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]

In one aspect, there is provided a device for calculating respiratory waveform data, comprising measuring means which measures respiratory waveform data of a subject for a predetermined measurement period; creating means which creates an inverse number of a standard deviation of respiratory frequency (RSI) at each measurement time as an index indicating stability of the measured value at each measurement time during said measurement period and creates data of a temporal change of the index during the measurement period; and output means which executes output processing of at least any of display, printing or sending of said created data to the outside of the device.

In another aspect, there is provided a device for calculating respiratory waveform data, wherein an operation performed by the measuring means as described herein is performed by a respiratory waveform data recording meter and an operation performed by the creating means and the output means as described herein is performed by a respiratory waveform data analyzing device on the basis of the waveform recorded in said respiratory waveform data recording meter.

In another aspect, there is provided a diagnosis device for chronic heart failure, comprising the device for calculating respiratory waveform data as described herein; and evaluation means which evaluates presence or degree of symptom of chronic heart failure based on said data of a temporal change of the index.

In another aspect, there is provided a respiratory assisting device, comprising said device for calculating respiratory waveform data as described herein; compressed air feeding means configured to feed out compressed air with a pressure higher than the atmospheric pressure and capable of changing the feeding-out pressure; duct means connected to the feeding-out side of said compressed air feeding means; and mask means provided on the other end part of said duct means and attached to a patient for treatment for supplying said compressed air to the patient, wherein the respiratory assisting device is provided for continuously supplying said compressed air to the patient in a sleep state through said mask means; and further comprising control means which changes and controls the feeding-out pressure of said compressed air feeding means to a direction to improve the quality of sleep of the patient.

In another aspect, there is provided a testing device used in a titration work, comprising a device for calculating respiratory waveform data as described herein, provided with compressed air feeding means configured to feed out compressed air with a pressure higher than the atmospheric pressure; duct means connected to the feeding-out side of said compressed air feeding means; mask means provided on the other end part of said duct means and attached to a patient for treatment for supplying said compressed air to the patient; and a respiratory assisting device for continuously supplying said compressed air at a constant or variable level to the patient through said mask means.

In another aspect, there is provided a blood-pressure testing device, comprising a device for calculating respiratory waveform data as described herein; and blood-pressure value measuring means which measures and obtains a blood pressure value of a subject in accordance with an obtainment command, wherein the obtainment command is created for blood pressure value by said blood-pressure value measuring means if said index indicating stability of the measured value exceeds a threshold value set in advance.

In another aspect, there is provided an oxygen supply device, comprising a device for calculating respiratory waveform data as described herein, wherein the oxygen supply device is provided for supplying oxygen gas for suction or oxygen concentrated gas for suction to a patient; and control means which changes and controls a supply flow of said gas in a direction to improve comfort level of the patient by using said created data.

In another aspect, there is provided a patient monitoring system, comprising a device for calculating respiratory waveform data as described herein; transmission means and reception means for transmitting/receiving respiratory waveform data measured and/or index and/or data created in said measuring means through a communication path to/from a remote place from said device for calculation.

The present invention 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) 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;

CLAIMS

[Claim 1]

A device for calculating respiratory waveform data,

comprising measuring means which measures respiratory waveform data of a subject for a predetermined measurement period;

creating means which creates an inverse number of a standard deviation of respiratory frequency (RSI) at each measurement time as an index indicating stability of the measured value at each measurement time during said measurement period and creates data of a temporal change of the index during the measurement period; and

output means which executes output processing of at least any of display, printing or sending of said created data to the outside of the device.

[Claim 2]

A device for calculating respiratory waveform data, wherein an operation performed by the measuring means according to claim 1 is performed by a respiratory waveform data recording meter and an operation performed by the creating means and the output means according to claim 1 is performed by a respiratory waveform data analyzing device on the basis of the waveform recorded in said respiratory waveform data recording meter.

[Claim 3]

The device for calculating respiratory waveform data according to claim 2, wherein the information of the respiratory waveform data recorded in said respiratory waveform recording meter is transmitted to said respiratory waveform analyzing device via a recording medium or a communication path.

[Claim 4]

The device for calculating respiratory waveform data according to any one of claims 1 to 3, wherein the device calculates respiratory waveform information including one or more data selected from RSI trend, frequency distribution of RSI, RSI autocorrelation function, change of ultradian power included in RSI as data of a temporal change of said index.

[Claim 5]

The device for calculating respiratory waveform data according to any one of claims 1 to 4, wherein said measurement period is a predetermined measurement period including sleep.

[Claim 6]

A diagnosis device for chronic heart failure, comprising

the device for calculating respiratory waveform data according to any one of claims 1 to 5; and

evaluation means which evaluates presence or degree of symptom of chronic heart failure based on said data of a temporal change of the index.

[Claim 7]

The device for calculating respiratory waveform data according to any one of claims 1 to 5, wherein the device is provided with means for automatic determination of quality of sleep by comparing said created data with the data of good quality of sleep.

[Claim 8]

A respiratory assisting device,

comprising said device for calculating respiratory waveform data according to claim 7;

compressed air feeding means configured to feed out compressed air with a pressure higher than the atmospheric pressure and capable of changing the feeding-out pressure;

duct means connected to the feeding-out side of said compressed air feeding means; and

mask means provided on the other end part of said duct means and attached to a patient for treatment for supplying said compressed air to the patient,

wherein the respiratory assisting device is provided for continuously supplying said compressed air to the patient in a sleep state through said mask means;

and further comprising control means which changes and controls the feeding-out pressure of said compressed air feeding means to a direction to improve the quality of sleep of the patient.

[Claim 9]

The respiratory assisting device according to claim 8, wherein said compressed air feeding means is configured to automatically change and control said feeding-out pressure so that the pulmonary ventilation of the patient for treatment and/or a respiratory frequency of the patient for treatment gets close to a certain quantity set in advance.

[Claim 10]

A testing device used in a titration work, comprising a device for calculating respiratory waveform data according to any one of claims 1 to 7, provided with

compressed air feeding means configured to feed out compressed air with a pressure higher than the atmospheric pressure;

duct means connected to the feeding-out side of said compressed air feeding means;

mask means provided on the other end part of said duct means and attached to a patient for treatment for supplying said compressed air to the patient;

and a respiratory assisting device for continuously supplying said compressed air at a constant or variable level to the patient through said mask means.

[Claim 11]

A blood-pressure testing device, comprising a device for calculating respiratory waveform data according to any one of claims 1 to 7;

and blood-pressure value measuring means which measures and obtains a blood pressure value of a subject in accordance with an obtainment command,

wherein the obtainment command is created for blood pressure value by said blood-pressure value measuring means if said index indicating stability of the measured value exceeds a threshold value set in advance.

[Claim 12]

An oxygen supply device, comprising a device for calculating respiratory waveform data according to any one of claims 1 to 7, wherein the oxygen supply device is provided for supplying oxygen gas for suction or oxygen concentrated gas for suction to a patient; and control means which changes and controls a supply flow of said gas in a direction to improve comfort level of the patient by using said created data.

[Claim 13]

A patient monitoring system, comprising a device for calculating respiratory waveform data according to any one of claims 1 to 7; transmission means and reception means for transmitting/receiving respiratory waveform data measured and/or index and/or data created in said measuring means through a communication path to/from a remote place from said device for calculation.