testing device used for a titration work, a blood pressure testing device, a computer program for conducting a blood pressure test, and a polysomnography testing device.

[Solution to Problem]

The present ~~invention~~disclosure provides, in order to solve the above problems, a device for calculating respiratory waveform information described in 1) to 42) below, a device for evaluating the comfort level including the quality of sleep, a device for calculating physiological data, a computer program for calculation by using the respiratory waveform information, a computer program for evaluating the comfort level including the quality of sleep of the subject, a respiratory assisting device, a device for treating chronic cardiac diseases, a testing device used for a titration work, a blood pressure testing device, a computer program for conducting a blood pressure test, and a polysomnography testing device.

1) In an aspect, there is provided a~~A~~ device for calculating respiratory waveform information, comprising (1) measuring means which measures a change in a respiratory flow of a subject for a predetermined measurement period including sleep; (2) calculating means which performs calculation including the following steps A to C with respect to the waveform of the respiratory flow measured by the measuring means; and (3) output means which executes at least any of processing of display, printing or sending to the outside the device of information of a calculation result calculated by the calculating means:

Step A: A step of creating a frequency spectrum at each time by sequentially executing window Fourier transform with a displaced start point at a predetermined displacement time interval with respect to the respiratory waveforms;

Step B: A step of creating an index indicating regularity of a respiratory cycle of the subject in the Fourier window time at the respective times; and

Step C: A step of creating the waveform information indicating a temporal change of the index as the information of the calculation result.

2) In another aspect, there is provided a~~A~~ device for calculating respiratory waveform information, comprising (1) measuring means which measures a change in a respiratory flow of a subject for a predetermined measurement period; (2) calculating means which performs calculation including the following steps A to C with respect to the waveform of the respiratory flow measured by the measuring means; and (3) output means which executes at least any of processing of display, printing or sending to the outside of the device of information of a calculation result calculated by the calculating means:

Step A: A step of creating a frequency spectrum at each time by sequentially executing window Fourier transform with a displaced start point at a predetermined displacement time interval with respect to the respiratory waveforms;

Step B: A step of creating an index indicating regularity of a respiratory cycle of the subject in the Fourier window time at the respective times; and

Step C: A step of creating the waveform information indicating a temporal change of the index as the information of the calculation result.

3) The device for calculating respiratory waveform information described in 1) or 2), wherein the index indicating the regularity of the respiratory cycle is configured as a value in inverse proportion to a standard deviation of respiratory frequency variation in a certain period.

4) The device for calculating respiratory waveform information described in any of 1) to 3), further comprising a step of creating at least any of information of (a) a

waveform indicating a temporal change; (b) a maximum value; (c) an average value; and (d) time from start of sleep to time when the maximum value is reached of the power of ultradian rhythm included in the waveform indicating temporal change of the index indicating regularity of the respiratory cycle as information of a result of the calculation.

5) A device for calculating respiratory waveform information, wherein an operation performed by the measuring means in (1) described in any of 1) to 4) is performed by a respiratory waveform recording meter, and an operation performed by the calculating means in (2) and the output means in (3) described in any of 1) to 4) is performed by a respiratory waveform analyzing device on the basis of the waveform recorded in the respiratory waveform recording meter.

6) The device for calculating respiratory waveform information described in 5), wherein the information of the respiratory waveform recorded in the respiratory waveform recording meter is transmitted to the respiratory waveform analyzing device via a recording medium or a communication path.

7) In another aspect, there is provided a~~A~~ device for evaluating a comfort level including the quality of sleep, comprising (1) measuring means which measures a change in a respiratory flow of a subject for a predetermined measurement period including sleep; (2) calculating means which performs calculation including the following steps A to C with respect to the waveform of the respiratory flow measured by the measuring means; and (3) evaluating means which makes evaluation of the comfort level including the quality of sleep on the basis of the size of a numeral value of at least any one of (a) a maximum value; (b) an average value; and (c) time from start of the sleep to time when the maximum value is reached of power of ultradian rhythm included in the waveform indicating the temporal

change of an index indicating regularity of the respiratory cycle obtained by the calculating means:

Step A: A step of creating a frequency spectrum at each time by sequentially executing window Fourier transform with a displaced start point at a predetermined displacement time interval with respect to the respiratory waveforms;

Step B: A step of creating an index indicating regularity of a respiratory cycle of the subject in the Fourier window time at the respective times; and

Step C: A step of creating the waveform information indicating a temporal change of the index as the information of the calculation result.

8) In another aspect, there is provided a~~A~~ device for evaluating a comfort level including the quality of sleep, wherein an operation performed by the measuring means in (1) described in 7) is performed by a respiratory waveform recording meter, and an operation performed by the calculating means in (2) and the output means in (3) described in 7) is performed by a respiratory waveform analyzing device on the basis of the waveform recorded in the respiratory waveform recording meter.

9) The device for evaluating a comfort level including the quality of sleep described in 8), wherein the information of the respiratory waveform recorded in the respiratory waveform recording meter is transmitted to the respiratory waveform analyzing device via a recording medium or a communication path.

10) A device for calculating physiological data, comprising measuring means which measures physiological data of a subject for a predetermined measurement period; creating means which creates an index at each measurement time indicating stability of the measured value at each measurement time during the measurement period and creates data of a temporal change of the index during the measurement

waveform analyzing device on the basis of the waveform recorded in the respiratory waveform recording meter.

19) The device for calculating respiratory waveform information described in 18), wherein the information of the respiratory waveform recorded in the respiratory waveform recording meter is transmitted to the respiratory waveform analyzing device via a recording medium or a communication path.

20) In another aspect, there is provided a~~A~~ computer program for performing calculation using respiratory waveform information, comprising (1) a measurement step in which measuring means measures a change in a respiratory flow of a subject for a predetermined measurement period including sleep; (2) a calculation step in which calculating means performs calculation including the following steps A to C with respect to the waveform of the respiratory flow measured by the measurement step; and (3) an output step in which output means executes at least any of processing of display, printing or sending to the outside of the device of information of a calculation result calculated by the calculating means:

Step A: A step of creating a frequency spectrum at each time by sequentially executing window Fourier transform with a displaced start point at a predetermined displacement time interval with respect to the respiratory waveforms; and

Step B: A step of creating an index indicating regularity of a respiratory cycle of the subject in the Fourier window time at the respective times; and

Step C: A step of creating the waveform information indicating a temporal change of the index as the information of the calculation result.

21) The computer program for performing calculation using respiratory waveform information described in 20), wherein the calculation step executes the calculation, further comprising a step of creating information of at least any one of (a) a

waveform indicating a temporal change; (b) a maximum value; (c) an average value; and (d) time from start of the sleep to time when the maximum value is reached of power of ultradian rhythm included in the waveform indicating the temporal change of an index indicating regularity of the respiratory cycle.

22) In another aspect, there is provided a~~A~~ computer program to be executed for evaluating a comfort level including the quality of sleep of a subject, comprising (1) a measurement step in which measuring means measures a change in a respiratory flow of the subject for a predetermined measurement period including sleep; (2) a calculation step in which calculating means performs calculation including the following steps A to C with respect to the waveform of the respiratory flow measured in measurement step; and (3) an evaluation step in which evaluating means makes evaluation of the comfort level including the quality of sleep on the basis of the size of a numeral value of at least any of (a) a maximum value; (b) an average value; and (c) time from start of the sleep to time when the maximum value is reached of power of ultradian rhythm included in the waveform indicating the temporal change of an index indicating regularity of the respiratory cycle obtained by the calculating step:

Step A: A step of creating a frequency spectrum at each time by sequentially executing window Fourier transform with a displaced start point at a predetermined displacement time interval with respect to the respiratory waveforms;

Step B: A step of creating an index indicating regularity of a respiratory cycle of the subject in the Fourier window time at the respective times; and

Step C: A step of creating the waveform information indicating a temporal change of the index as the information of the calculation result.