CLAIMS

[Claim 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 said 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 said calculating mans:

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 said respiratory waveforms;

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

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

[Claim 2]

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 said 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 said calculating mans:

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 said respiratory waveforms;

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

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

[Claim 3]

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

[Claim 4]

The device for calculating respiratory waveform information according to any one of claims 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 said respiratory cycle as information of a result of said calculation.

[Claim 5]

A device for calculating respiratory waveform information, wherein an operation performed by the measuring means in (1) according to any one of claims 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) according to any one of claims 1 to 4 is performed by a respiratory waveform analyzing device on the basis of the waveform recorded in said respiratory waveform recording meter.

[Claim 6]

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

[Claim 7]

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 said 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 said 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 said respiratory waveforms;

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

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

[Claim 8]

A device for evaluating a comfort level including the quality of sleep, wherein an operation performed by the measuring means in (1) according to claim 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) according to claim 7 is performed by a respiratory waveform analyzing device on the basis of the waveform recorded in said respiratory waveform recording meter.

[Claim 9]

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

[Claim 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 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 to the outside of the device of said created data.

[Claim 11]

A device for calculating physiological data, wherein an operation performed by the measuring means according to claim 10 is performed by a physiological data recording meter and an operation performed by the creating means and the output means according to claim 10 is performed by a physiological data analyzing device on the basis of the waveform recorded in said physiological data recording meter.

[Claim 12]

The device for calculating physiological data according to claim 11, wherein the information of the physiological data recorded in said physiological data recording meter is transmitted to said physiological data analyzing device via a recording medium or a communication path.

[Claim 13]

A device for calculating respiratory waveform information, comprising at least (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 and B with respect to the waveform of the respiratory flow measured by said measuring means; and (3) output means which executes at least any of output processing of display, printing or sending to the outside of the device of information of a calculation result calculated by said calculating mans:

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 said e respiratory waveforms; and

Step B: A step of extracting and creating a specific frequency domain power waveform of the respiratory flow waveform, which is waveform data of the power in a specific frequency domain changing over time, from a frequency spectrum at each time obtained in said Step A as information of said calculation result.

[Claim 14]

The device for calculating respiratory waveform information according to claim 13, wherein said specific frequency domain includes a respiratory frequency of a human body.

[Claim 15]

The device for calculating respiratory waveform information according to claim 13 or 14, wherein said specific frequency region includes a frequency of the Cheyne-Stokes respiratory symptom of a human body.

[Claim 16]

The device for calculating respiratory waveform information according to any one of claims 13 to 15, wherein said calculating means further creates and outputs a waveform obtained by extracting a noise component caused by measurement performed by said measuring means from the waveform of said respiratory flow.

[Claim 17]

The device for calculating respiratory waveform information according to any one of claims 13 to 16, further comprising means for selecting arbitrary time in said measurement period from a specific frequency domain power waveform subjected to said output processing; and means for further creating (A) waveform information which enlarges said specific frequency domain power waveform in a neighboring region including said selected time and/or (B) information of said frequency spectrum in the

neighboring region including said selected time as the information of said calculation result.

[Claim 18]

A device for calculating respiratory waveform information, wherein an operation performed by measuring means according to any one of claims 13 to 17 is performed by a respiratory waveform recording meter, and an operation performed by the calculating means and the output means according to any one of claims 13 to 17 is performed by a respiratory waveform analyzing device on the basis of the waveform recorded in said respiratory waveform recording meter.

[Claim 19]

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

[Claim 20]

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 said 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 said 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 said respiratory waveforms; and

Step B: A step of creating an index indicating regularity of a respiratory cycle of the subject in said Fourier window time at said 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.

[Claim 21]

The computer program for performing calculation using respiratory waveform information according to claim 20, wherein the calculation step executes said calculation, further comprising a step of creating information as new information of a result of said calculation 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 said respiratory cycle.

[Claim 22]

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 said 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 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 said respiratory cycle obtained by said 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 said respiratory waveforms;

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

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

[Claim 23]

A computer program for performing calculation using respiratory waveform information, comprising at least (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 and B with respect to the waveform of the respiratory flow measured by said measurement step; and (3) an output step in which output means executes at least any of output processing of display, printing or sending to the outside of the device of the information of a calculation result calculated by said calculating mans:

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 said respiratory waveforms; and

Step B: A step of extracting and creating a specific frequency domain power waveform of the respiratory flow waveform, which is waveform data of a temporal change of the power in a specific frequency domain of the following (A) or (B), and/or the extracted waveform of the following (C) from a frequency spectrum at each time obtained in said Step A as information of the calculation result;

(A) A frequency band including a respiratory frequency of a body;

(B) A frequency band including a generation frequency of the Cheyne-Stokes respiration symptom of a human body;

(C) A waveform obtained by extracting a noise component caused by measurement executed in said measurement step from said respiratory waveform.

[Claim 24]

A respiratory assisting device, comprising 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, said respiratory assisting device continuously supplying said compressed air to the patient in a sleep state through said mask means, further comprising:

(1) biological information obtaining means which continuously obtains biological information of the patient to whom said compressed air is supplied; and (2)

control means which changes and controls the feeding-out pressure of said compressed air feeding means to a direction to improve the comfort level including the quality of sleep of the patient by using said biological information obtained as above, wherein said biological information is information relating to the respiratory waveform of the patient, and said control means executes change and control of said feeding-out pressure on the basis of a temporal change of an index indicating regularity of a respiratory cycle of the subject, said respiratory cycle having been continuously obtained.

[Claim 25]

A device for treating chronic cardiac diseases, comprising 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, said device being configured to continuously supply said compressed air to the patient in a sleep state through the mask means, further comprising:

(1) biological information obtaining means which continuously obtains biological information of the patient to whom said compressed air is supplied; and

(2) control means which changes and controls the feeding-out pressure of said compressed air feeding means to a direction to improve the comfort level including the quality of sleep of the patient by using said biological information obtained as above, in which said biological information is information relating to the respiratory waveform of the patient, and said control means executes change and control of said feeding-out pressure on the basis of a temporal change of an index indicating regularity of a

respiratory cycle of the subject, said respiratory cycle having been continuously obtained.

[Claim 26]

The device according to claim 24 or 25, wherein said compressed air feeding means is configured to automatically change and control said feeding-out pressure so that the pulmonary ventilation of the treatment patient and/or a respiratory frequency of the treatment patient gets close to a certain quantity set in advance.

[Claim 27]

A device wherein the operation performed by the biological information obtaining means of (1) according to any one of claims 24 to 26 is performed by a respiratory waveform recording meter and the operation performed by the control means of (2) according to any one of claims 24 to 26 is performed by a device for changing/controlling a feeding-out pressure on the basis of the waveform recorded in the respiratory waveform recording meter.

[Claim 28]

The device according to claim 27, wherein the information of said respiratory waveform recorded in said respiratory waveform recording meter is transmitted to said device for changing/controlling a feeding-out pressure through a recording medium or a communication path.

[Claim 29]

A testing device used in a titration work, comprising a respiratory assisting device provided with compressed air feeding means which feeds 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, and mask means provided on the

other end part of said duct means and attached to a treatment patient for supplying said compressed air to the patient, the respiratory assisting device being configured to continuously supply said compressed air to the patient through said mask means at a constant pressure or a variable pressure, wherein a medical staff determines at least any one of (1) a pressure value of said compressed air; (2) a change pattern of the pressure value of said compressed air; and (3) selection from plurality of said respiratory assisting devices so as to be suitable for the treatment, further comprising:

detecting means which continuously detects the respiratory waveform information of the treatment patient; calculating means which calculates an index indicating regularity of the respiratory cycle of the patient from said respiratory information; and output means which performs at least any one of display, printing, and output to the outside so that a temporal change of the pressure of said compressed air and a temporal change of the index indicating the regularity of said respiratory cycle can be observed simultaneously.

[Claim 30]

A testing device used in a titration work, wherein the operation performed by the detecting means according to claim 29 is performed by a respiratory waveform recording meter, and the operation performed by the calculating means and the output means according to claim 29 is performed by a respiratory waveform analyzing device on the basis of the waveform recorded in said respiratory waveform recording meter.

[Claim 31]

The testing device used in a titration work according to claim 30, wherein the information of the respiratory waveform recorded in said respiratory waveform

recording meter is transmitted to said respiratory waveform analyzing device through a recording medium or a communication path.

[Claim 32]

A blood-pressure detecting device, comprising (1) respiratory flow measuring means which measures a change of the respiratory flow of a subject for a first 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 said respiratory flow measuring means and outputs the result as information; (3) blood-pressure value measuring means which measures a temporal change of a blood pressure value of said subject for a second predetermined measurement period having a period matched with said first predetermined period; and (4) output means which performs at least any one of processing of display, printing or sending to the outside of the device of the information of said outputted calculation result and the information of the change of said measured blood pressure value in a mode capable of comparison with each other:

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 said respiratory waveforms;

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

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

[Claim 33]

The blood-pressure testing device according to claim 32, wherein said first predetermined measurement period and/or said second predetermined measurement period is configured so as to include a period during sleep of said subject.

[Claim 34]

A blood-pressure testing device, wherein the operation performed by the respiratory flow measuring means according to claim 32 or 33 is performed by a respiratory waveform recording meter, and/or the operation performed by said blood-pressure value measuring means is performed by a blood-pressure value recording meter, and the operation performed by the calculating means and the output means according to claim 32 or 33 is performed by an analyzing device on the basis of the waveform recorded in said respiratory waveform recording meter and/or the value recorded in said blood-pressure value recording meter.

[Claim 35]

The blood-pressure testing device according to claim 34, wherein the information of the respiratory waveform recorded in said respiratory waveform recording meter and/or the blood pressure value recorded in said blood-pressure value recording meter is transmitted to said analyzing device through a recording medium or a communication path.

[Claim 36]

A blood-pressure testing device, comprising (1) blood-pressure value measuring means which measures and obtains a blood pressure value of a subject in accordance with an obtainment command; (2) respiratory flow measuring means which measures a temporal change of the respiratory flow of said subject; (3) calculating means which performs calculation including the following steps A to C with respect to

the waveform of the respiratory flow measured by said respiratory flow measuring means; and (4) obtainment command creating means which creates said obtainment command if an index indicating regularity of a respiratory cycle described in the following step B included in the information calculated by said calculating means exceeds a threshold value set in advance:

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 said respiratory waveforms;

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

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

[Claim 37]

The blood-pressure testing device according to any one of claims 32 to 36, wherein the index indicating the regularity of said respiratory cycle is configured as a value in inverse proportion to a standard deviation of respiratory frequency variation in a certain period.

[Claim 38]

A computer program for performing a blood pressure test, comprising (1) a step in which respiratory flow measuring means measures a change in a respiratory flow of a subject for a first predetermined measurement period; (2) a 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 said respiratory flow measuring means; (3) a step in which blood-pressure measuring means measures a change of a blood

pressure value of said subject for a second predetermined measurement period having a period matched with the first predetermined period; and (4) a step in which output means performs at least any one of processing of display, printing or sending to the outside of the device of the information of said calculated calculation result and the information of the change of said measured blood pressure value in a mode capable of comparison with each other:

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 said respiratory waveforms; and

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

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

[Claim 39]

A computer program for performing a blood pressure test of claim 38, wherein the index indicating the regularity of said respiratory cycle is configured as a value in inverse proportion to a standard deviation of respiratory frequency variation in a certain period.

[Claim 40]

A polysomnography testing device comprising measuring means which measures a blood pressure value of a subject.

[Claim 41]

A blood-pressure testing device comprising (1) measuring means which measures a change of a single piece of or a plurality of physiological data of a subject

for a first predetermined measurement period including sleep; (2) determining means which continuously determines whether or not the subject is in a slow-wave sleep state at each measurement time on the basis of the physiological data measured by said measuring means; (3) blood-pressure value measuring means which measures a change of the blood pressure value of said subject for a second predetermined measurement period having a period matched with said first predetermined measurement period; and (4) output means which performs at least any one of processing of display, printing or sending to the outside of the device of the information of said determination result and the information of the change of said measured blood pressure value in a mode capable of comparison with each other.

[Claim 42]

A blood-pressure testing device, comprising (1) blood-pressure value measuring means which measures and obtains a blood pressure value of a subject in accordance with an obtainment command; (2) measuring means which measures a change of a single piece of or a plurality of physiological data of said subject; (3) determining means which continuously determines whether or not the subject is in a slow-wave sleep state at each measurement time on the basis of the physiological data measured by said measuring means; and (4) obtainment command creating means which creates said obtainment command if said determining means determines that the subject is in the slow-wave sleep state.

[Claim 43]

An oxygen supply device for supplying oxygen gas for suction or oxygen concentrated gas for suction and, comprising (1) biological information obtaining means which continuously obtains biological information of a target patient to whom said gas

is supplied; and (2) control means which changes and controls a supply flow of said gas in a direction to improve the comfort level of the patient by using said obtained biological information.

[Claim 44]

The oxygen supply device according to claim 43, wherein said biological information is information relating to a respiratory waveform of the patient, and said control means executes control of said supply flow on the basis of the information of respiratory cycle stability obtained from the information relating to this respiratory waveform.

[Claim 45]

The oxygen supply device according to claim 44, further comprising respiratory synchronization means which executes control of supply of said gas in accordance with inspired air of a user on the basis of a signal of a sensor which detects a state of at least either of inspired air or expired air of said patient and characterized in that said control means obtains the information relating to said respiratory waveform on the basis of the signal of the sensor.

[Claim 46]

The oxygen supply device according to any one of claims 43 to 45, wherein a supply source of said gas is any one of the following (A) to (D) provided inside or outside the device:

(A) Means which separates oxygen in the air and creates said oxygen concentrated gas;

(B) A high-pressure gas container which compresses and stores said oxygen gas and discharges it in accordance with an operation;

(C) A liquid oxygen container which stores said liquefied oxygen gas and discharges it as oxygen gas in accordance with the operation; and

(D) Piping means having one end connected to said high-pressure gas container and the other end to the oxygen supply device.

[Claim 47]

A testing system, comprising sensor means which detects a state of inspired air and/or expired air of a subject; first creating means which creates respiratory waveform information of the subject on the basis of an output signal of said sensor means; and second creating means which creates information of respiratory cycle stability from said created respiratory waveform information.

[Claim 48]

A patient monitoring system, comprising sensor means which detects a state of inspired air and/or expired air of a subject; first creating means which creates respiratory waveform information of the subject on the basis of an output signal of said sensor means; second creating means which creates information of respiratory cycle stability from said created respiratory waveform information; and transmission means and reception means which transmits/receives said respiratory waveform information and/or said respiratory cycle stability information through a communication path.

[Claim 49]

A medical equipment system, comprising a medical equipment installed in a patient's home or a medical institution; and a transmission terminal connected to or incorporated in said medical equipment, the transmission terminal obtaining information from said medical equipment and transmitting it to a reception terminal installed in a place away from the medical equipment through a communication

medium, wherein said transmitted information includes respiratory waveform information obtained by detecting the state of inspired air and/or expired air of the patient on the basis of an output signal of sensor means incorporated in or provided separately from said medical equipment and/or information of respiratory cycle stability obtained from said respiratory waveform information created as above.

[Claim 50]

The medical equipment system according to claim 49, wherein said transmitted information further includes operation information of said medical equipment.

CLAIMS

[Claim 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 said 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 said 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 said respiratory waveforms;

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

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

[Claim 2]

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 said 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 said 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 said respiratory waveforms;

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

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

[Claim 3]

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

[Claim 4]

The device for calculating respiratory waveform information according to any one of claims 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 said respiratory cycle as information of a result of said calculation.

[Claim 5]

A device for calculating respiratory waveform information, wherein an operation performed by the measuring means in (1) according to any one of claims 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) according to any one of claims 1 to 4 is performed by a respiratory waveform analyzing device on the basis of the waveform recorded in said respiratory waveform recording meter.

[Claim 6]

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

[Claim 7]

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 said 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 said 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 said respiratory waveforms;

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

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

[Claim 8]

A device for evaluating a comfort level including the quality of sleep, wherein an operation performed by the measuring means in (1) according to claim 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) according to claim 7 is performed by a respiratory waveform analyzing device on the basis of the waveform recorded in said respiratory waveform recording meter.

[Claim 9]

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

[Claim 10]

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 said 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 said 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 said respiratory waveforms; and

Step B: A step of creating an index indicating regularity of a respiratory cycle of the subject in said Fourier window time at said 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.

[Claim 11]

The computer program for performing calculation using respiratory waveform information according to claim 10, wherein the calculation step executes said calculation, further comprising a step of creating information as new information of a result of said calculation 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 said respiratory cycle.

[Claim 12]

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 said 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 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 said respiratory cycle obtained by said 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 said respiratory waveforms;

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

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