
The authors reply:

Drs. Mirowski and co-workers engage in minor polemics, but alas do not address themselves to the substantive criticisms raised in the Editorial. One essential and troublesome question relates to assessing operational adequacy of an implantable standby device in absence of the catastrophic condition for which it was intended. When such in vivo testing is impossible, how is one to be certain that the probe is properly positioned and not encased in thrombus or fibrous tissue so as to properly sense cardiac quiescence? What basis can there be for surmising discharge of its stored electrical energy at the appropriate time? What assurance is there that the electrical pulse will prove adequate? On different occasions, in the same animal, markedly disparate electrical energies may be required for achieving defibrillation. What a priori guidelines can exist for anticipating the defibrillating threshold in a particular patient? If the discharge is adequate the first time, what about recurrent arrhythmia, when energy release is set high in relation to the limited power stored in the device? And, what guarantee can one provide against the hazards of malfunction? Mirowski and co-workers imply abiding faith in the prowess of science; these commendable sentiments by themselves do not assure that these problems are soluble.

The clinical question still remains, for whom is such a device intended? If Mirowski and co-workers have found a method for precisely identifying the patient susceptible to sudden death, they remain remarkably modest in divulging such valuable knowledge. The undue enthusiasm for their device is exposed by the dismaying concept that the surgical insertion of a power plant within the body may not be more “burdening” than swallowing of pills.

But, there is a broader issue not dealt with in the Editorial or in these letters which relates to medical priorities. No society, whatever its wealth, can adequately respond to all social needs. Indeed within our own society the brief honeymoon between bountiful government and scientific investigative undertakings is coming to an end. It will be increasingly essential to define precisely the competitive position of health requirements to other legitimate societal goals. Within medicine itself support for investigative endeavor will need to be justified in relation not only to cost but to certain not problematic benefits. We continue to be unpersuaded that a complex, untestable, and costly electronic device provides a legitimate answer to the problem of sudden death justifying diversion of scarce social resources for its development.

In response to Dr. Moss’ letter we pretend no clairvoyant powers, but merely common sense, unfortunately the least common of the senses.

BERNARD LOWN, M.D.
PAUL AXELROD, M.D.
Harvard School of Public Health
Peter Bent Brigham Hospital
Boston, Massachusetts

Effect of Procaine Amide on Canine Purkinje Fibers

To the Editor:

The article by Drs. Rosen, Gelband, and Hoffman (Circulation 46: 528, 1972) describing their findings of the effect of procaine amide on the electrophyslogic properties of canine Purkinje fibers appears somewhat contradictory to previously published studies. By using a donor animal to perfuse isolated cardiac tissues, they correlated electrocardiographic and electrophysiologic effects with therapeutic and toxic plasma concentrations of procaine amide. In this preparation at therapeutic concentrations of 0.9 μg/ml the control action potential duration (APD) was prolonged from 230 to 270 msec and the effective refractory period (ERP) increased only from 200 to 210 msec. Therefore the ΔAPD/ΔERP ratio was greater than one with procaine amide.

However, two of the same authors have previously stated that, while both the APD and ERP are prolonged with procaine amide, the ERP is prolonged proportionately more than APD, thus producing a ΔAPD/ΔERP ratio of <1. They implied that this effect modifies the usual relationship between conduction and refractoriness in reentrant circuits and may be important in abolishing reentrant arrhythmias.1 Bigger also has recently stressed the same proportionately greater prolongation of ERP than prolongation of APD with procaine amide.2

In the article under discussion the authors noted a modifying effect on repolarization by the perfusate potassium level. They also speculated that the absence of early effects on conduction in the presence of the demonstrated early effects on automaticity may reflect a time lag in achieving tissue concentrations comparable to plasma levels. They did not comment specifically on their somewhat contradictory findings of the effects of procaine amide on the ΔAPD/ΔERP ratio.

Possibly the discrepant findings mentioned above may be explained by the effect of potassium or some artifact of the experimental preparation. It would seem important to resolve these differing results in an attempt to explain the useful effects of procaine amide on an electrophysiologic basis.

JOHN M. BETE, M.D.
Fellow in Cardiology
Massachusetts General Hospital
Boston, Massachusetts

References

Circulation, Volume XLVII, May 1973

The authors reply:

To the Editor:

As stated by Dr. Bette, studies of Purkinje fiber bundles perfused with physiologic salt solution have shown that procaine amide prolongs the action potential duration (APD) and the effective refractory period (ERP), the latter to a greater extent than the former. We did not discuss the differences Dr. Bette has noted in calculating the ΔAPD/ΔERP ratio for our studies because our method for determining the ERP (as outlined in the text) differs somewhat from that used in other investigations. To measure the ERP we delivered a premature stimulus (S2) after each basic drive (S1), not intermittently as is often done. The value we reported for the APD was that at the basic stimulus rate; that for the ERP (with an S2 being delivered after each S1) was obtained at a rate twice as fast as the basic drive.

Hence, although the method was sensitive to changes in APD and ERP it did not lend itself to the direct determination of the ΔAPD/ΔERP which is calculated when both parameters are being measured at the same stimulus rate. Our studies did indicate that at therapeutic plasma procaine amide concentrations there is no significant change in membrane responsiveness and the ERP is only slightly prolonged; while when high concentrations (equivalent to those attained in other studies) are attained membrane responsiveness is depressed and the ERP is more markedly prolonged. We stated that the rather small prolongation of ERP and the lack of effect on membrane responsiveness which occur during maintenance of therapeutic plasma procaine amide concentrations “suggest that altered response to premature impulses may not be as consistent a mechanism for abolition of arrhythmias as are changes in conduction and automaticity.” (The latter changes were invariably noted during maintenance of therapeutic concentrations.)

I am not certain of the intent of Dr. Bette’s comment regarding automaticity and conduction time. We demonstrated that following a single procaine amide injection depression of automaticity occurred well before changes in other parameters including conduction time in the Purkinje fiber bundles. The implication was that tissue concentrations of procaine amide required for suppression of automaticity might be lower than those required for depression of conduction. As a result of these observations we speculated that ventricular arrhythmias which respond rapidly to intravenously administered procaine amide might be due to enhanced automaticity and those which respond more slowly, or require higher concentrations of procaine amide, might be due to abnormal conduction.

MICHAEL R. ROSEN, M.D.
Department of Pharmacology
College of Physicians and Surgeons
Columbia University
New York, New York

Reference


Abnormalities in Ventricular Function following MI

To the Editor:

The paper entitled “Evolution of Abnormalities in Left Ventricular Function after Acute Myocardial Infarction” (Circulation 46: 731, 1972) uses a left ventricular dimension to reflect changes in ventricular volume. This dimension is obtained by an echographic technic now in use in several laboratories. However, I am distressed to note that figure 4 of Drs. Broder and Cohn’s paper does not show measurement of the left ventricle. Inspection of this illustration shows motion of the “PWLV” away from the transducer between the QRS and T waves, and motion toward the transducer between the P and QRS waves of the electrocardiogram. The PWLV is closest to the transducer at the time of QRS inscription. This is the pattern of the posterior left atrial wall. The posterior left ventricular wall should demonstrate anterior motion (toward the transducer) in systole and posterior motion in diastole. Clearly the “left ventricular diameters” as measured in this figure would not be valid. LVIDd is measured at a mid-to-late diastolic point judging from the ECG and mitral valve pattern while LVID is measured at the onset rather than the end of systole by these same criteria. It is hoped that the authors used echographic left ventricular studies in the remaining four patients, but this represents a considerable defect in study and would suggest that the authors may have to modify their conclusions regarding the state of left ventricular function and compliance in the postinfarction period.

RICHARD L. POPP, M.D.
Assistant Professor of Medicine
Director, Noninvasive Laboratory
Cardiology Division
Stanford University Medical Center
Stanford, California

References

Effect of Procaine Amide on Canine Purkinje Fibers
JOHN M. BETE

Circulation. 1973;47:1136-1137
doi: 10.1161/01.CIR.47.5.1136-a
Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
Copyright © 1973 American Heart Association, Inc. All rights reserved.
Print ISSN: 0009-7322. Online ISSN: 1524-4539

The online version of this article, along with updated information and services, is located on the World Wide Web at:
http://circ.ahajournals.org/content/47/5/1136.2.citation

Permissions: Requests for permissions to reproduce figures, tables, or portions of articles originally published in Circulation can be obtained via RightsLink, a service of the Copyright Clearance Center, not the Editorial Office. Once the online version of the published article for which permission is being requested is located, click Request Permissions in the middle column of the Web page under Services. Further information about this process is available in the Permissions and Rights Question and Answer document.

Reprints: Information about reprints can be found online at:
http://www.lww.com/reprints

Subscriptions: Information about subscribing to Circulation is online at:
http://circ.ahajournals.org/subscriptions/