CFL-512

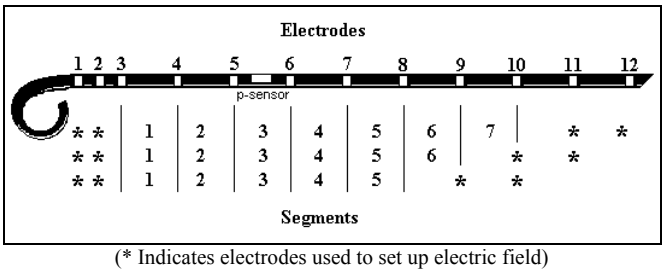
Dual Field measurement

Author: Dinant Goorhorst, CD Leycom, February 2005

Introduction

The CFL-512 has been developed to measure intra-ventricular volume using Dual Field excitation. To measure left ventricular volume, a 10- or 12-electrode conductance catheter is introduced into the left ventricle, and positioned along the long axis of the ventricle. Via the two most distal electrodes, positioned in the apex, and two proximal electrodes, close to the aortic valve, a very small electric field is generated. Using the remaining eight electrodes seven segmental electrical conductances are measured continuously. CD Leycom has several cables in his product line to connect the volume arm of the catheter to the CFL-512 Patient Module and make measurements with Dual Field excitation possible.

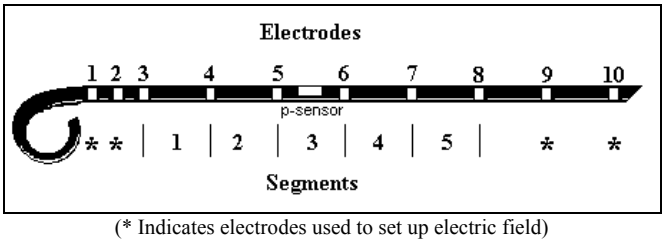
Dual Field with 12-electrode catheter



(* Indicates electrodes used to set up electric field)

Using a 12-electrode catheter, it is possible to measure 5, 6 and 7 segments using Dual Field excitation.
Use the **CCBL-BBD-1.5M** for using with CD Leycom or Numed catheters and the **CCBL-BRD-1.5M** with Millar catheters.

Dual Field with 10-electrode catheter



(* Indicates electrodes used to set up electric field)

Using a 10-electrode catheter, it is possible to measure 5 segments using Dual Field excitation.
It is possible to use the same connection cables as using a 12-electrode catheter.

☑ **Note:** Dual field excitation using an 8-electrode catheter is not possible.

To the right you find two abstracts from published articles concerning dual field excitation.

AJP - Heart and Circulatory Physiology, Vol 264, Issue 6 2198-H2207,

Left ventricular stroke volume by single and dual excitation of conductance catheter in dogs

P. Steendijk, E. T. Van der Velde and J. Baan
Dep. of Cardiology, Leiden University Hospital, The Netherlands.

The conductance method employs a multielectrode catheter to measure intracavitary electric conductance from which left ventricular volume is estimated. A dual-excitation method introduced by us uses a more homogeneous electric field and thereby should enable more accurate volume estimation. In six anesthetized open-chest dogs we compared stroke volume obtained from electromagnetic flow probes with the conventional single-excitation method and with the new dual-excitation conductance method. Caval occlusion and left atrial hemorrhage were used to obtain a wide range of stroke volumes. The slope of the relation between stroke volume calculated from the flow probes and from the conductance catheter increased significantly ($P < 0.001$) from 0.635 with single excitation to 0.835 with dual excitation, but the interanimal variability was not reduced. The linearity of the relation was substantially improved.

IEEE Trans Biomed Eng. 1997 Apr;44(4):266-77.

Accuracy of the conductance catheter for measurement of ventricular volumes seen clinically: effects of electric field homogeneity and parallel conductance.

Wu CC, Skalak TC, Schwenk TR, Mahler CM, Anne A, Finnerty PW, Haber HL, Weikle RM 2nd, Feldman MD.
Div. of Cardiology, School of Medicine, Univ. of Pittsburgh, USA

The conductance-volume method is an important clinical tool, which allows the assessment of left ventricular function in vivo. However, the accuracy of this method is limited by the homogeneity of electric field the conductance catheter produces and the parallel conductance of surrounding structures. This paper examines these sources of error in volumes seen clinically. The characteristics of electric field within a chamber were examined using computer simulation. Nonconductive and conductive models were constructed and experimental measurements obtained using both single-field (SF) and dual-field (DF) excitation. Results from computer simulations and in vitro measurements were compared to validate the purposed theoretical model of conductance-volume method. The effects of field homogeneity and significance of parallel conductance in volume measurement were then determined. The results of this study show that DF provides a more accurate measure of intraventricular volume than SF, especially at larger volumes.

If you have any questions or comments, please contact us
by phone +31-79 -360 1780
by fax +31-79 -362 1743
or by E-mail
support@cdleycom.com
or through our website at
www.cdleycom.com

Our address is: CD Leycom
Argonstraat 116
2718 SP Zoetermeer
The Netherlands