HUMAN CLINICAL PROTOCOL
for
THE CORATOMIC C-100 SERIES
of
RADIOISOTOPE POWERED
CARDIAC PACERS
JULY 1, 1975

CORATOMIC, INC.

BOX 434, INDIANA, PENNA., 15701 (412) 349-1811

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1. Investigational Program

The purpose of the Coratomic C-100 Series Investigational Program is to obtain statistical data under controlled conditions to determine the reliability,efficacy and longevity of the C-100 Series of Pacers. Its objective is also to provide greater increased longevity compared to standard pacers and prolonged relief from consequences of symptomatic bradycardia for those patients receiving the C-100 Series of Pacers.

2. Description of the Pacers and Radionuclide Pacer Source

The totally implanted, battery powered cardiac pacer has been in clinical use since 1960, and is now the selected method of treatment for heart block and other forms of symptomatic bradycardia. It is also used in selected cases of symtomatic tachyarrhythmias. An extensive literature has arisen in connection with cardiac pacing, and selected references are listed in Exhibit 1. The physician responsible for this study is cognizant of these and other relevant references, and has had extensive experience in the use of cardiac pacers.

The C-100 Series of Pacers are R-wave inhibited demand pacers with a projected life of greater than 20 years. They are electronically similar to demand pacers which have been in use for many years. The series consists of two models, the C-100 and the C-101. The C-100 is extremely insensitive to electromagnetic interference and skeletal muscle artifact signals. These are picked up between the anode or case of the pacer and the electrode tip located in the heart. If the anode is adjacent to the pectoralis, for example, as the pectoralis flexes it creates a voltage which may resemble a broad R-wave, which might inhibit the pacer as does a normally occurring R-wave. The C-100, in order to discriminate against these external signals has a fairly narrow bandpass and relatively insensitive input amplifier, which allows it to sense R-waves only. The C-101 on the other hand has been designed to be more sensitive and to have a broader bandpass since in certain patients their broad,low amplitude R-waves will be insufficient to allow the C-100 to effectively sense. Thus, this unit should be used when the C-100 is known to be unable to effectively sense, which can be determined by the use of the C-100 evaluator. The C-100 evaluator must be used prior to the implant of a C-100 to assure that the C-100 can sense the patients R-wave. A description of the evaluator and its use is given under Section 9, Sensing Threshold Measurements. The pacers provide a nominal 72 beat per minute pulse rate when the patient's R-wave is not sensed, and are inhibited when the R-wave is sensed. The units are hermetically sealed and shielded against electromagnetic interference. They have an asynchronous "magnet rate" of 90 beats per minute, used to ascertain cardiac capture and for operational verification, and will switch to the same fixed rate rather than becoming inhibited if high energy electromagnetic fields are present.

The fuel used for the C-100 Series of Pacers is plutonium-238 in its oxide form, pressed and sintered into a hard, ceramic pellet. The isotopic battery has been so designed that excess electrical power is available at the end of a 20 year life. The pacers have undergone extensive testing for efficacy, including excessive mechanical shock, impact, and vibration testing, and the nuclear fuel is contained in such a manner to prevent fuel release under any credible accident, including building or auto accident,fire, fall from an airplane, crushing, corrosion in sea water, or accidental cremation.

Data concerning radiation level, safety, and efficacy testing is on file with the United States Nuclear Regulatory Commission, as a Master Protocol.

The C-100 Pacer has been used in dogs since September 1973, and animal testing to assure higher reliability is continuing as part of Coratomic's data gathering and licensing program.

3. Patient Selection

The patients to be selected for this clinical study will be those who have heart block or other form of symptomatic bradycardia requiring an implanted pacer. The physician will select patients who have a life expectancy of at least ten* and preferably twenty years, in order to obtain a maximum amount of data concerning longevity and reliability of the unit. An influential factor, however, other than longevity is that the small size and weight of the Coratomic unit may enhance the longevity of the patient compared to other pacemakers, and data on all age groups will, therefore, be of value since additional variables other than life expectancy are important in the C-100 series test. For example, the smaller size and weight of the unit may be statistically significant in reducing pressure necrosis, lead failure or other volume and shape induced failures unknown at this time. For this reason, life expectancy alone, although still significant, is not as dominant a factor as in the use of other nuclear pacemakers heretofore licensed for clinical applications, and patients with a life expectancy less than 20 years should form part of the statistical sample. In certain cases, also, the physician may judge the use of the C-100 series to be paramount in prolonging life in an older patient who has had many previous operations, or is resistant to frequent operations, or is not mentally capable of handling a rechargeable unit. In these cases, expected to be a small percentage, the physician may use his discretion in implanting the C-100 series units.

From a statistical point of view only, it would be ideal if the distribution of patients with C-100 series pacers were weighted in the same manner as the general pacer population, thus providing the most accurate statistical data where the greater number of patients with pacers exist. An attempt will be made to skew the total pacer population in this manner by continued feedback and communication between individual physicians, and the statistical correlation center at Coratomic.

Patients whose life expectancies are limited to less than 10 years by reason of co-existing diseases will, except for conditions of extreme need, be excluded from this study. Cooperative and reliable patients, who are stable and non-mobile members of the community will be selected to assure accurate long-term follow-up reporting and study.

4. Implantation Time Period

The clinical implantation period discussed in this protocol will continue for two years, at which time this study will have completed its implantation period. All patients will be monitored until the death of the patient or removal of the pacer.

5. Follow-Up and Reporting

A careful follow-up and reporting procedure will be followed during the life of the patient or until the pacer is removed. At each examination period an electrocardiogram will be obtained, with and without the application of a

*The 1971 Life Insurance Fact Book Institute of Life Insurance, New York, N. Y., Page 107, indicates that in the U. S. total population the life expectancy of a 72 year old is 10.27 years.

magnet to induce fixed rate operation of the pacer. The following examination in time after implant will be followed as closely as possible: 24 hours, 1 week, 1 month, 3 months and 6 month intervals thereafter until removal. Telephone transmission and testing of pulse intervals is an acceptable method of testing. It is recognized that general medical care may be more frequent than this, but this is the minimal time between tests of pacer function by the study clinic, or responsible physician.

6. Patient Control Group

A reference control group, identified as closely as possible in age, sex, stability and diagnosis will be used. An attempt should be made to include in this group pacer systems using lithium or rechargeable nickel cadmium batteries to provide comparative data on other potentially long lived systems. The number of patients in this group should be equal to the C-100 series group. All data and information collected from this group will be identical to that obtained with the C-100 series of pacers. All patients in the control group will have unipolar electrodes and have R-wave inhibited electronics powered by conventional sources currently available.

7. Implantation Procedures and Leads

Conventional methods of pacemaker insertion are to be used, ensuring as far as possible that the electrodes and leads used have an expected life comparable to the pacemaker and that they have appropriate pacing thresholds. In patients with an existing lead, the type of existing electrode must be compatible. If not, standard adaptors may be used. Spliced leads may not be used. Ideally, the Coratomic C-100 series leads should be utilized to assure long-term compatibility with the pacer materials. Myocardial or endocardial leads may be used with any of the standard surgical approaches for lead implantation in either the left or the right ventricle. The C-100 series pulse generators may be implanted in the subcutaneous tissue of the abdomen, chest wall, the subpectoral muscular tissue of the chest wall, or any other area deemed suitable by the responsible physician.

8. Stimulation Threshold Measurements

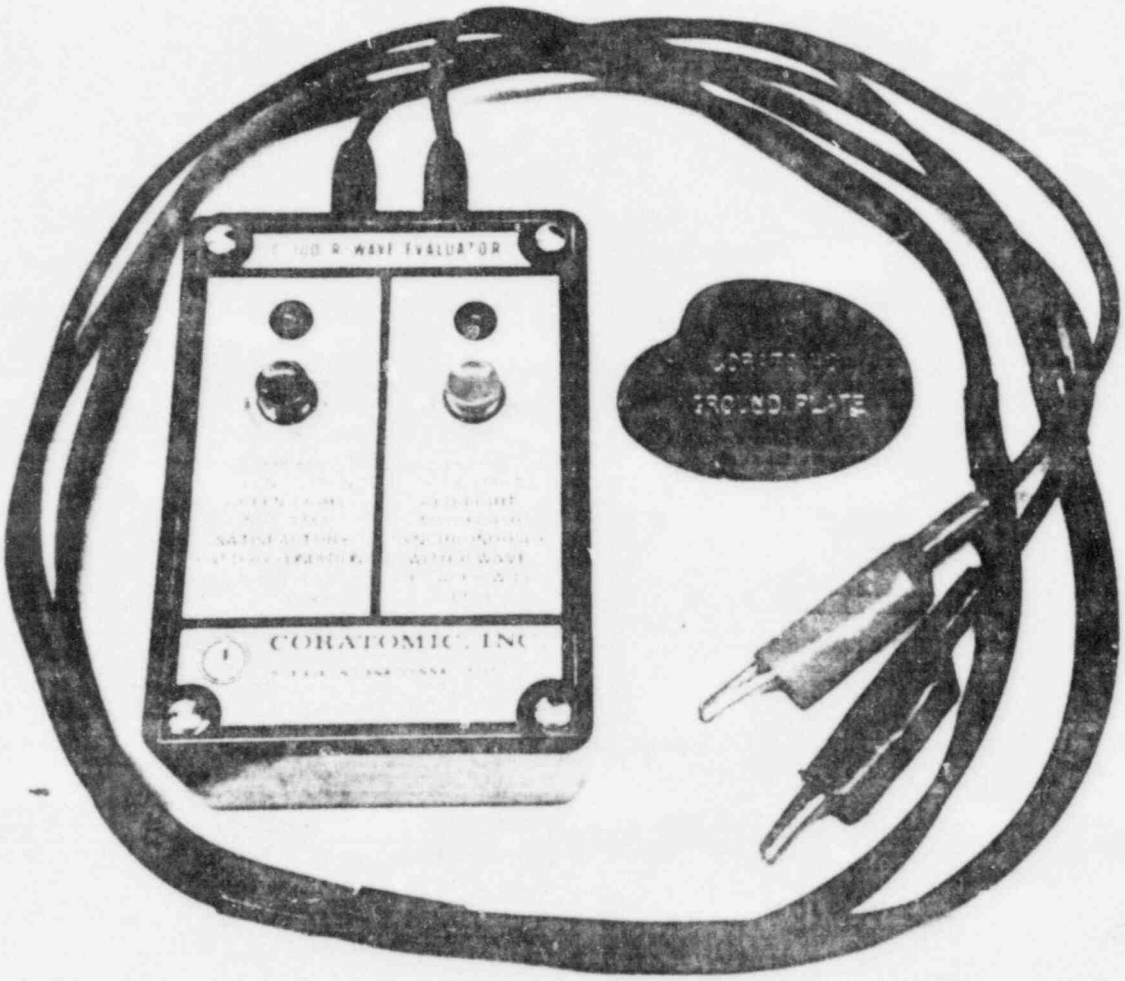
The pacing threshold will be tested for all electrodes, old or new, utilizing a battery operated, calibrated (±5% accuracy) pulse generator with an adjustable amplitude and of a pulse duration of .8 to 1.2 milliseconds.

Only those electrodes may be utilized in which a threshold is demonstrated no greater than 1.5 ma if newly implanted or 4.0 ma if chronically implanted, whether transvenous or epicardial, measured at a pulse width of 1.0 milliseconds

9. Sensing Threshold Measurements

Since the C-100 pacer has a relatively high threshold for sensing, i.e., voltages below this sensing threshold will not be detected by the C-100 and recognized as normal R-waves, an evaluator is provided with the C-100 to assure that the operation of the C-100 will be adequate in patients who have broad low amplitude R-waves. The C-100 evaluator is designed with an attenuation factor to assure that the C-100 will continue to function even though the patient's R-wave may change, as has been reported in Reference 5. A photograph of the evaluator is shown in Figure 1.

When the Coratomic C-100 Evaluator is used with the following procedure, effective sensing and pacing will occur with the C-100. If the C-100 Evaluator



C-100 Evaluator, C-100 Plug-In Connector and Ground Plate

Figure 1

indicates that the C-100 pacemaker should not be used, the C-101, a more sensitive pacemaker, should be used.

a. Depress the green battery test button seen on the left of the evaluator in Figure 1. If the green light above the green button glows, the batteries are known to be sufficiently strong to operate the electronics. A standard 9 volt battery, similar to the Eveready Model #216, the RCA Model #VS-323, the Mallory Model #M-1604 or equivalent is used.

b. The Coratomic groundplate, also shown in Figure 1, should be placed in the surgical pocket prepared by the surgeon for insertion of the C-100 pacer. The black lead should then be connected to the groundplate in the surgical pocket, the leads having been previously sterilized, either by ethylene oxide, zephirin, or autoclaving. The pin end of the black lead is inserted into the black terminal on the evaluator, thereby connecting the anode or groundplate, which simulates the anode of the pacer, to the ground terminal of the evaluator.

c. The red lead is connected to the end of the previously implanted cardiac lead and the pin of the red lead is inserted into the red terminal on the Evaluator -- the red lead also being previously sterilized. This connects the electrode to the electronic circuitry in the same manner as the electrode would be connected to the C-100 pacer, and thus the Evaluator now sees the same electrical environment that the C-100 or C-101 pacer will see when implanted.

d. Depress the red test button at the right side of the evaluator. If the red light above the button flashes in synchronism with the patient's R-wave, effective sensing is occurring and, thus, proper sensing will occur when the Coratomic C-100 Pacemaker is implanted. The button should be depressed for approximately one second to allow the electronics to stabilize before observing the flashing. If sensing by the C-100 will not occur, the red indicator light will glow at a very low level of brightness, but no flashing will occur. If the red light does not flash in synchronism with the patient's R-wave, the C-100 should not be used, and the C-101 should be used in place of the C-100. This is because its sensitivity is much greater than the C-100, i.e., it will sense much lower amplitude and broader R-waves than the C-100. It is anticipated that approximately 5 percent of the patients will require the C-101 pacer, due to its greater sensitivity.

10. Registration and Implant Reports

Immediately upon implantation of the C-100 series, the physician or hospital will complete a Registration and Implant Data Form, and forward it, within 10 to the Coratomic Data Center. The form includes identification of the pacemaker, the patient, the physician, the hospital, the heart lead, and adapter (if used), stimulated rate, and clinical data concerning the patient and his or her cardiac disease. The data form is shown as Exhibit II, attached.

11. Follow-up Data

The follow-up data, reported at intervals as discussed in 5 above, "Follow-up and Reporting", will be prepared by the investigator and submitted to the Coratomic Data Center on the Follow-up Data Form. This form is attached, (Exhibit III) and provides information on the patient, C-100 series pacer function and a brief clinical history of the patient including laboratory data, adverse reactions to the implanted device, if any, a description of the reactions and opinions as to the nature and major cause of the reactions, and an evaluation of the efficacy of the device and procedure.

12. Data and Reports of Removal and Replacement

Removal and Replacement constitutes particularly significant data, and therefore, a special form, "Pacer Failure and Removal or Patient Death", is provided, Exhibit IV. This form has all pertinent required data concerning the patient, investigator, hospital, and reasons for removal and replacement including whether the failure was of battery, electronic, or lead origin. Corrective procedures and results of patient examinations are also required.

13. Notification of Deaths, Adverse Reactions or Malfunctions

Notification of death is included in the form, "Pacer Failure and Removal or Patient Death", shown in Exhibit IV. The cause of death and autopsy findings are included.

14. Notification of Loss of Patient Contact

This notification is included in the Follow-up Data Form, Exhibit III. The reasons for loss of contact and steps taken to reestablish contact are included. If loss of contact is reported on this form, Coratomic, with data provided in the initial implant form, Exhibit II, will attempt to pursue the patient until a satisfactory explanation or terminus of the lost pacer case is provided.

15. Information To and Consent From the Patient

a. All patients will be completely informed about the nature of the clinical trial by the investigator, and to confirm this communication, will sign the informed consent form (Exhibit V). They will be informed of alternative procedures.

b. All patients accepting the pacemaker must agree to the follow-up scheme summarized above and to the removal and return to the physician (and from them to Coratomic) of the unit upon the completion of its expected useful life (20 years), its failure, or upon the patients death, whichever occurs first. A legally binding document (Exhibit V) will be signed by the patient, a witness, his spouse, and/or a relative of the patient.

c. The patient will be required to carry an identification card as stated in the form shown in Exhibit V. This card is shown in Exhibit VI. The card will identify the carrier as a radioisotope powered cardiac pacer patient, will specify the manufacturer and model number of the subjects pacemaker, specify the radionclides contained in the pacer, and present explicit

instructions for notification of responsible parties in the event of accident or difficulty. The patient will also be required to carry a uniform anatomical Gift Act Card, as shown in Exhibit VII. If the patient has not attained majority age, the agreement card shown in Exhibit VIII should be executed by the patient where possible and his or her legal guardian.

d. The patient will also be required to carry an identification bracelet of the medical-alert type which will carry the same patient's name and a statement to call the proper emergency telephone and physician in emergency. This bracelet is mentioned in Exhibits III and IV.

e. The patient will participate in follow-up examinations as discussed in 5 above, and he will be required to agree to do so on the informed consent form of Exhibit V.

f. The patient will notify the hospital of any change in address or contact and will be required to agree to do so on the informed consent form of Exhibit V.

g. The patient will be required to notify the hospital of his intention to travel in foreign countries. The hospital will, in turn. notify Coratomic, who will notify the Nuclear Regulatory Commission. The patient agrees to provide this information on the informed consent form (Exhibit V).

16. Record Retention

All pacer records will be maintained separately from the rountine hospital records, either by a centralized authority so designated, health physics personnel, or the pacemaker clinic within the hospital's jurisdiction, or the physician responsible for the study.

EXHIBIT I

REFERENCES

1. Smyth, Nicholas P. D.: Cardiac Pacemaking. Surgical Diseases of the Chest, Second Edition in Press, Editor Brian Blades., C. V. Mosby Co. St. Louis, Mo., 1974.

2. Chardack, William M.: Cardiac Pacemakers and Heart Block. In Surgery of the Chest (Chapter 38), Second Edition, Editors John H. Gibson, Jr., David C. Sabiston and Frank C. Spencer. W. B. Saunders Co., Philadelphia, Pa., 1969.

3. Furman, Seymour, and Escher, Doris J. W.: Principles and Techniques of Cardiac Pacing. Harper and Row, New York, N.Y., 1970.

4. Thalen, Hilbert J.: The Artificial Cardiac Pacemaker: Its History, Development and Clinical Application. C. C. Thomas, Springfield, Ill., 1969.

5. Hurzeler, Philip; Decaprio, Vincent; and Furman, Seymour, Montefiore Hospital and Medical Center, New York, N.Y.: Endocardial Electrograms and Pacer Sensing ; paper presented at AAMI 10th Annual meeting March 17-18, 1975.

EXHIBIT II
REGISTRATION AND IMPLANTATION DATA FORM (Attachment 3)

CORATOMIC C-100 SERIES ISOTOPIC PULSE GENERATOR

Please complete this form. Retain one copy for your records and return [within 10 days] one copy to:

CORATOMIC, INCORPORATED
DATA CENTER
P. O. Box 434
Indiana, Pennsylvania 15701

(please print or type)

1. Patient Name _____
Last First Initial
Social Security No. _____
Hospital Record No. _____
Home Address _____
City _____ State _____ Zip _____
Area Code and Telephone No. _____
Business Address _____
City _____ State _____ Zip _____
Area Code and Telephone Co. _____

Name, address, and telephone of person(s) to be contacted if patient cannot be located: _____
City _____ State _____ Zip _____
Area Code and Telephone No. _____
Relationship to Patient _____
Name, address, and telephone of alternate person(s) to be contacted if patient cannot be located: _____
City _____ State _____ Zip _____
Area Code and Telephone No. _____
Relationship to Patient _____

2. Physician(s) and Hospital:
Name _____
Office Address _____
City _____ State _____ Zip _____
Area Code and Telephone No. _____

3. Radioisotope Powered Pacer Information:
Model No. _____ Serial No. _____
Date of Implant _____
Placement: subcutaneous/submuscular/intramuscular/other
right/left pectoral/abdominal/other
existing/new pocket
Stimulation rate: with Magnet _____ without _____
Threshold measurements: voltage _____ current _____
Pulse width _____ other method (describe): _____
Equipment used to measure threshold _____
_____

EXHIBIT II - (Continued) (Attachment 3)

4. Previous Implant Information: Yes/No If yes:
   Manufacturer_____
   Model_____
   Date of implant_____
   Why removed_____
   Total number of previous implants_____

5. Lead:
   Manufacturer_____
   Model No._____
   Serial No. (for new leads only)_____
   Date of implant_____
   Placement:
   Myocardial: right/left ventricle
   transthoracic/transmediastinal
   Endocardial: vein used_____
   Previous leads (if applicable and available):
   Myocardial: Number, models, and implant dates; how many removed?
   _____
   Endocardial: Number, models, and implant dates; how many removed?
   _____

6. Clinical data:
   Patient's age_____Sex_____
   Race_____Height_____Weight_____
   Right handed/Left handed
   Etiology of arrhythmia_____
   Kind of arrhythmia_____
   Previous drug therapy for arrhythmia_____
   Associated diseases_____
   Temporary pacing (for initial implants only) yes/no
   Anesthetics used during surgery_____
   Antibiotics: locally/systemically/none
   Cortisones or other anti-inflamatory drugs: locally/systemically/none
   Was pocket drained: yes/no If yes, how long?_____
   Did complications or adverse reaction occur in:
   pacemaker/lead surgery
   If yes, treatment_____
   Comments_____
   _____

EXHIBIT III

(Attachment 3)

FOLLOW-UP DATA FORM

CORATOMIC C-100 SERIES ISOTOPIC PULSE GENERATOR

Please complete this form. Retain one copy for your records and return one copy to:

CORATOMIC INCORPORATED
DATA CENTER
Box 434
Indiana, Pa. 15701

1. Patient Name_____
Last First Initial
Social Security No._____
Patient Hospital Record No._____
Pulse Generator Model No._____ Serial No._____
Date of Implantation_____
Date of Follow-up_____
Name of Physician_____
Name of Hospital_____Telephone No._____
Address_____
City_____State_____Zip_____
Patient has I.D. Card: Yes__No__
Patient is wearing Bracelet or its Equivalent: Yes__No__

2. C-100 Series Pacer Information
__Satisfactory Stimulation Rate - with Magnet_____
without Magnet_____
__Unsatisfactory
Description of adverse reactions_____
Nature and cause of adverse reaction_____
Description of side effects_____
Toxicity_____
Contraindications_____
Ineffectiveness_____
Pacer malfunction_____
Pacer degradation_____
Has any repair, relocation or replacement of leads been necessary?
Yes__No__

3. Has satisfactory contact been maintained with the patient for follow-up and accountability purposes? Yes__No__
If no, why was contact lost?_____
What steps have been taken to re-establish contact?_____

4. Summary of medical examination, including laboratory data (at yearly intervals_____

EXHIBIT IV

PACER FAILURE AND REMOVAL OR PATIENT DEATH FORM

CORATOMIC C-100 SERIES ISOTOPIC PULSE GENERATOR

Please complete this form. Retain one copy for your records and return one copy to:

CORATOMIC, INCORPORATED
DATA CENTER
Box 434
Indiana, Pa. 15701

1. Patient Name _____
Last First Initial
Social Security No. _____
Patient Hospital Record No. _____
Pulse Generator Model No. _____ Serial No. _____
Date of Implantation _____
Date of Follow-up _____
Name of Physician _____
Name of Hospital _____ Telephone No. _____
Address _____
City _____ State _____ Zip _____
Patient has I.D. Card: Yes__ No__
Patient is wearing Bracelet of its Equivalent: Yes__ No__

2. Pacer Failure
__Battery Failure
__Lead Failure
__Electronics Failure

Description of Failure _____

Corrective Procedure Due to Failure
__Replaced Pacer
__Model and Serial Number of Replacement
__Replaced Lead
__Model and Serial Number of Replacement Lead

3. Patient Death
Causes of Death _____

Autopsy Findings _____

Was pacer functioning at time of death? Yes__ No__
Was lead functioning at time of death? Yes__ No__

4. Summary of Medical Examinations (if other than death) _____

EXHIBIT V (Attachment 3)

INFORMED CONSENT FOR SURGICAL IMPLANTATION
OF RADIOISOTOPE POWERED CARDIAC PACER

CORATOMIC C-100 SERIES ISOTOPIC PULSE GENERATOR

I understand that for the treatment of my cardiac condition--a disturbance of normal cardiac conduction--a cardiac pacer is to be implanted in me. I understand that the surgical procedure may/will require the implantation of a new electrode or lead into or onto the surface of my heart. While the surgical procedure is not of unreasonable risk, the possibility of complications or even death exist. The procedure has been explained to me, and I have had the opportunity to ask any questions concerning it.

I understand that the pacer to be used for the implantation is a radioisotope powered cardiac pacer manufactured by Coratomic. The pacer is now undergoing its initial clinical use. Although the pacer has been extensively tested, it is of relatively new design, and there is no assurance that its components will last the full design life. On the basis of experiments in animals and in the laboratory, units of this type are expected to have a reliable life expectancy in excess of that of current standard cardiac pacers. I understand that the cardiac pacer does produce radiation, but I have been told by my attending physician that it is his medical judgment that this radiation presents a negligible hazard.

I understand that in consenting to the implantation of this pacer, I am authorizing, as well, all standard operating procedures, including the administration of anesthetics which may be incident to the operation. For the purpose of advancing medical and scientific knowledge, I consent to the admittance of observers to the operating room.

Since the device contains radioisotope material (Plutonium-238), ultimately, after my death or earlier, if the useful life of the pacer is exceeded, if it ceases to function effectively for my medical needs, or if I request to have it removed, the pacer must be returned to Coratomic via _____(licensed institution). Accordingly, I agree to contact _____(institution) at regular intervals of no less than six months, and whenever I change my residence. I will always carry the appropriate identification card on my person, and will at all times wear the standard identification bracelet.

Notwithstanding my contacting the implanting institution following the insertion of a cardiac pacer of any sort, I am advised to remain in contact with my personal physician.

Since the use of radioisotope powered pacers is governed by agreements between the Nuclear Regulatory Commission of various countries, I agree to notify the hospital, who will, in turn, notify Coratomic of my intention to travel in foreign countries. Coratomic will. in turn, notify the Nuclear Regulatory Commission.

I understand that the radioisotope powered cardiac pacer is a highly technical prosthetic device and in order to assess the effectiveness of its use, _____(institution) and Coratomic are interested in collecting data upon the device. Accordingly, I agree to visit the institution in person or to transmit by telephone (with the aid of a device loaned to me and applied to the surface of my skin) my electrocardiogram as an indication of the functioning of the pacer. This will be at no less than the

following intervals: at 1 month, 3 months and 6 month intervals, thereafter, following the insertion of the pacer. I further agree to provide information on my clinical condition as it pertains to the pacer at no less than 6-month intervals. Furthermore, I consent to disclosure by the clinic or Coratomic of any information acquired by the clinic in regard to the implantation of the radioisotope powered cardiac pacer, provided, however, in no event shall disclosure other than to Coratomic include my identification without my specific written approval.

I have had the opportunity to ask questions pertaining to the surgical procedure, the radioisotope powered cardiac pacer, and the follow-up procedure. The possible alternate methods of treatment, including the use of conventional chemical battery powered pacers and rechargeable pacers have been called to my attention.

With these facts in mind and intending to be legally bound, I hereby authorize the surgical procedure whereby the Coratomic radioisotope powered pacer will be implanted in me waiving the right to claim that such procedure was not properly authorized, and I agree to the follow-up procedures and to the ultimate return of the unit as detailed above.

Witness (Date)

Patient's signature or person authorized to consent for the patient. (Date)

Relationship to the patient signing if other than the patient.

I certify that I have explained the above procedure

Dr. (Date)

Please sign 3 copies:

1 copy to patient
1 copy to hospital
1 copy to Coratomic

EXHIBIT VI

PATIENT IDENTIFICATION CARDS

CORATOMIC C-100 SERIES ISOTOPIC PULSE GENERATORS

(Front)

I HAVE AN IMPLANTED CORATOMIC™ RADIOISOTOPE POWERED CARDIAC PACER. IT CONTAINS LESS THAN 4.3 CURIES OF PLUTONIUM 238. GOVERNMENT REGULATIONS REQUIRE PACER REMOVAL AND RETURN UPON DEATH.

RADIOACTIVE

IN CASE OF EMERGENCY, HOSPITALIZATION OR DEATH, CALL COLLECT. INFORM OPERATOR CALL CONCERNS A NUCLEAR PACER.

PHYSICIAN _____

ADDRESS _____

PHONE _____

(Back)

CORATOMIC, INC.

P. O. BOX 434, INDIANA, PA. 15701 (412) 349-1811

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

PHONE _____ SOC. SEC. NO. _____

PACER MODEL _____ SERIAL NO. _____

DATE OF IMPLANT _____ PACE RATE _____

TYPE OF LEAD _____

EXHIBIT VII

DONOR CARDS FOR ADULTS

CORATOMIC C-100 SERIES ISOTOPIC PULSE GENERATOR

(Front)

CORATOMIC, INC.

P. O. BOX 434, INDIANA, PA. 15701 (412) 349-1811

DONOR CARD FOR ADULTS

OF _____
PRINT OR TYPE NAME OF DONOR

IN CONSIDERATION FOR THE IMPLANTATION IN ME OF A C-100 PACER AS A NECESSARY AND PREFERRED METHOD OF TREATMENT, I HEREBY MAKE THIS IRREVOCABLE GIFT OF THE PACER SYSTEM AND SURROUNDING TISSUE TO TAKE EFFECT UPON MY DEATH; I ALSO GIVE THE FOLLOWING OTHER ORGANS OF MY BODY TO TAKE EFFECT UPON MY DEATH:

(a) _____ ANY NEEDED ORGANS OR PARTS
(b) _____ ONLY THE FOLLOWING ORGANS OR PARTS

_____
SPECIFY THE ORGAN(S) OR PART(S)

TO _____
HOSPITAL

(Back)

SIGNED BY THE DONOR AND THE FOLLOWING TWO WITNESSES IN THE PRESENCE OF EACH OTHER

_____
Signature of Donor — Donor's Birth Date

_____
Date — City — State — Zip

SIGNED BY DONOR WHO IS OF SOUND MIND, IN OUR PRESENCE.

_____
Witness — Witness

THIS IS A LEGAL DOCUMENT UNDER THE UNIFORM ANATOMICAL GIFT ACT, TESTAMENTARY OR SIMILAR LAWS.
IN THE EVENT OF DEATH OR IF DEATH IS IMMINENT, PLEASE CALL:

_____
Doctor — Phone

_____
Hospital

_____
City — State — Phone

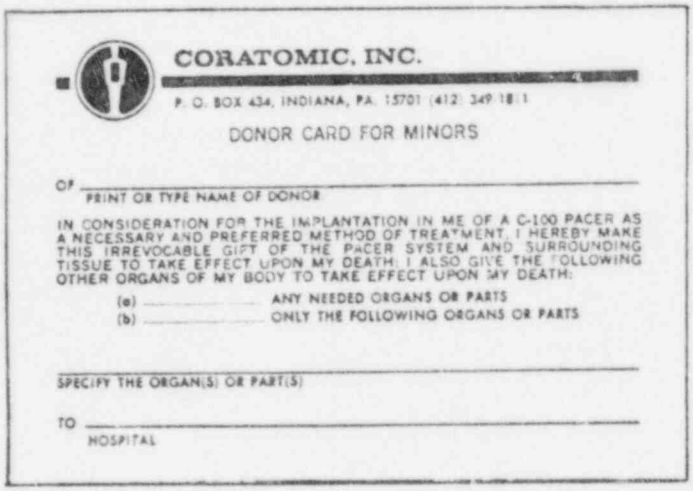
NOTIFY OPERATOR CALL CONCERNS A NUCLEAR PACEMAKER

EXHIBIT VIII

DONOR CARDS FOR MINORS

CORATOMIC C-100 SERIES ISOTOPIC PULSE GENERATOR

(Front)



CORATOMIC, INC.

P. O. BOX 434, INDIANA, PA. 15701 (412) 349-1811

DONOR CARD FOR MINORS

OF _____
PRINT OR TYPE NAME OF DONOR

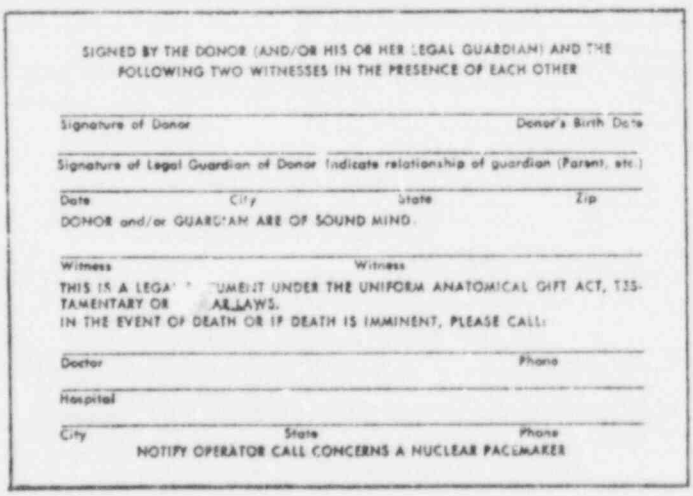
IN CONSIDERATION FOR THE IMPLANTATION IN ME OF A C-100 PACER AS A NECESSARY AND PREFERRED METHOD OF TREATMENT, I HEREBY MAKE THIS IRREVOCABLE GIFT OF THE PACER SYSTEM AND SURROUNDING TISSUE TO TAKE EFFECT UPON MY DEATH. I ALSO GIVE THE FOLLOWING OTHER ORGANS OF MY BODY TO TAKE EFFECT UPON MY DEATH:

(a) _____ ANY NEEDED ORGANS OR PARTS
(b) _____ ONLY THE FOLLOWING ORGANS OR PARTS

_____
SPECIFY THE ORGAN(S) OR PART(S)

TO _____
HOSPITAL

(Back)



SIGNED BY THE DONOR (AND/OR HIS OR HER LEGAL GUARDIAN) AND THE FOLLOWING TWO WITNESSES IN THE PRESENCE OF EACH OTHER

_____ _____
Signature of Donor Donor's Birth Date

_____ _____
Signature of Legal Guardian of Donor Indicate relationship of guardian (Parent, etc.)

_____ _____ _____ _____
Date City State Zip

DONOR and/or GUARDIAN ARE OF SOUND MIND.

_____ _____
Witness Witness

THIS IS A LEGAL DOCUMENT UNDER THE UNIFORM ANATOMICAL GIFT ACT, TESTAMENTARY OR [illegible] LAWS.
IN THE EVENT OF DEATH OR IF DEATH IS IMMINENT, PLEASE CALL:

_____ _____
Doctor Phone

_____
Hospital

_____ _____ _____
City State Phone

NOTIFY OPERATOR CALL CONCERNS A NUCLEAR PACEMAKER

EXHIBIT IX

INSTRUCTIONS FOR HOSPITAL OR CLINIC TELEPHONE OPERATORS

CORATOMIC C-100 SERIES ISOTOPIC PULSE GENERATOR

Project Nuclear Pacemaker

Instructions to Operator:

1. Accept any collect call with reference to "Project Nuclear Pacemaker".

2. Any call concerning "Project Nuclear Pacemaker" involves a patient with a nuclear pacer and requires immediate action to insure that there is no danger of radiation exposure and recovery of the nuclear pacer.

3. Obtain as much information from the caller as is possible including:

   Caller's Name and Where he may be Reached.

   Patient's Name, Status, and Where he may be Reached.

   Attending Physician (if any) and Where he may be Reached.

   Information from Patient I.D. Card

   Patient's Social Security No._____

   Date of Implant_____

   Pacer Serial Number_____

4. Notify immediately: _____

   _____

   (Name, address, telephone number of physician responsible for study)

   If he cannot be reached, notify: _____

   _____

   Name, address, telephone number of alternative physician.
   If neither can be reached, contact physician on duty for the Cardiac Care Unit; inform him that this involves a nuclear pacer; and advise him of the information you have and the urgency of the matter.

EXHIBIT X

SUGGESTED APPLICATION FORMAT FOR NUCLEAR POWERED PACEMAKERS

CORATOMIC C-100 SERIES ISOTOPIC PULSE GENERATOR

Chief, Materials Branch
Division of Materials and Fuel
Cycle Facility Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20545

Re: Application for license to participate in the research study involving the implantation of Coratomic C-100 Series nuclear powered pacemakers, each containing 250 milligrams of Pu-238 (<4.3 curies).

Gentlemen:

The following information is submitted in application for a license to participate in the investigational program utilizing the Coratomic C-100 nuclear powered pacer.

1. Applicant: _____
(Hospital or Medical Institution)

_____
(Address)

_____
(State and Zip Code)

2. Physicians responsible for study: (Provide this information for each physician on the study team.)

Name:
Office Address:
Telephone Number:
State Licensed in Which to Practice:
Specialty Board Certification:

Position with the Applicant:

Previous experience in the clinical implantation and follow-up of pacemakers by physicians; (include duration of pacemaker experience, total number of implants physician has done, and the total number he has done at the applicant's facilities.)

EXHIBIT X (Continued)

3. Protocol to be followed:
HUMAN CLINICAL PROTOCOL FOR THE CORATOMIC C-100 SERIES RADIOISOTOPE POWERED CARDIAC PACERS DATED JULY 1, 1975.

4. A maximum of___ Coratomic C-100 series pacemakers is requested to be implanted annually during the study.

5. Description of physical facilities and equipment at the applicant institution or hospital:

(Include description of cardiac care unit and operating facilities and list specific equipment needed and available to carry out the study; include equipment for measuring stimulation thresholds, threshold parameters, and overall pacemaker function).

6. Description of applicant's present pacemaker implantation and follow-up program: (Include size, i.e., number of patients, and duration.)

7. Describe methods applicant will establish to maintain records of implantation and follow-up of patients separate from routine hospital records. (Include procedures for assuring continuity of follow-up and determining any possible loss of follow-up with a patient).

8. Confirm that the applicant institution or hospital will establish appropriate control procedures to insure the physical security of the pacemaker while in the possession of the applicant. These procedures will include keeping track, by serial number, of the location of each pacemaker and requiring that they be kept under lock and key when not being used to guard against loss or theft. Confirm that all activities will be conducted in accordance with the regulations under Title 10, Code of Federal Regulations, Part 70.

9. Describe the applicants procedures to assure notification of appropriate individuals upon receipt of an emergency report of inquiry concerning a pacemaker bearer. Include written instructions to be given to telephone operators.

10. Confirm that the physicians responsible for and participating in the study represent that they are familiar with Coratomic C-100 Series Protocol and the Coratomic C-100 Series Pacer and understand that the issuance of a license is conditional upon the following of this protocol.

11. Confirm that the applicant institution agrees to continue the follow-up reporting and recovery procedures during the life of the patient and until the pacemaker is recovered and returned to Coratomic, Inc., P.O. Box 434, Indiana, Pa. 15701, even in the event the physicians named in the application to participate in the study are no longer associated with the applicant.

12. Confirm that packaging, labeling, and shipping instructions to be furnished by Coratomic, Inc. will be followed upon the return of the pacemaker for approved disposal.

EXHIBIT X (Continued)

13. The applicant hospital or medical institution hereby requests a license to receive, possess, store and implant the Coratomic C-100 Series nuclear powered pacemaker in accordance with this application.

Signed:

Applicant: _____
(Hospital or Medical Institution)

By: _____
(name and title of individual signing on behalf of the applicant)

Physicians responsible for study:

_____
(letter should be signed by both an officer of the applicant and the physicians responsible for the study. Type or print names under signatures.)