Detection of the Catabolic State by Determining the Rate of Systemic Oscillations in Carbon Isotope Ratios

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method to determine if an individual is transitioning from a healthy state to an unhealthy state by identifying the rate of systemic oscillations in carbon isotope ratios.

Overview

The catabolic state refers to the condition where the body uses stores of carbohydrates, amino acids or fats as a source of energy for maintenance. The catabolic state may be induced by infection, disease, external pathogens, toxic chemical exposure, malnutrition or other causes. Early detection of the onset of the catabolic state as an indicator of serious disease has broad applications in human and veterinary health. In sepsis alone, the mortality rate can be cut in half through earlier detection and intervention.

A noninvasive, nondoping, stable isotope method to discern the onset of the catabolic state within minutes was previously developed. The method compares the sampled isotope ratio (C^{13}:C^{12}) to a baseline ratio in the organism by testing changes in exhaled breath samples. That technique uses a comparison specimen to determine the onset of the catabolic state. Other methods to determine if an organism is experiencing a viral or bacterial infection require a baseline measurement from a healthy individual and ongoing measurements over several hours or even days, and can be confounded by the individual's diet. A need exists for additional methods to determine the catabolic or infected state of an organism and the transition from healthy to sick to enable prompt identification and intervention.

The Invention

UW–Madison researchers have developed a method to determine if an individual is transitioning from a healthy state to an unhealthy state by monitoring breath and measuring the oscillation pattern in the relative amount of carbon isotopes. Breath taken from the individual is measured for a relative amount of a first isotope to a second isotope over a total time interval. Changes in the functional oscillation pattern of the isotope ratio can be correlated with and provide information about the health of the individual. Diet is not a confounding factor in the functional oscillation pattern.

To determine whether an individual is transitioning between a healthy and unhealthy state, a healthy functional oscillation pattern in the relative amount of the isotopes is identified during a time interval when the individual is healthy. Then, it can be determined that the individual is transitioning from a healthy state to an unhealthy state when the healthy oscillation pattern and a test oscillation pattern are distinct in period of oscillation, oscillations per unit time and/or variability in oscillation period. To determine the severity of an infection in an individual, the relative amount of a first isotope to a second isotope over a time period is measured. The degree of difference between the functional oscillation pattern for the individual compared to a reference pattern can be determined to indicate the severity of the infection.

Applications

- Point of care testing to determine patient status and type of infection

Key Benefits

- Allows detection of infection without interference from diet
- Can be used in conjunction with existing tests for monitoring the onset of the catabolic state
- Obtains a faster diagnostic test result
- Enables comparison of frequency of oscillation without requiring baseline data

Tech Fields

- Medical Devices : Diagnostics & monitoring tools

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846