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(54) Title: DETECTION OF T-WAVE ALTERNANS PHASE REVERSAL FOR ARRHYTHMIA PREDICTION AND SUDDEN
CARDIAC DEATH RISK STRATIFICATION

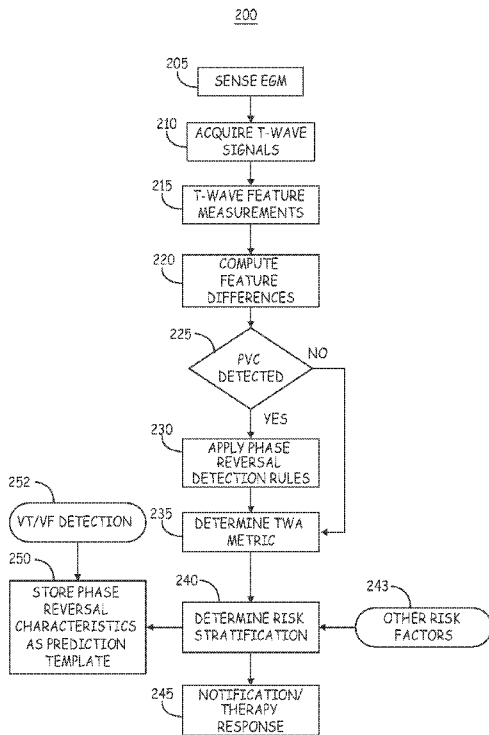


FIG. 5

(57) Abstract: An implantable medical device and associated method for classifying a patient's risk for arrhythmias by sensing a cardiac electrogram (EGM) signal and selecting a first pair of T-wave signals and a second pair of T-wave signals. A first difference between the two T-wave signals of the first pair is compared to a second difference between the two T-wave signals of the second pair. A T-wave alternans phase reversal is detected in response to comparing the first difference and the second difference, and the patient's arrhythmia risk is classified in response to detecting the phase reversal.

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INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER
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According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/138106 A1 (CHRISTINI DAVID J [US] ET AL) 26 September 2002 (2002-09-26) paragraphs [0010] - [0020] paragraphs [0032] - [0037], [0041], [0060]	1-9
X	----- WO 2009/048845 A1 (MEDTRONIC INC [US]; ZHOU XIAOHONG [US]; GILLBERG JEFFREY M [US]) 16 April 2009 (2009-04-16) figures 1,2,4 page 7, line 24 - page 9, line 17 page 5, line 19 - line 26 page 15, line 1 - line 5; claim 10 ----- -/--	1-9

Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
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"O" document referring to an oral disclosure, use, exhibition or other means	"&" document member of the same patent family
"P" document published prior to the international filing date but later than the priority date claimed	

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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Vanderperren, Yves
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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2007/013911 A2 (MEDTRONIC INC [US]; ZHOU XIAOHONG [US]; MULLEN THOMAS J [US]; GILLBERG) 1 February 2007 (2007-02-01) figures 1,2 paragraphs [0018], [0028], [0044], [0050], [0056] - [0063] -----	1-9
X	US 2005/234362 A1 (KAISER WILLI [DE] ET AL) 20 October 2005 (2005-10-20) figures 1,2 paragraphs [0020], [0021] -----	1-9

INTERNATIONAL SEARCH REPORT

Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2002138106	A1	26-09-2002	NONE

WO 2009048845	A1	16-04-2009	EP 2237722 A1 13-10-2010
		US 2009192398 A1	30-07-2009

WO 2007013911	A2	01-02-2007	EP 1919551 A2 14-05-2008

US 2005234362	A1	20-10-2005	NONE
