

## Claims

1. System for predicting heart failure hospitalization, comprising:  
a processing device (3) configured to process data derived from signals  
5 sensed by an implantable medical device (1), said signals being indicative of cardiac activity, to obtain a heart failure prediction index,  
**characterized in** that the processing device (3) is configured to process a multiplicity of variables relating to different cardiac characteristics to obtain a multiplicity of processed variables, and to combine said processed variables using a  
10 mathematical model to compute said heart failure prediction index.
2. System according to claim 1, **characterized in** that said variables relate to at least a subset of a mean ventricular heart rate parameter, a mean number of extrasystoles parameter, a mean ventricular heart rate at rest parameter, a burden of atrial  
15 arrhythmias parameter, a heart rate variability parameter, a patient activity parameter, and a thoracic impedance parameter.
3. System according to claims 1 or 2, **characterized in** that, for processing a particular variable of said multiplicity of variables, the processing device (3) is  
20 configured to process a series (s) of data points (nW) derived from the signals sensed by the implantable medical device (1).
4. System according to claim 3, **characterized in** the processing device (3) is configured, for the processing, to apply a moving average filter to the series (s) of  
25 data points (nW).
5. System according to one of the preceding claims, **characterized in** that the processing device (3) is configured, for the processing, to at least one of identify  
30 intervals (I) containing monotonously increasing data points or monotonously decreasing data points, determine a slope for data points within an interval (I), determine a number of data points within an interval (I) which fall outside a

stability range, and determine a number of data points within an interval (I) which exceed a predefined threshold (TH).

- 5 6. System according to one of the preceding claims, **characterized in** that a series (s) of data points (nW) of a first variable relating to a mean ventricular heart rate parameter is processed to obtain a first processed variable by identifying intervals (I) in a series (s) of data points (nW) containing monotonously increasing values, satisfying a condition  $s_i \geq s_{i+1} \geq s_{i+2} \geq \dots \geq s_{i+L-1}$ , wherein  $s_i \dots s_{i+L-1}$  are data points in an interval (I) having a length of L data points.  
10
7. System according to one of the preceding claims, **characterized in** that a series (s) of data points (nW) of a second variable relating to a mean number of ventricular extrasystoles parameter is processed to obtain a second processed variable by computing a slope of data points in an interval.  
15
8. System according to one of the preceding claims, **characterized in** that a series (s) of data points (nW) of a third variable relating to a mean ventricular heart rate at rest parameter is processed to obtain a third processed variable by determining a number of data points within an interval (I) which fall outside a stability range (SR) associated with the interval (I).  
20
9. System according to one of the preceding claims, **characterized in** that a series (s) of data points (nW) of a fourth variable relating to a burden of atrial arrhythmias parameter is processed to obtain a fourth processed variable by determining a number of data points within an interval (I) which exceed a predefined threshold (TH).  
25
10. System according to one of the preceding claims, **characterized in** that a series (s) of data points (nW) of a fifth variable relating to a heart rate variability parameter is processed to obtain a fifth processed variable by identifying intervals (I) in a series (s) of data points (nW) containing monotonously decreasing values, satisfying a  
30

condition  $s_i \leq s_{i+1} \leq s_{i+2} \leq \dots \leq s_{i+L-1}$ , wherein  $s_i \dots s_{i+L-1}$  are data points in an interval (I) having a length of L data points.

11. System according to one of the preceding claims, **characterized in** that a series (s) of data points (nW) of a sixth variable relating to a patient activity parameter is processed to obtain a sixth processed variable by computing a slope of data points in an interval.
12. System according to one of the preceding claims, **characterized in** that a series (s) of data points (nW) of a seventh variable relating to a thoracic impedance parameter is processed to obtain a seventh processed variable by identifying intervals (I) in a series (s) of data points (nW) containing monotonously decreasing values, satisfying a condition  $s_i \leq s_{i+1} \leq s_{i+2} \leq \dots \leq s_{i+L-1}$ , wherein  $s_i \dots s_{i+L-1}$  are data points in an interval (I) having a length of L data points.
13. System according to one of the preceding claims, **characterized in** that said mathematical model is a linear combination of said processed variables, wherein within the linear combination each processed variable is multiplied by an associated coefficient.
14. System according to claim 13, **characterized in** that processing device (3) is configured to determine a SHFM score and to include the SHFM score in the linear combination.
15. Method for predicting heart failure hospitalization, comprising:
  - processing data derived from signals sensed by an implantable medical device (1), said signals being indicative of cardiac activity, to obtain a heart failure prediction index,
  - characterized by** processing a multiplicity of variables relating to different cardiac characteristics to obtain a multiplicity of processed variables, and combining said processed variables using a mathematical model to compute said heart failure prediction index.