

CLAIMS

1. Implantable medical device (10) for stimulating a human or animal heart (20), comprising a processor (120), a memory unit (122), a stimulation unit (124)
5 configured to stimulate a cardiac region of a human or animal heart, a detection unit (126) configured to detect an electrical signal of the same heart, and a temperature sensor (132) for sensing a body temperature,
characterized
in that the memory unit comprises a computer-readable program (130) that causes
10 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 implantable medical device is implanted;
 - b) storing body temperature values obtained in step a) in the memory unit;
 - c) performing a statistical analysis on at least a subset of the stored body
15 temperature values to calculate at least one of a body temperature reference value, a variation of the sensed body temperature values and a variability of the sensed body temperature values; and
 - d) performing the task of adding an absolute value of the variety or the variability of the sensed body temperature values to the calculated body temperature
20 reference value or subtracting an absolute value of the variety or the variability of the sensed body temperature values from the calculated body temperature reference value to obtain an adjusted body temperature reference value and outputting the adjusted body temperature reference value or comparing an actual body temperature value with the adjusted body temperature reference
25 value.
2. Implantable medical device according to claim 1, **characterized** in that the statistical analysis is chosen from the group consisting of calculating a mean value of at least a subset of the stored body temperature values, calculating a median value of at least
30 a subset of the stored body temperature values, calculating an exponential moving average value of at least a subset of stored temperature values, calculating an exponential moving median value of at least a subset of stored temperature values,

calculating a standard deviation of at least a subset of the stored body temperature values, fitting at least a subset of the stored body temperature values by a function and calculating a function parameter.

- 5 3. Implantable medical device according to claim 1 or 2, **characterized** in that the computer-readable program causes the processor to sense the body temperature multiple times per day.
4. Implantable medical device according to any of the preceding claims, **characterized**
10 in that the computer-readable program causes the processor to sense the body temperature for multiple days.
5. Implantable medical device according to any of the preceding claims, **characterized**
15 in that the computer-readable program causes the processor to perform the statistical analysis on the body temperature values sensed on at least three different days.
6. Implantable medical device according to any of the preceding claims, **characterized**
20 in that the computer-readable program causes the processor to output an alert if the actual body temperature value exceeds the body temperature reference value or the adjusted body temperature reference value by a predetermined value.
7. Arrangement, comprising an implantable medical device (10) for stimulating a human or animal heart (20) and an evaluation unit (40) separate from the implantable medical device, wherein the implantable medical device comprises a first processor
25 (120), a first memory unit (122), a stimulation unit (124) configured to stimulate a cardiac region of a human or animal heart, a detection unit (126) configured to detect an electrical signal of the same heart, a temperature sensor (132) for sensing a body temperature, and a data communication unit (128),
characterized
30 in that 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 implantable medical device is implanted;
- b) transmitting body temperature values obtained in step a) via the data communication unit to the evaluation unit located outside a body of the person to whom the implantable medical device is implanted;
- 5 and in that 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:
- 10 c) storing the transmitted body temperature values in the second memory unit;
- d) performing a statistical analysis on at least a subset of the stored body temperature values to calculate at least one of a body temperature reference value, a variation of the sensed body temperature values and a variability of the sensed body temperature values; and
- 15 e) performing the task of adding an absolute value of the variety or the variability of the sensed body temperature values to the calculated body temperature reference value or subtracting an absolute value of the variety or the variability of the sensed body temperature values from the calculated body temperature reference value to obtain an adjusted body temperature reference value and
- 20 outputting the adjusted body temperature reference value or comparing an actual body temperature value with the adjusted body temperature reference value.
8. Arrangement according to claim 7, **characterized** in that the data communication unit is arranged and designed to transfer data to the evaluation unit in a wireless manner.
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9. Arrangement according to claim 7 or 8, **characterized** in that the first computer-readable program causes the first processor to transmit the body temperature values at least once a day.
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10. Arrangement according to any of claims 7 to 9, **characterized** in that the evaluation unit is located remote from the implantable medical device.
11. Method for calibrating a temperature sensor of an implantable medical device (10) for stimulating a human or animal heart (20), the implantable medical device comprising a processor (120), a memory unit (122), a stimulation unit (124) configured to stimulate a cardiac region of a human or animal heart, a detection unit (126) configured to detect an electrical signal of the same heart, and a temperature sensor (132) for sensing a body temperature, comprising the following steps:
- a) storing body temperature values provided by the temperature sensor in the memory unit, the body temperature values reflecting a body temperature at different time points;
 - b) performing a statistical analysis on at least a subset of the stored body temperature values to calculate a body temperature reference value; and
 - c) calibrating the temperature sensor by using the calculated body temperature reference value as expected regular body temperature value
- characterized** in that the method further comprises performing a statistical analysis on at least a subset of the stored body temperature values to calculate at least one of a variation of the stored body temperature values and a variability of the stored body temperature values, wherein an absolute value of the variation or the variability of the sensed body temperature values is added to or subtracted from the calculated body temperature reference value to obtain an adjusted calculated body temperature reference value replacing the calculated body temperature reference value.
12. Computer program product comprising computer-readable code that causes a processor to perform the following steps when executed on the processor:
- a) storing body temperature values obtained from a temperature sensor of an implantable medical device in a memory unit of the implantable medical device or of an evaluation unit located outside a body of the person to whom the implantable medical device is implanted;

- b) performing a statistical analysis on at least a subset of the stored body temperature values to calculate at least one of a body temperature reference value, a variation of the sensed body temperature values and a variability of the sensed body temperature values; and
 - 5 c) performing the task of adding an absolute value of the variety or the variability of the sensed body temperature values to the calculated body temperature reference value or subtracting an absolute value of the variety or the variability of the sensed body temperature values from the calculated body temperature reference value to obtain an adjusted body temperature reference value and
10 outputting the adjusted body temperature reference value or comparing an actual body temperature value with the adjusted body temperature reference value.
13. Method for sensing a body temperature of a person in need of such sensing, the
15 method comprising the following steps:
- a) repeatedly sensing a body temperature of a person to whom an implantable medical device is implanted with a temperature sensor of the implantable medical device, wherein the implantable medical device serves for stimulating a human or animal heart and further comprises a processor, a memory unit, a
20 stimulation unit configured to stimulate a cardiac region of a human or animal heart, and a detection unit configured to detect an electrical signal of the same heart;
 - b) storing body temperature values obtained in step a) in the memory unit;
 - c) performing a statistical analysis on at least a subset of the stored body
25 temperature values to calculate at least one of a body temperature reference value, a variation of the sensed body temperature values and a variability of the sensed body temperature values; and
 - d) performing the task of adding an absolute value of the variety or the variability of the sensed body temperature values to the calculated body temperature
30 reference value or subtracting an absolute value of the variety or the variability of the sensed body temperature values from the calculated body temperature reference value to obtain an adjusted body temperature reference value and

outputting the adjusted body temperature reference value or comparing an actual body temperature value with the adjusted body temperature reference value.

- 5 14. Method according to claim 13, further comprising indicating a risk of an infection of the person if an actual body temperature value measured with the temperature sensor exceeds the body temperature reference value or the adjusted body temperature reference value by a predetermined value.
- 10 15. Method according to claim 14, wherein the predetermined value lies in a range from 0.3 to 2.0°C, in particular from 0.4 to 1.9°C, in particular from 0.5 to 1.8°C, in particular from 0.6 to 1.7°C, in particular from 0.7 to 1.6°C, in particular from 0.8 to 1.5°C, in particular from 0.9 to 1.4°C, in particular from 1.0 to 1.3°C, in particular from 1.1 to 1.2°C.