

Claims

1. Active medical device (10A, 10B), comprising a processor (120), a memory unit (122), and at least one of an accelerometer (132) and a detection unit (126) configured to detect a body impedance,
5 wherein the memory unit comprises a computer-readable program (130) that causes the processor to perform the following steps when executed on the processor:
 - a) measuring a body impedance of a patient with the detection unit during a first period of time to obtain time-dependent impedance data and calculating a power spectral density of the impedance data;
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 - b) alternatively or additionally to step a), measuring an acceleration of a body of the patient with the accelerometer during the first period of time to obtain time-dependent acceleration data and calculating a power spectral density of the acceleration data;
 - 15 c) identifying coughing of the patient on the basis of the calculated power spectral density, if at least 1% of all values of the power spectral density have a frequency of at least 1 Hz;
wherein the computer-readable program causes the processor to identify coughing of the patient on the basis of the calculated power spectral density if at least 60% of the
20 power in the power spectral density is contained in the frequency band of 1 to 8 Hz.
2. Active medical device according to claim 1, **characterized** in that the active medical device (10A, 10B) is a wearable device (10A) or an active implantable medical device (10B).
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3. Active medical device according to claim 1 or 2, **characterized** in that the active medical device is an implantable pulse generator, an implantable cardioverter-defibrillator, a cardiac resynchronization therapy device, or an implantable cardiac monitor.
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4. Active medical device according to any of the preceding claims, **characterized** in that the detection unit is configured to detect a transthoracic body impedance.

5. Active medical device according to any of the preceding claims, **characterized** in that the computer-readable program causes the processor to additionally detect at least one of a position of the patient relative to a ground and an activity status of the patient with the accelerometer.
6. Active medical device according to claim 5, **characterized** in that the computer-readable program causes the processor to indicate a validity of the identification of coughing on the basis of at least one of the detected position and the detected activity status of the patient.
7. Active medical device according to any of the preceding claims, **characterized** in that the computer-readable program causes the processor to identify an amount of identified coughing events of the patient.
8. Active medical device according to claim 7, **characterized** in that the computer-readable program causes the processor to create an alert if the amount of identified coughing events of the patient exceeds a predetermined threshold.
9. Arrangement, comprising an active medical device (10A, 10B) and an evaluation unit (40) separate from the active medical device, wherein the active medical device comprises a first processor (120), a first memory unit (122), at least one of an accelerometer (132) and a detection unit (126) configured to detect a body impedance, and a data communication unit (128), wherein the first memory unit comprises a first computer-readable program (130) that causes the first processor to perform the following steps when executed on the first processor:
- measuring a body impedance of a patient with the detection unit during a first period of time to obtain time-dependent impedance data;
 - alternatively or additionally to step a), measuring an acceleration of a body of the patient during the first period of time to obtain time-dependent acceleration data;

c) transmitting impedance data obtained in step a) and/or acceleration data obtained in step b) via the data communication unit to the evaluation unit located outside a body of the patient;

wherein the first computer-readable program causes the first processor to identify coughing of the patient on the basis of the calculated power spectral density if at least 60% of the power in the power spectral density is contained in the frequency band of 1 to 8 Hz;

and wherein the evaluation unit comprises a second processor (420) and a second memory unit (422), wherein the second memory unit comprises a second computer-readable program (430) that causes the second processor to perform the following steps when executed on the second processor:

- d) storing the transmitted impedance data and/or the transmitted acceleration data in the second memory unit;
- e) calculating a power spectral density of the impedance data and/or calculating a power spectral density of the acceleration data;
- f) identifying coughing of the patient on the basis of the calculated power spectral density if at least 1% of all values of the power spectral density have a frequency of at least 1 Hz.

10. Arrangement according to claim 9, **characterized** in that the data communication unit is arranged and designed to transfer data to the evaluation unit via a wireless data communication.

11. Arrangement according to claim 10, **characterized** in that the wireless data communication is configured to use standard data transmission protocols or specifications, in particular the Medical Device Radiocommunications Service (MICS), the Bluetooth Low Energy (BLE) protocol and the Zigbee specification.

12. Computer program product comprising computer-readable code that causes a processor to perform the following steps when executed on the processor:

- a) measuring a body impedance of a patient with a detection unit of an active medical device during a first period of time to obtain time-dependent impedance data and calculating a power spectral density of the impedance data;
- b) alternatively or additionally to step a), measuring an acceleration of a body of the patient with an accelerometer of the active medical device during the first period of time to obtain time-dependent acceleration data and calculating a power spectral density of the acceleration data;
- c) identifying coughing of the patient on the basis of the calculated power spectral density if at least 1% of all values of the power spectral density have a frequency of at least 1 Hz;

wherein the computer-readable code causes a processor to identify coughing of the patient on the basis of the calculated power spectral density if at least 60% of the power in the power spectral density is contained in the frequency band of 1 to 8 Hz.

13. Method for automatically detecting coughing of a patient, the method comprising the following steps:

- a) measuring a body impedance of a patient with a detection unit of an active medical device during a first period of time to obtain time-dependent impedance data and calculating a power spectral density of the impedance data;
- b) alternatively or additionally to step a), measuring an acceleration of a body of the patient with an accelerometer of the active medical device during the first period of time to obtain time-dependent acceleration data and calculating a power spectral density of the acceleration data;
- c) identifying coughing of the patient on the basis of the calculated power spectral density if at least 1% of all values of the power spectral density have a frequency of at least 1 Hz;

wherein a computer-readable program causes a processor to identify coughing of the patient on the basis of the calculated power spectral density if at least 60% of the power in the power spectral density is contained in the frequency band of 1 to 8 Hz.

14. Method according to claim 13, **characterized** in that the method comprises indicating an increased risk of a COVID-19 infection if an amount of identified coughing events of the patient exceeds a predetermined threshold.
- 5 15. Method according to claim 13, **characterized** in that the method comprises indicating an increased risk of an influenza infection if an amount of identified coughing events of the patient exceeds a predetermined threshold.