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(54) **Process and implantable device for the intrapulmonary assessing of density dependant physical properties of the lung tissue**

(57) The invention relates to an implantable device for therapeutic and diagnostic purposes, which is capable to detect the physical properties of the pulmonary tissue which depend from its density and their variations caused by a pathologic condition of the heart (heart failure, ischemia, arrhythmia), using one or more intrapulmonary catheters, provided with sensors, inserted in branches of the pulmonary artery. The catheters provided with sensors preferably use as sensors electrodes and the detected physical property, which depends by the density of the pulmonary tissue, is preferably the bioelectric impedance of the explored portion of lung. The same electrodes can be also used for monitoring of an electrocardiogram, without artefacts and interferences. The device can be used to guide and optimise the therapy of the heart disease made with electrostimulators

and/or cardiac defibrillator and/or systems for the exhibition of drugs and/or for the drainage of the fluids accumulated in the body and/or for the circulatory assistance to the heart. The device comprises means for the communication with external devices by means of radio-frequency transmission. This invention constitutes a significant improvement in the state of the art of the implantable devices for the therapy and the diagnosis of the heart diseases, because it allows the measurement of the specific bioelectric impedance of the pulmonary tissue only, overcoming the drawbacks of the known systems, which by using surfaces electrodes placed upon the skin or electrodes placed inside of the heart cavities, give a measurement of the transthoracic impedance determined prevalently by the volume variations of the heart and great vessels and only partially of the contents of fluids in the pulmonary tissue.

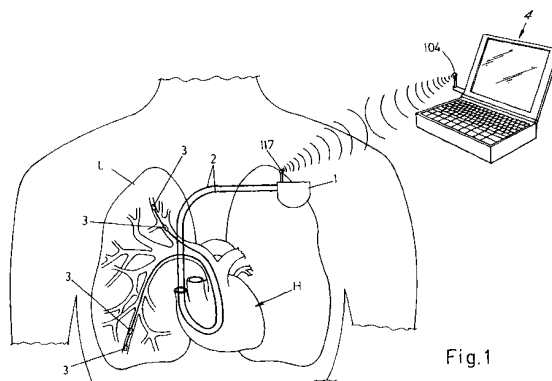


Fig.1



European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 00 4183

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
D,X	US 5 957 861 A (COMBS WILLIAM J ET AL) 28 September 1999 (1999-09-28)	1,5,28, 34-36, 38-48	A61B5/053 A61B5/00 A61N1/365
Y	* column 4, line 24 - column 5, line 61 * * column 8, line 49 - column 9, line 7 * ---	2	A61B5/05 A61B5/042 A61B5/08
Y	US 4 676 252 A (NEWBOWER RONALD S ET AL) 30 June 1987 (1987-06-30) * column 2, line 3 - line 49 * * column 2, line 67 - column 4, line 29 * ---	2	
X	US 5 174 299 A (NELSON JAMES P) 29 December 1992 (1992-12-29) * column 1, line 54 - column 2, line 22 * * column 4, line 66 - column 5, line 10 * ---	1,2	
A	US 4 596 251 A (PLICCHI GIANNI ET AL) 24 June 1986 (1986-06-24) * column 3, line 16 - line 63 * -----	1,5, 41-48	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			A61B A61N
-The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
BERLIN		28 October 2003	TRACHTERNA, M
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			

EPO FORM 1503 03.82 (P04C01)



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Application Number

EP 02 00 4183

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing more than ten claims.

- Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims and for those claims for which claims fees have been paid, namely claim(s):
- No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for the first ten claims.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

- All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.
- As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.
- Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:
- None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1,2,5,28,41-48



European Patent
Office

LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 02 00 4183

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. Claims: 1, 2, 5, 28, 41-48

An implantable device for the measurement of the physical properties of the pulmonary tissue depending from its density by means of thermodilution.

1.1. Claims: 34-36, 38-40

An implantable device for the measurement of the physical properties of the pulmonary tissue depending from its density further comprising a postural sensor.

2. Claim : 3

An implantable device for the measurement of the physical properties of the pulmonary tissue depending from its density by means of optical sensors.

3. Claim : 4

An implantable device for the measurement of the physical properties of the pulmonary tissue depending from its density by means of ultrasound.

4. Claims: 6, 7, 9-23, 24 (part) 25 (part), 27, 29, 30 (part), 31-33, 37 (part)

An implantable device for the measurement of the physical properties of the pulmonary tissue depending from its density by means of electrical impedance.

5. Claims: 8, 24 (part), 25 (part), 26, 30 (part), 37 (part)

An implantable device for the measurement of the physical properties of the pulmonary tissue depending from its density further comprising means for assessing electrocardiographic signals.

Please note that all inventions mentioned under item 1, although not necessarily linked by a common inventive concept, could be searched without effort justifying an additional fee.

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 02 00 4183

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

28-10-2003

Patent document cited in search report		Publication date		Patent family member(s)	Publication date
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			EP	1011803 A1	28-06-2000
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EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

专利名称(译)	用于肺内评估肺组织密度依赖性物理特性的过程和可植入装置		
公开(公告)号	EP1238630A3	公开(公告)日	2004-03-31
申请号	EP2002004183	申请日	2002-02-26
[标]申请(专利权)人(译)	TRE ESSE PROGETTAZIONE BIOMEDICA		
申请(专利权)人(译)	TRE ESSE PROGETTAZIONE BIOMEDICA S.R.L		
当前申请(专利权)人(译)	TRE ESSE PROGETTAZIONE BIOMEDICA S.R.L		
[标]发明人	PLICCHI GIANNI MARCELLI EMANUELA		
发明人	PLICCHI, GIANNI MARCELLI, EMANUELA		
IPC分类号	A61B5/00 A61B5/042 A61B5/05 A61B8/12 A61N1/39 A61B5/053 A61N1/365 A61B5/08		
CPC分类号	A61B5/0538 A61B5/0002 A61B5/0084 A61B5/0422 A61B5/05 A61B5/4878 A61B5/7207 A61B8/12 A61B8/565 A61N1/3956		
优先权	102001900912437 2001-03-01 IT		
其他公开文献	EP1238630A2		
外部链接	Espacenet		

摘要(译)

本发明涉及一种用于治疗 and 诊断目的的可植入装置，其能够检测肺组织的物理性质，所述物理性质取决于其密度和由心脏病理状况引起的变化（心力衰竭，缺血，心律失常），使用一个或多个肺内导管，其设有传感器，插入肺动脉的分支中。设置有传感器的导管优选地用作传感器电极，并且检测到的物理特性（取决于肺组织的密度）优选地是肺的探查部分的生物电阻抗。相同的电极也可以用于监测心电图，没有假象和干扰。该装置可用于引导和优化用电刺激器和/或心脏除颤器和/或系统制造的心脏病的治疗，用于药物展示和/或用于排出体内积聚的液体和/或对心脏的循环辅助。该设备包括用于通过射频传输与外部设备通信的装置。本发明构成了用于治疗 and 诊断心脏病的可植入装置的现有技术的显著改进，因为它仅允许测量肺组织的特定生物电阻抗，克服了已知系统的缺点。通过使用放置在皮肤上的表面电极或放置在心腔内的电极，可以测量经心脏阻抗的测量值，该阻抗通常由心脏和大血管的体积变化确定，并且仅部分地由肺组织中的液体含量决定。。

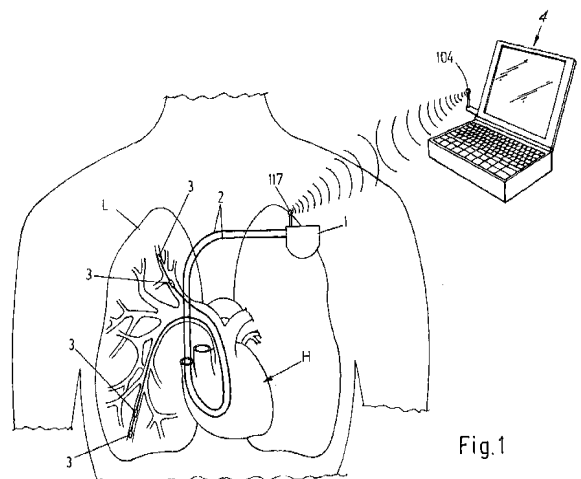


Fig.1