selected from the list consisting of:

- {BR; HRV}; {BR; HR}; {BR; SLEEP}; {BR; ACTIVITY}; {BR; TEMPERATURE}; {HR; HRV}; {HR; SLEEP}; {HR; BR}; {HR; ACTIVITY}; {HRV; SLEEP}; {HRV; ACTIVITY}; {SLEEP; ACTIVITY}; {TEMPERATURE; HRV}; {TEMPERATURE; SLEEP}; {TEMPERATURE; HR}}; {BP; HR}; {BP; HRV}; {BP; BR}; {BP; SLEEP}; {BP; ACTIVITY}; and {BP; TEMPERATURE}.

7. The method of any one of claims 1 to 6, wherein obtaining the plurality of sensor readings is performed at a frequency between once per night to 265 times per second and/or wherein obtaining the plurality of sensor readings is performed from more than one wearable sensing devices worn by the individual.

8. The method of any one of the preceding claims, wherein the indicator is identified prior to occurrence of a clinical manifestation of a varying inflammatory response by the individual.

9. A system for detecting an inflammatory response modification in an individual comprising:

- one or more processors configured to:

- obtain a plurality of sensor readings from an individual over a period of time;

- compute over the period of time at least a subset of the plurality of sensor readings into a plurality of timestamped records;

- by applying an inflammatory response variability model on the plurality of timestamped records, identify an indicator of variation for one or more values for at least one inflammatory biomarker for the individual

10. The system of claim 9, wherein the indicator relates to a medical condition and the system further comprises indicating a likelihood of a deterioration in the medical condition in the individual from the indicator when the inflammatory response variability model indicates a valid increase of the one or more values or indicates a valid decrease of the one or more values.

11. The system of claim 10, wherein the individual is asymptomatic for the medical condition when the plurality of sensor readings are obtained, and the method further comprises predicting a likelihood of the future occurrence of the medical or one or more symptoms thereof in the individual from the indicator when the inflammatory response variability model indicates a valid increase of the one or more values.

12. The system of any one of claims 10 to 11, wherein the medical condition is one or more of a respiratory disease, an infectious disease, an autoimmune disease, a metabolic syndrome, a sterile inflammation, an exercise induced inflammation, a drug induced inflammation, sarcopenia, a preoperative inflammation, hypertension, a human immunodeficiency virus (HIV) infection, chronic obstructive pulmonary disease (COPD), allergy, asthma, arteriosclerosis and Alzheimer's disease, wherein examples of the respiratory disease include COVID-19, Influenza, Rhinovirus (common cold), RSV, COPD, etc.

13. The system of claim 9 to 12, wherein obtaining the plurality of sensor readings is performed during a free-living baseline period of the individual, the method further comprising establishing a baseline pattern for the individual from the plurality of timestamped records obtained thereduring and wherein, optionally, establishing the

baseline pattern for the individual is repeated after a buffer period of at least 1 day following the identifying of the indicator of variation.

14. The system of claim 9 to 13, further comprising selecting the subset of the plurality of sensor readings from a set of sensor values of defined nature expected by the inflammatory response variability model, the set of one or more sensor values of defined nature being determined from a correlation factor with the at least one inflammatory biomarker, wherein, optionally, the set of sensor values of defined nature is selected from the list consisting of:

- {minimal heat rate variability measured during a night (hrv_min)}
- standard {deviation of heart rate during the night (hr_std)}; and
- {mean breathing rate during the night (breath_average)}, or

wherein the set of sensor values of defined nature is selected from the list consisting of:

- {BR; HRV}; {BR; HR}; {BR; SLEEP}; {BR; ACTIVITY}; {BR; TEMPERATURE}; {HR; HRV}; {HR; SLEEP}; {HR; BR}; {HR; ACTIVITY}; {HRV; SLEEP}; {HRV; ACTIVITY}; {SLEEP; ACTIVITY}; {TEMPERATURE; HRV}; {TEMPERATURE; SLEEP}; {TEMPERATURE; HR}}; {BP; HR}; {BP; HRV}; {BP; BR}; {BP; SLEEP}; {BP; ACTIVITY}; and {BP; TEMPERATURE}..

15. The system of claim 9 to 14, wherein obtaining the plurality of sensor readings is performed at a frequency between once per night to 265 times per second and/or wherein obtaining the plurality of sensor readings is performed from more than one wearable sensing devices worn by the individual.

16. The system of claim any one of claims 9 to 15, wherein the indicator is identified prior to occurrence of a clinical manifestation of a varying inflammatory response by the individual.