

Claims

1. Active implantable medical device, comprising a processor, a memory unit, a detection unit configured to detect a cardiac physiologic parameter, and a temperature sensor for sensing a body temperature,
5 wherein the memory unit comprises a computer-readable program that causes the processor to perform the following steps when executed on the processor:
- a) causing the temperature sensor to repeatedly sense a body temperature of a person to whom the active implantable medical device is implanted;
 - 10 b) storing body temperature values obtained in step a) in the memory unit;
 - c) causing the detection unit to repeatedly sense a cardiac physiologic parameter of the person;
 - d) storing cardiac physiologic parameter values obtained in step c) in the memory unit;
 - 15 e) determining whether at least one of the body temperature values exceeds a predefined body temperature threshold;
 - f) if an excess of the predefined body temperature threshold has been determined, determining whether at least one of the cardiac physiologic parameter values exceeds a predefined cardiac physiologic parameter threshold, wherein the at least one of the cardiac physiologic parameter values has been determined in the same time period as the at least one of the body temperature values exceeding the body temperature threshold;
 - 20 g) i) classifying an infection of the person as a local infection if the at least one of the body temperature values exceeds the body temperature threshold and if the at least one of the cardiac physiologic parameter values does not exceed the cardiac physiologic parameter threshold; or ii) classifying an infection of the person as a systemic infection if the at least one of the body temperature values exceeds the body temperature threshold and if the at least one of the cardiac physiologic parameter values exceeds the cardiac physiologic parameter threshold,
 - 25 30
- wherein the cardiac physiologic parameter is a heart rate or a heart rate at rest, wherein the computer-readable program causes the processor to determine an excess

- of the cardiac physiologic parameter threshold if the heart rate or the heart rate at rest is at least 110% of a mean heart rate or a mean heart rate at rest, respectively, over a first number of last days prior to the determining, wherein the first number is a number chosen from a range between 3 and 400, in particular from 5 to 365, in particular from 10 to 350, in particular from 15 to 300, in particular from 20 to 250, in particular from 25 to 200, in particular from 30 to 190, in particular from 40 to 180, in particular from 50 to 150, in particular from 60 to 120, in particular from 70 to 100, in particular from 80 to 90.
2. Active implantable medical device according to claim 1, **characterized** in that the active implantable medical device is an implantable pulse generator, an implantable cardioverter-defibrillator, a cardiac resynchronization therapy device, a neurostimulator, or an implantable cardiac monitor.
3. Active implantable medical device according to claim 1 or 2, **characterized** in that the cardiac physiologic parameter is at least one chosen from the group consisting of a heart rate, a heart rate at rest, a respiratory rate, a respiratory rate at rest, and a cardiac impedance, cardiac contractility, cardiac output, heart rate variability, respiratory arrhythmia, oxygen saturation, blood flow velocity, heart sounds.
4. Active implantable medical device according to any of the preceding claims, **characterized** in that the cardiac physiologic parameter is a heart rate or a heart rate at rest, wherein the cardiac physiologic parameter threshold is a heart rate in a range of 80 to 110 beats per minute. rate at rest is at least 110% of a mean heart rate or a mean heart rate at rest, respectively, over a first number of last days prior to the determining.
5. Active implantable medical device according to any of the preceding claims, **characterized** in that the body temperature threshold is a temperature lying in a range from 37.5°C to 38.5°C.

6. Active implantable medical device according to any of the preceding claims, **characterized** in that the computer-readable program causes the processor to sense the body temperature multiple times per day.
- 5 7. Active implantable medical device according to any of the preceding claims, **characterized** in that the computer-readable program causes the processor to sense the body temperature for multiple days.
8. Active implantable medical device according to any of the preceding claims, **characterized** in that the computer-readable program causes the processor to output
10 an alert if the actual body temperature value exceeds the body temperature threshold and if optionally also the cardiac physiologic parameter value exceeds the cardiac physiologic parameter threshold.
- 15 9. Arrangement, comprising an active implantable medical device and an evaluation unit separate from the active implantable medical device, wherein the active implantable medical device comprises a first processor, a first memory unit, a detection unit configured to detect a cardiac physiologic parameter, a temperature sensor for sensing a body temperature, and a data communication unit,
20 wherein the first memory unit comprises a first computer-readable program that causes the first processor to perform the following steps when executed on the first processor:
- a) causing the temperature sensor to repeatedly sense a body temperature of a person to whom the active implantable medical device is implanted;
 - 25 b) causing the detection unit to repeatedly sense a cardiac physiologic parameter of the person;
 - c) transmitting body temperature values obtained in step a) and cardiac physiologic parameters obtained in step b) via the data communication unit to the evaluation unit located outside a body of the person;
- 30 and in that the evaluation unit comprises a second processor and a second memory unit, wherein the second memory unit comprises a second computer-readable

program that causes the second processor to perform the following steps when executed on the second processor:

d) storing the transmitted body temperature values and the transmitted cardiac physiologic parameter values in the second memory unit;

5 e) determining whether at least one of the body temperature values exceeds a predefined body temperature threshold;

f) if an excess of the predefined body temperature threshold has been determined, determining whether at least one of the cardiac physiologic parameter values exceeds a predefined cardiac physiologic parameter threshold, wherein the at
10 least one of the cardiac physiologic parameter values has been determined in the same time period as the at least one of the body temperature values exceeding the body temperature threshold;

g) i) classifying an infection of the person as a local infection if the at least one of the body temperature values exceeds the body temperature threshold and if the
15 at least one of the cardiac physiologic parameter values does not exceed the cardiac physiologic parameter threshold; or ii) classifying an infection of the person as a systemic infection if the at least one of the body temperature values exceeds the body temperature threshold and if the at least one of the cardiac physiologic parameter values exceeds the cardiac physiologic parameter
20 threshold,

wherein the cardiac physiologic parameter is a heart rate or a heart rate at rest, wherein the computer-readable program causes the processor to determine an excess of the cardiac physiologic parameter threshold if the heart rate or the heart rate at rest is at least 110% of a mean heart rate or a mean heart rate at rest, respectively, over a
25 first number of last days prior to the determining, wherein the first number is a number chosen from a range between 3 and 400, in particular from 5 to 365, in particular from 10 to 350, in particular from 15 to 300, in particular from 20 to 250, in particular from 25 to 200, in particular from 30 to 190, in particular from 40 to 180, in particular from 50 to 150, in particular from 60 to 120, in particular from 70
30 to 100, in particular from 80 to 90.

10. Arrangement according to claim 9, **characterized** in that the data communication unit is arranged and designed to transfer data to the evaluation unit in a wireless manner.
- 5 11. Arrangement according to claim 9 or 10, **characterized** in that the first computer-readable program causes the first processor to transmit the body temperature values and the cardiac physiologic parameter values at least once a day.
12. Computer program product comprising computer-readable code that causes a
10 processor to perform the following steps when executed on the processor:
- a) storing body temperature values obtained from a temperature sensor of an active implantable medical device and cardiac physiologic parameter values obtained from a detection unit of the same active implantable medical device in a memory unit of the implantable medical device or of an evaluation unit
15 located outside a body of a person to whom the active implantable medical device is implanted;
 - b) determining whether at least one of the body temperature values exceeds a predefined body temperature threshold;
 - c) if an excess of the predefined body temperature threshold has been determined,
20 determining whether at least one of the cardiac physiologic parameter values exceeds a predefined cardiac physiologic parameter threshold, wherein the at least one of the cardiac physiologic parameter values has been determined in the same time period as the at least one of the body temperature values exceeding the body temperature threshold;
 - 25 d) i) classifying an infection of the person as a local infection if the at least one of the body temperature values exceeds the body temperature threshold and if the at least one of the cardiac physiologic parameter values does not exceed the cardiac physiologic parameter threshold; or ii) classifying an infection of the person as a systemic infection if the at least one of the body temperature values
30 exceeds the body temperature threshold and if the at least one of the cardiac physiologic parameter values exceeds the cardiac physiologic parameter threshold,

wherein the cardiac physiologic parameter is a heart rate or a heart rate at rest, wherein the computer-readable program causes the processor to determine an excess of the cardiac physiologic parameter threshold if the heart rate or the heart rate at rest is at least 110% of a mean heart rate or a mean heart rate at rest, respectively, over a
5 first number of last days prior to the determining, wherein the first number is a number chosen from a range between 3 and 400, in particular from 5 to 365, in particular from 10 to 350, in particular from 15 to 300, in particular from 20 to 250, in particular from 25 to 200, in particular from 30 to 190, in particular from 40 to 180, in particular from 50 to 5 150, in particular from 60 to 120, in particular from 70
10 to 100, in particular from 80 to 90.

13. Method for distinguishing between a local infection and a systemic infection of a patient to whom an active implantable medical device has been implanted, the method comprising the following steps:
- 15 a) repeatedly sensing a body temperature of a patient to whom an active implantable medical device has been implanted with a temperature sensor of the active implantable medical device, wherein the active implantable medical device further comprises a processor, a memory unit, and a detection unit configured to detect a cardiac physiologic parameter;
- 20 b) storing body temperature values obtained in step a) in the memory unit;
- c) repeatedly sensing a cardiac physiologic parameter of the patient;
- d) storing cardiac physiologic parameter values obtained in step c) in the memory unit;
- e) determining whether at least one of the body temperature values exceeds a
25 predefined body temperature threshold;
- f) if an excess of the predefined body temperature threshold has been determined, determining whether at least one of the cardiac physiologic parameter values exceeds a predefined cardiac physiologic parameter threshold, wherein the at least one of the cardiac physiologic parameter values has been determined in
30 the same time period as the at least one of the body temperature values exceeding the body temperature threshold;

- 5 g) i) classifying an infection of the patient as a local infection if the at least one of the body temperature values exceeds the body temperature threshold and if the at least one of the cardiac physiologic parameter values does not exceed the cardiac physiologic parameter threshold; or ii) classifying an infection of the patient as a systemic infection if the at least one of the body temperature values exceeds the body temperature threshold and if the at least one of the cardiac physiologic parameter values exceeds the cardiac physiologic parameter threshold,

10 wherein the cardiac physiologic parameter is a heart rate or a heart rate at rest, wherein the computer-readable program causes the processor to determine an excess of the cardiac physiologic parameter threshold if the heart rate or the heart rate at rest is at least 110% of a mean heart rate or a mean heart rate at rest, respectively, over a first number of last days prior to the determining, wherein the first number is a number chosen from a range between 3 and 400, in particular from 5 to 365, in particular from 10 to 350, in particular from 15 to 300, in particular from 20 to 250, in particular from 25 to 200, in particular from 30 to 190, in particular from 40 to 180, in particular from 50 to 150, in particular from 60 to 120, in particular from 70 to 100, in particular from 80 to 90.

20 14. Method according to claim 13, **characterized** in that the method further comprises deciding to examine and/or treat the patient in a hospital specialized on the treatment of infectious diseases if the infection of the patient has been classified as systemic infection.

25 15. Method according to claim 14, **characterized** in that the hospital is a hospital specialized on the treatment of COVID-19.