

Claims

1. A method for detecting an ectopic signal in an electrocardiogram, the ectopic signal being caused by an ectopic cardiac beat, the method comprising the following steps that are performed by a processor of an implantable medical device when a computer-readable program comprised in a memory of the implantable medical device is executed on the processor:
- detecting, with a detection unit of the implantable medical device, consecutive R-R intervals in an electrocardiogram;
- calculating an average R-R interval for a determinable number of latest R-R intervals;
- recognizing a signal as ectopic signal if the signal belongs to at least one of two consecutive R-R intervals, wherein
- i) a first of the two consecutive R-R intervals is at least 5% shorter than the average R-R interval; and
- ii) a second of the two consecutive R-R intervals is at least 5% longer than the average R-R interval, wherein the second R-R interval occurs later than the first R-R interval;
- wherein the first and the second of the two consecutive R-R intervals are discarded from calculating the average R-R interval, if the signal is recognized as ectopic signal.
2. The method according to claim 1, wherein the method further comprises the following steps: calculating a first deviation, the first deviation being an average absolute deviation of the consecutive R-R intervals of the determinable number of latest consecutive R-R intervals used for calculating the average R-R interval from the average R-R interval; multiplying the first deviation with a factor being greater

than 1 to obtain an increased first deviation; calculating a second deviation, the second deviation being an absolute deviation of a successive R-R interval from the average R-R interval; defining the R-R interval as significantly shorter than the average R-R interval if the R-R interval is shorter than the average R-R interval and if the second deviation is greater than the increased first deviation, or defining the R-R interval as significantly longer than the average R-R interval if the R-R interval is longer than the average R-R interval and if the second deviation is greater than the increased first deviation.

3. The method according to claim 2, wherein the factor is a number between 1.05 and 5.
4. The method according to claim 2 or 3, wherein the first deviation is recalculated if the average R-R interval is updated.
5. The method according to one of the preceding claims, wherein the average R-R interval is recalculated with each newly detected R-R interval if this newly detected R-R interval is not discarded from calculating the average R-R interval.
6. The method according to one of the preceding claims, wherein, if the first and the second of the two consecutive R-R intervals are discarded from calculating the average R-R interval.
7. The method according to one of the preceding claims, wherein the first of the two consecutive R-R intervals is considered to be significantly shorter than the average R-R interval if the first of the two consecutive R-R intervals is at least 5% shorter than the average R-R interval.
8. The method according to one of the preceding claims, wherein the second of the two consecutive R-R intervals is considered to be significantly longer than the average R-R interval if the second of the two consecutive R-R intervals is at least 5% longer than the average R-R interval.

9. The method according to one of the preceding claims, wherein a number of detected ectopic signals is counted.
10. An implantable medical device for detecting an electrical signal of a human or animal heart, the implantable medical device comprising a processor, a memory unit, and a detection unit configured to detect an electrical signal of a human or animal heart, wherein the memory unit comprises a computer-readable program that causes the processor to perform the following steps when executed on the processor:
- detecting, with the detection unit, consecutive R-R intervals in an electrocardiogram;
- calculating an average R-R interval for a determinable number of latest consecutive R-R intervals;
- recognizing a signal as ectopic signal if the signal belongs to at least one of two consecutive R-R intervals, wherein
- i) a first of the two consecutive R-R intervals is at least 5% shorter than the average R-R interval; and
- ii) a second of the two consecutive R-R intervals is at least 5% longer than the average R-R interval, wherein the second R-R interval occurs later than the first R-R interval;
- wherein the first and the second of the two consecutive R-R intervals are discarded from calculating the average R-R interval.
11. A method for detecting atrial fibrillation of a human or animal heart, the method comprising applying an atrial fibrillation detection algorithm and the method for detecting an ectopic signal in an electrocardiogram according to at least one of the claims 1 to 9.

12. The method according to claim 11, wherein the method for detecting an ectopic signal in an electrocardiogram is only carried out for a programmable time period after a beginning of the atrial fibrillation detection algorithm, or for a programmable time period after the detection of an atrial fibrillation episode.

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13. The method according to claim 11, wherein a number of detected ectopic signals is counted and wherein an observed cardiac rhythm is considered being a rhythm devoid of atrial fibrillation if the number of detected ectopic signals exceeds a threshold.

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14. The method according to claim 12 or 13, wherein an observed cardiac rhythm is considered being a rhythm devoid of atrial fibrillation if the number of detected ectopic signals plus a number of detected noise events exceeds a threshold.

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