Artificial Organs
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The Artificial Organ Museum in Cleveland (1979–1999) Moved to Houston, Texas, and Named in 2002 as the ICMT Museum for Artificial Organs

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Abstract: The artificial organ museum established in Cleveland, Ohio, in 1979 organized by the International Center for Artificial Organs and Transplantation (ICAOT), was moved to Houston, Texas, in 1999. The museum with expanded and renewed artificial organ exhibits was officially opened on the 8th and 9th of November, 2002, at the Cullen Pavilion of the original Memorial Hermann Hospital. This building is the oldest in the Texas Medical Center, which was built in 1922.

The ICMT (International Center for Medical Technologies) Museum for Artificial Organs (Museum) was completed after phase I, II, and III expansions of the exhibit booths, which were made over the last two years. Approximately 250 historically important and currently widely used artificial organs are exhibited in the Museum. The official opening of the Museum was coordinated with the "Symposium on Artificial Organs: Past, Present, and Future" during two days in November. There were approximately 225 participants at these events, and approximately 40 pioneers and clinical experts in the development and practice of various types of artificial organs contributed. During these programs, a proposal to maintain human resources in addition to artificial organ hardware and software was made in addition to the Museum. This new organization would be called the International Academy of Artificial Organ Pioneers (Academy). All contributors to the symposium were invited to be members of the Academy. The attendants of the symposium accepted this proposal unanimously. An additional 40 individuals, who were recognized as contributors to artificial organ technologies, were later added to the original Academy members.

Later, the effective utilization of the Museum and Academy was encompassed in the International Faculty for Health and Medical Technologies (Faculty), a new addition to the activities of the ICMT. Dr. Michael DeBakey was elected as Dean of the Faculty. This is considered a "university without walls," a "university linked to the world," and a "university providing simultaneous teaching at multiple sites"—a completely new concept in teaching tools for medical technologies.

All of these subsidiary organizations of the ICMT were legally included as nonprofit, nontaxable charity organizations of the state of Texas. **Key Words:** ICMT Museum—ICMT Academy—ICMT Faculty.

Before the ICMT official opening

The Artificial Organ Museum was established in Cleveland, Ohio, in 1979 at the White Mansion near the Cleveland Clinic Foundation through the efforts of the International Center for Artificial Organs and Transplantation (ICAOT). Many members of the International Society for Artificial Organs worldwide had donated historically relevant artificial organ hardware to the ICAOT. Under the able leadership of Dr. Adrian Kantrowitz and Dr. Paul S. Malchesky, the ICAOT Museum had been successfully maintained until 1997, at which time the Cleveland Clinic Foundation (CCF) took over the management of the White Mansion for other CCF business, and the ICAOT Museum had to end its exhibit program. Dr. Paul Malchesky tried to find a husbandry organization for the ICAOT assets. All of the ICAOT assets were moved to a warehouse facility.

In 1999, I realized that unless I transferred all of ICAOT's artificial organ hardware to Houston, these historically important artificial organ pieces would disappear. I felt responsible, because all of this artificial organ hardware was donated to ICAOT, with their historical preservation entrusted to ICAOT. In

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FIG. 1. Mr. Seigo Arai with Ms. Emiko Jones. Mr. Arai was the major financial contributor to the ICMT and participated at the official ICMT opening ceremony.

1999, an organizing committee was formulated to transfer all the hardware of the ICAOT to Houston. With the generous support of not only the Japan Foundation for Artificial Organs (Chairman of the Board and President, Y. Nosé), several other friends of the ICAOT contributed financial support to this transfer process. Thus, the International Center for Medical Technologies (ICMT) was officially founded in Houston. Among the many supporters, I would like to specifically express our gratitude to Dr. Mitsuru Suzuki of Matsudo and Mr. Seigo Arai of Houston (Fig. 1).

Originally, an independent museum was attempted, but it was a financially difficult. Thus, we initiated our search for an institution in Texas to accommodate the ICMT Museum in the Texas Medical Center.

It happened that I met Dr. Akira Nishikawa and told him we were looking for a housing facility for the ICMT Museum for Artificial Organs. He immediately said, "I was just elected as the Chief of the Staff of Memorial Hermann Hospital, and it would be a great addition to the hospital, since we just expanded our facility quite substantially. The entrance hall and main hallways of the Cullen Pavilion of the original Hermann Hospital could be utilized for the museum exhibits." The Board of Directors of the Memorial Hermann Hospital approved Dr. Nishikawa's proposal, and the ICMT found a home for the museum exhibits in January 2001. During the next three months, my laboratory staff volunteered their time to designing the exhibits. Ms. Julia Glueck, Drs. Tadashi Motomura, Seiji Ichikawa, Hiroshi Ishitoya, along with many others, contributed.

On March 30, 2001, a preview opening of the ICMT Museum was prepared and further improvement of the museum exhibits were planned, aiming for the official opening of the ICMT Museum in November 2001. Prior to the preview opening on the same day, Project Bionics of the ASAIO Historical Preservation Committee had met at the ICMT Museum for Artificial Organs for a committee meeting. These members included Ms. Jean Kantrowitz (co-chairperson of the committee), Arthur A. Ciarkowski (FDA), Shelly McKellar (ASAIO Scholar), Tomas G. Cody (Smithsonian), Judy M. Chelnik (Smithsonian), Dr. Paul Theeman (National Library of Medicine), Mark Kurusz (University of Texas Medical Center, Galveston), Dr. Wayne E. Richenbacher (University of Iowa), Dr. Paul Malchesky (ICAOT), and Dr. Nosé. The members of Project Bionics gave valuable suggestions for the future of the ICMT Museum.

The preview opening of the ICMT was made in the ICMT Museum for Artificial Organs. Dr. Ward Cassels of Memorial Hermann Hospital was the master of ceremonies for the preview opening of the ICMT Museum for Artificial Organs. Congratulatory addresses were presented by Dr. Willerson, President of the University of Texas Medical Center; Dr. Nishikawa; Ms. Jean Kantrowitz; Mr. Dick Lury, Executive Committee member of the Japan Foundation for Artificial Organs; and Dr. Paul Malchesky, the president of ICAOT. Unfortunately, Dr. Michael E. DeBakey could not attend this event due to an unexpected conflict. Dr. Nosé gave a special prologue acknowledging the great contribution made by Mr. Seigo Arai. Additional acknowledgments were given by Dr. Nosé to Ms. Joanne Elser of the ICMT Press, Shane Spees of the Hermann Memorial Hospital, Robert Little of Precision Design, and Mike Allen of Kinko's. All of them contributed to the formation of the ICMT. Phase II and phase III expansion of the exhibits were planned, as well as the official opening of the ICMT for November 2001. However, in June, as many of us were attending the 47th ASAIO Congress in New York, we were informed that Tropical Storm Allison had caused disastrous flooding of the Texas Medical Center, and the ICMT exhibit areas at Memorial Hermann Hospital were inaccessible for the next 10 months. Thus, our ICMT expansion schedule was delayed for

FIG. 2. The original Memorial Hermann Hospital Cullen Pavilion, the oldest building in the Texas Medical Center, built in 1922 and the house of the ICMT.

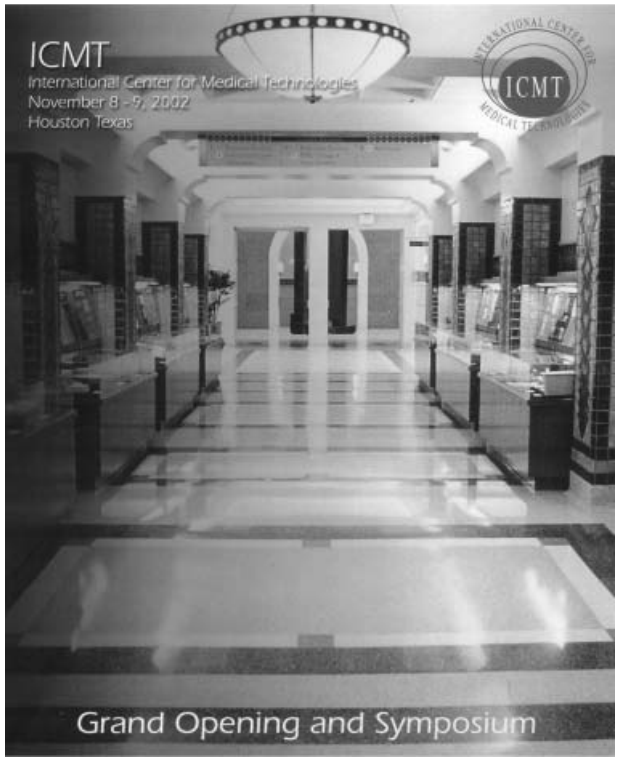

FIG. 3. The main hallway of the ICMT Museum for Artificial Organs.

almost one year, and it was decided that the official opening of the ICMT Museum be scheduled for November 2002.

Official opening of the ICMT

On November 8 and 9, 2002, the official opening and symposium of the ICMT Museum for Artificial Organs was held at the Warwick Hotel near the ICMT. By the official opening, phases I, II, and III of the museum exhibit program were completed. Approximately 250 various types of artificial organ hardware were exhibited (Table 1; Figs. 2–6). The office of the ICMT was also furnished properly (Fig. 7). Three books describing the historical development of blood purification (volume 1), blood oxygenation (volume 2), and cardiac prostheses (volume 3, draft) have also been published by the ICMT Press with the help of Ms. Joanne Elser formerly of ICAOT (Fig. 8). Approximately 225 people attended these events, which were planned by the executive committee of the ICMT (Table 2). The opening symposium was organized by Dr. George P. Noon (President), Dr. Akira Nishikawa (Vice President; Fig. 9), and Dr. Yukihiko Nosé (Secretary General, Fig. 10) with the support of Dr. Michael E. DeBakey (Chancellor Emeritus, Baylor College of Medicine), and Dr. James T. Willerson (Dean of the University of Texas School of Medicine). The program for the symposium is presented in Table 3. The opening ceremony was held the evening of the 8th of November 2002. The program of the ceremony is shown in Table 4. Dr. Lowell Harmison and other presentors are shown in Figs. 11–19.

Prior to the opening symposium, Dr. Lowell Harmison proposed the creation of the International Academy for Artificial Organ Pioneers (Academy, or IAAOP). This proposal was favorably accepted by

FIG. 4. Exhibit panels for the historical oxygenator modules.

TABLE 1. *Partial categorized list of ICMT displays*

NONPULSATILE PUMPS
NIKKISO CENTRIFUGAL PUMP
GYRO PUMP C1E3
MICROMED DEBAKEY VAD
INCOR-1
HEARTMATE II LVAD
EVAHEART LVAD
BCM GYRO PI BIVENTRICULAR ASSIST DEVICE
BIO PUMP (2001)
SARNS (2001)
CAPIOX (2001)
ROTAFLOW (2001)
PORTABLE ROLLER PUMP (1970s)
BLACKSHEAR MEDTRONIC CENTRIFUGAL PUMP (1976)

VENTRICULAR ASSISTS
EXTERNAL MASSAGE DEVICE
DEBAKEY VENTRICULAR ASSIST PUMP
AXISYMMETRIC LVAD
TOYOBO-NATIONAL CARDIOVASCULAR TYPE VAS
ZEON-TOKYO UNIVERSITY TYPE VENTRICULAR ASSIST SYSTEM
BERLIN HEART VENTRICULAR ASSIST SYSTEM
THORATEC VENTRICULAR ASSIST SYSTEM
HEARTMATE I VENTRICULAR ASSIST DEVICE (VE & IP)
BCM LEFT VENTRICULAR ASSIST DEVICE
NOVACOR LEFT VENTRICULAR ASSIST SYSTEM
HEARTSAVER VENTRICULAR ASSIST DEVICE
LIONHEART LEFT VENTRICULAR ASSIST SYSTEM
BCM LEFT VENTRICULAR BYPASS PUMP (1960)
BCM LEFT VENTRICULAR BYPASS PUMP (1966)
CANNULAE FOR THE BERLIN HEART
EXCOR PORTABLE DRIVING UNIT FOR THE BERLIN HEART
KANTROWITZ CARDIO VAD TM

GRAFTS
PTFE GRAFTS
CRIMPED DACRON
HEMASHIELD
GELSOFT EXTRA SOFT WOVEN
GELSEAL KNITTED COOLEY

TOTAL ARTIFICIAL HEARTS
CCF PUSHER PLATE BLOOD PUMP
HOLTER HEART
METAL SHELL TWIN SAC HEART
NATURAL RUBBER HEART
POLYURETHANE HEART
FLUID AMPLIFIER TOTAL ARTIFICIAL HEART
ELLIPOSOD HEART (AUSTRIA)
KEDR TOTAL ARTIFICIAL HEART (RUSSIA)
DEBAKEY TOTAL ARTIFICIAL HEART
UTAH-WESTINGHOUSE HEART
UNIVERSITY OF WASHINGTON THERMAL VAS
CARDIOWEST TOTAL ARTIFICIAL HEART
CLEVELAND CLINIC FOUNDATION TOTAL ARTIFICIAL HEART
KUNIKO LINEAR MOTOR DRIVEN TOTAL ARTIFICIAL HEART (1992)
BCM TOTAL ARTIFICIAL HEART
TWIN SAC HEART

LARGE ITEMS
CRYOMAX CRYROFILTRATION DEVICE
AMINCO CELLTRIFUGE (1969)
CURRENT HEMODIALYZER (DBG-02, NIKKISO CO., INC)
KIIL FLAT PLATE KIDNEY
DIALYSATE TANK FOR TWIN COIL DIALYZER
KOLFF ROTATING DRUM KIDNEY MODIFIED BY JOHN P. MERRILL (1949)

HIGHLIGHTS IN HISTORY
BRAMSON PLATE TYPE MEMBRANE OXYGENATOR (1965)
CLOWES PLATE TYPE MEMBRANE OXYGENATOR (1956)
OLSON HEART LUNG MACHINE CONSOLE MODEL #601-113
OLSON CORONARY PERFUSION PUMP (2-HEAD) MODEL #611-5
NASA DRIVING SYSTEM (1979)
NORTON DRIVE SYSTEM (EARLY 1960s)
BELZER TRANSPORTABLE RENAL PRESERVATION UNIT
IRON LUNG
BARBER POLE (1905)
WASHING MACHINE FOR HOME HEMODIALYSIS
TRAVENOL MINIPRIME DISPOSABLE OXYGENATOR
KAY CROSS ROTATING DISK OXYGENATOR

VALVES
STARR-EDWARDS CAGED BALL VALVE (1960)
MAGOVERN-CROMIE SUTURELESS BALL VALVE (1963)
SMELOFF-CUTTER CAGED BALL VALVE (1966)
CROSS-JONES CAGED DISC VALVE (1965)
BEALL CAGED DISK VALVE (1971)
KAY-SHILEY CAGED DISC VALVE (1965)
BJORK-SHILEY PIVOTING AORTIC DISC VALVE (1969)
BJORK-SHILEY PIVOTING MITRAL DISC VALVE (1969)
LILLEHEI-KASTER AORTIC DISC VALVE (1970)
TORONTO STENTLESS PORCINE VALVE (SPV) (2001)
AORTIC HANCOCK PERICARDIAL VALVE (21MM) (1970)
HANCOCK AORTIC PORCINE VALVE (STANDARD MODEL) (1969-PRESENT)
HANCOCK VALVE CONDUIT (SIZE 22 MM) (1982)
ST JUDE MEDICAL BILEAFLET DISK VALVE (2001)
CARBOMEDICS BILEAFLET AORTIC VALVE "TOPHAT" (2001)
CARBOMEDICS BILEAFLET AORTIC VALVE: FOR PEDIATRIC (2001)
CARBOMEDICS BILEAFLET MITRAL VALVE (2001)
CARBOMEDICS CARBO-SEAL (2001)
GOTT-DAGGATT BUTTERFLY AORTIC VALVE (1964)
PROTOTYPE HEART VALVE "TOILET SEAT" HINGE TYPE (1960s)
SAM DISK VALVE (1967)
VALVE CAGE OF ORIGINAL STARR-EDWARDS (1960)
IONESCU-ROSS WOOLER FASCIA LATA HEART VALVE GRAFT SUPPORT (1960s)
EXPERIMENTAL CAGED VALVE (LATE 1950s–1960s)
DURA MATER BIOPROSTHESIS
FABRIC VALVE PROSTHESIS (PROTOTYPE)
SJM TAILOR ANNULOPLASTY RING
CARPENTIER-EDWARDS PHYSIO ANNULOPLASTY RING

OXYGENATORS
VISION HOLLOW FIBER MEMBRANE OXYGENATOR GISH BIOMEDICAL (2001)
SPIRAL GOLD HOLLOW FIBER MEMBRANE OXYGENATOR BAXTER HEALTHCARE CORP (2001)
SAFE MAXI HOLLOW FIBER MEMBRANE OXYGENATOR POLYSTAN (2001)
SAFE MINI HOLLOW FIBER MEMBRANE OXYGENATOR POLYSTAN (2001)

TABLE 1. *Continued*

SAFE MICRO HOLLOW FIBER MEMBRANE OXYGENATOR POLYSTAN (2001)
BENTLEY DISPOSABLE HARD SHELL BUBBLE OXYGENATOR (1966)
KOLFF'S DISPOSABLE TWIN COIL-TYPE MEMBRANE OXYGENATOR
COBE CARDIOVASCULAR INC. OPTIMA XP HOLLOW FIBER MEMBRANE OXYGENATOR (2001)
SENKO MEDICAL INDUSTRIES HPO20-C HOLLOW FIBER MEMBRANE OXYGENATOR (2001)
DISPERSION-TYPE BUBBLE OXYGENATOR (1970)
HARVEY-H 1000 DISPOSABLE BUBBLE OXYGENATOR
OXYBEL DISPOSABLE BUBBLE OXYGENATOR
TONOKURA SHEET-TYPE DISPOSABLE BUBBLE OXYGENATOR (1970s)
TRAVENOL CARDIOTOMY BLOOD RESERVOIR (1970s)
PEMCO BLOOD FILTER
BROWN-HARRISON HEAT EXCHANGER (1970s)
DISPOSABLE ROTATING DISC-TYPE POLYCARBONATE OXYGENATOR 22 INCH SIZE (1970s)
G-E PIERCE PARTIALLY DISPOSABLE PLATE MEMBRANE OXYGENATOR (1970)
LANDE-EDWARDS MEMBRANE OXYGENATOR (1970)
TRAVENOL ENVELOPE-TYPE MEMBRANE OXYGENATOR (1971)
TRAVENOL TMO TOTAL BYPASS MEMBRANE OXYGENATOR
TERUMO FIRST COMMERICALLY AVAILABLE HOLLOW FIBER MEMBRANE OXYGENATOR (1980)
CAPIOX-TERUMO CARDIOVASCULAR SYSTEMS CORP., JAPAN (2001)
SCI-MED KOLOBOW COIL-TYPE MEMBRANE OXYGENATOR (1975)
MEDTRONICS ECMO1500 COIL-TYPE MEMBRANE OXYGENATOR (2001)
DAINIPPON INK CHEMICALS CUBE 6000 HOLLOW FIBER MEMBRANE ECMO OXYGENATOR (2001)
FUJI-BCM PPM SILICONE HOLLOW FIBER MEMBRANE OXYGENATOR (2001)
SENKO MEDICAL INDUSTRIES MERA SILOX 03 HOLLOW FIBER MEMBRANE OXYGENATOR PEDIATRIC (2001)
SENKO MEDICAL INDUSTRIES HPO-15 HOLLOW FIBER MEMBRANE OXYGENATOR (2001)
MEDTRONICS MAXIMA PLUS PRF HOLLOW FIBER MEMBRANE OXYGENATOR (2001)
MEDTRONICS AFFINITY NT HOLLOW FIBER MEMBRANE OXYGENATOR (2001)
TERUMO CARDIOVASCULAR SYSTEMS CAPIOX SX HOLLOW FIBER MEMBRANE OXYGENATOR (2001)
BRAILE MRX HOLLOW FIBER MEMBRANE OXYGENATOR FOR PEDIATRIC (2001)
BRAILE LUCCHESE 050 HOLLOW FIBER MEMBRANE OXYGENATOR PEDIATRIC (2001)
BRAILLE LUCCHESE 025 HOLLOW FIBER MEMBRANE OXYGENATOR PEDIATRIC (2001)
D901 LILLIPUT 1 DIDECO S.P.A. (ITALY) (2001)
D903 AVANE DIDECO S.P.A. (ITALY) (2001)
COBE CARDIOVASCULAR INC CMR DUO HOLLOW FIBER MEMBRANE OXYGENATOR (2001)
QUADROX HOLLOW FIBER MEMBRANE OXYGENATOR JOSTRA (2001)
MANOLYTH HOLLOW FIBER MEMBRANE OXYGENATOR SORIN BIOMEDICAL (2001)
DISPOSABLE COIL MEMBRANE OXYGENATOR

DIALYSIS AND APHERESIS

FIRST HANDMADE DISPOSABLE COIL ARTIFICIAL KIDNEY (1956)
COMMERCIALIZED TWIN COIL DIALYZER (1965)
SELF-WINDING HOME DIALYSIS COIL FOR WASHING MACHINE (1965)
DISPOSABLE COIL DIALYZERS PLACED IN A PLASTIC CARTRIDGE (1970s)
ESMOND-DIALUNG KIDNEY (1966)
AN ENVELOPE FOR THE KIIL ARTIFICIAL KIDNEY (LATE 1960s–EARLY 1980s)
FIRST DISPOSABLE KIIL DIALYZER
COMMERCIALIZED DISPOSABLE FLAT PLATE DIALYZER (EARLY 1970s)
SECOND-GENERATION DISPOSABLE FLAT PLATE DIALYZER (LATE 1970s)
THIRD-GENERATION DISPOSABLE FLAT PLATE DIALYZER (EARLY 1980s)
EXPERIMENTAL FIRST DISPOSABLE HOLLOW FIBER DIALYZER (1967)
COMMERCIALIZED DISPOSABLE HOLLOW FIBER DIALYZER (CELLULOSE ACETATE FIBERS) AND CAPILLARY FLOW DIALYZER (EARLY 1970s)
SECOND-GENERATION DISPOSABLE HOLLOW FIBER DIALYZER (AFTER 1975)

ALBUMIN SEPARATOR
PLASMA FRACTIONATOR (1980s)
PLASMA SEPARATOR (1980s)
LEUKOCYTE REMOVAL FILTER
LDL ADSORPTION FILTER
ACTIVATED CHARCOAL
MACROMOLECULE FILTER (1980s)
CASCADE FILTER
ENDOTOXIN REMOVAL CARTRIDGE
PLATELET FILTER
LEUKOCYTE FILTER
HAEMONETIES CENTRIFUGE BOWL
DIDECO CENTRIFUGE BOWL
AMINCO CENTRIFUGE BOWL

the ICMT board of trustees. This proposal was made to all the scientific contributors of the symposium together with several pioneers of the field who could not attend this event. Dr. Harmison's proposal was presented at the ICMT opening symposium. There was no objection and all attendants agreed to establish "The Academy" in the ICMT.

ICMT's legal counsel also agreed to create two subsidiary organizations of the ICMT. One organization would be established to preserve and maintain all available artificial organ hardware, software, and archives of pioneers in artificial organ technologies—the ICMT Museum for Artificial Organs, succeeding the ICAOT Museum (Fig. 20). Dr. Steven Phillips was elected as the ICMT museum director. Dr. Akira Nishikawa (U.S.A.), Dr. Stewart Cameron (Europe), and Mr. Yoshio Aoki (Japan) were elected as Region Directors of ICMT. Dr. Tadashi Motomura was elected as the administrative director. Dr. Motomura is assisted by Dr. Joerg Linneweber (Europe),

FIG. 5. The entrance hall of the ICMT Museum for Artificial Organs; historical artificial hearts and the organ perfusion system.

FIG 6. The entrance hall of the ICMT Museum for Artificial Organs; various historical artificial kidney hardware.

FIG. 7. ICMT 2002 Scholarship recipients (three of five) are pictured with their teachers at the ICMT headquarters office.

FIG. 8. Picture of three historical books published by ICMT Press; from left, Blood Purification (Volume 1), Cardiac Prosthesis (Volume 3, manuscript edition), and Oxygenator (Volume 2).

FIG. 9. Dr. George Noon, Symposium President (middle) and Dr. Akira Nishikawa, Symposium Vice President (right) listening to Dr. O. Howard Frazier, Master of Ceremonies of the official opening of the ICMT Museum for Artificial Organs.

TABLE 2. *ICMT Executive Committee*

Honorary Chairman
Michael E. DeBakey, MD
Chairman
Yukihiko Nosé, MD, PhD
Associate Chairman
Akira Nishikawa, MD
Steven Allen, MD
L. Maximilian Buja, MD
Bobbie Didier, RN
O. Howard Frazier, MD
Barry Kahan, MD
George Noon, MD
Daniel Redmond, MD
Hazim Safi, MD
Executive Director
Julia Glueck
Associate Executive Director
Ako Nosé
Assistant Executive Director
Laurie Braun
Director of Museum Exhibits
Tadashi Motomura, MD, PhD
Director of Public Relations
Bryant Boutwell, Dr. PH

Dr. Atsushi Hata (Japan), and Mr. Mike McGee (U.S.A.). Scientific directors for artificial kidney, oxygenator, total artificial heart, and left ventricular assist devices were also recommended for appointment (Table 5).

The other organization is to maintain the human resources unifying the pioneers, developers, and practitioners of artificial organ technologies around the world, and the Academy was officially approved by the ICMT board of trustees and enthusiastically accepted by all attendants of the symposium.

Dr. Lowell Harmison was elected as the dean of engineering affairs. Dr. Denton Cooley was elected

FIG. 10. Founder of the ICMT, Dr. Yukihiko Nosé pictured with Ms. Jean Kantrowitz, co-chairperson of Project Bionics of ASAIO.

TABLE 3. *ICMT opening symposium program*

Historical Perspectives of Artificial Organs (Friday, November 8, 2002)

Historical Development of Artificial Kidney
Barry D. Kahan and Steven Phillips (moderators)

Willem Kolff	*How It Started*
Richard Stewart	*How It Became Useful*
Christopher Blagg	*How It Became Useful*

Historical Development of Oxygenator
Lowell Harmison and Shin-ichi Nitta (moderators)

Richard DeWall	*How It Started*
Viking Björk	*How It Became Practical*
Frederick S. Cross	*How It Became Practical*

Historical Development of Artificial Heart
O. Howard Frazier and George P. Noon (Moderators)

Adrian Kantrowitz	*Ventricular Assist Device*
William DeVries	*Permanently Implantable (TAH)*
Jack Copeland	*Bridge to Transplant (TAH)*

Opening Ceremony of ICMT
Warwick Hotel
Versailles Room, 12th floor

ICMT Official Reception and Dinner
Ballroom, 1st floor

Frontiers in Artificial Organ Technologies (Saturday, November 9, 2002)

Current Status of Blood Purification
Mitsuru Suzuki and Yukihiko Nosé (moderators)

Eli Friedman	*Keynote on Hemodialysis*
Wadi Suki	*Alternate Method of Renal Assist*
Paul Malchesky	*Membrane Apheresis*

Sponsored by Nikkiso Co., Inc.

Current Status of Oxygenators
Hazim Safi and Akira Nishikawa (moderators)

Terry Crane	*Keynote on Oxygenators*
Kozo Suma	*Hollow Fiber Oxygenators*
Yoshiyuki Taenaka	*ECMO Oxygenator*

Sponsored by Senko Medical Corporation

Current Status of Pulsatile Blood Pumps
Peer Portner and Kou Imachi (moderators)

Reiner Körfer	*Keynote, LVAD*
Laman Gray	*Keynote, TAH*
Victor Poirier	*TCI, VAD*
Tofy Mussivand	*Novacor and HeartSaver VAD*
Donald Hill	*Thoratec, VAD*

Lunch

Ernst Wolner
Keynote, Nonpulsatile Blood Pump

S*ponsored by MicroMed Technology, Inc.*

Current Status of Nonpulsatile Blood Pumps
George P. Noon and Isao Yada (moderators)

Dallas Anderson	*MicroMed/DeBakey Pump*
Robert Jarvik	*Jarvik 2000*
Kenneth Butler	*HeartMate II*
Chisato Nojiri	*Dura Heart*
Yukihiko Nosé	*Gyro Centrifugal*
Don Olsen	*Magnetic Suspension Pump*
Johannes Müeller	*INCOR-1 Pump*

Sponsored by Mutoh Co. Ltd.

Visit ICMT Museum

Julia Glueck	Yukihiko Nosé
Laurie Braun	Tadashi Motomura

TABLE 4. *Itinerary for ICMT opening ceremonies on November 8, 2002*

Opening Ceremonies	
5:30 PM	
O. Howard Frazier	Master of Ceremonies
George P. Noon	Symposium President
Akira Nishikawa	Symposium Vice President
Yukihiko Nosé	Symposium Secretary-General
Steven Phillips	President and CEO of American Society for Artificial Internal Organs, Assistant Director of Research and Education National Library of Medicine (Retired), and Consultant to NIH
Shin-ichi Nitta	President of Japanese Society for Artificial Organs, President of International Society of Artificial Organs, and Professor, University of Tohoku School of Medicine, Japan
Ernst Wolner	Honorary Congress President of European Society of Artificial Organs, and Professor and Director of the Department of Heart and Thoracic Surgery of the General Hospital of Vienna, Austria
Reiner Körfer	Honorary Congress President of the International Society for Rotary Blood Pumps, and Professor of the Herzzentrum NordRhein-Westfalen in Bad Oeynhausen, Germany
Ghodrat Siami	Congress President of International Society for Apheresis, Vice President World Apheresis Association, and Professor of Medicine at Vanderbilt University
Lowell Harmison	Dean of International Academy of Artificial Organ Pioneers and former Director of United States Artificial Heart Program of NIH
Jean Kantrowitz	Co-chairperson Project Bionics, American Society of Artificial Organs, and Co-founder of L-VAD Technology
Yukihiko Nosé	Presents ICMT Plaques to Outstanding Awardees ICMT Official Reception and Dinner
7:15 PM	
Hazim Safi	Master of Ceremonies
Yukihiko Nosé	How ICMT Started
Willem Kolff	Birth of Artificial Kidney and Heart
Richard DeWall	How Open Heart Surgery Became Possible
Adrian Kantrowitz	Support the Failing Heart
Laman Gray	Total Artificial Heart
Viking Björk	Toast
Dinner	
Eli Friedman	Artificial Kidney
Fred Cross	Oxygenator
Peer Portner	Ventricular Assist Heart Device
Jack Copeland	Bridge to Transplant
Donald Hill	Short-Term Implantation
William DeVries	Closing Toast

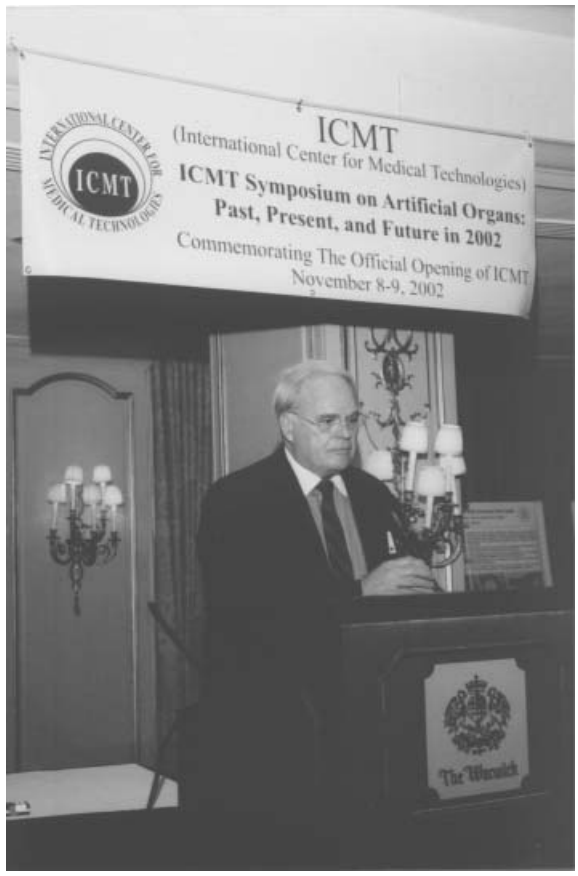

FIG. 11. Dr. Lowell Harmison, former Director of NIH Artificial Heart Program, and founder of the International Academy of Artificial Organ Pioneers (Academy) of the ICMT and the Dean of Engineering Affairs of the Academy.

FIG. 12. Dr. Adrian Kantrowitz, founding Chairman of the Board of the ICAOT (left) together with Dr. Eli Friedman, Editor-in-Chief of ASAIO Journal (right) at the official ICMT Opening Ceremony.

FIG. 13. Dr. Steven Phillips, President and CEO of ASAIO, and Assistant of Research and Education, National Library of Medicine (retired) presenting greetings at the official ICMT Opening.

as the dean of medical affairs. Dr. Steven Phillips (President, American Society for Artificial Internal Organs), Dr. Robert Bartlett (President, International Society for Artificial Organs), Dr. Kazuo Kyo (President, Japanese Society for Artificial Organs), Dr. Raymond Vanholder (President, European Society for Artificial Organs), Dr. Hikaru Matsuda (President, International Society for Rotary Blood Pumps), and Dr. Paul Malchesky (President, International Society for Apheresis) were elected as associate deans. Dr. Reiner Körfer (ventricular assist), Dr. George Schreiner (renal assist), Dr. George Noon (oxygenator), Dr. Akira Nishikawa (pacemaker), and Dr. Yukihiko Nosé (apheresis) were elected as assistant deans (Table 6). Approximately 80 individuals were elected as the founding members of the Academy (Table 7).

FIG. 15. Dr. Reiner Körfer, Honorary Congress President of ISRP, and Professor of Herzzentrum Nord-Rhein Westfalen in Bad Oeynhausen, Germany (right); Dr. Ernst Wolner, Honorary Congress President of ESAO, and Professor and Director of Heart Center of University of Vienna, Austria (middle), and Dr. Victor Poirier, founder of TCI and the inventor of the HeartMate (left).

Creation of the International Faculty for Health and Medical Technologies

All the symposium participants agreed to be founding members of the Academy and expressed their interest to be involved further in the global teaching activities of artificial organ technologies.

FIG. 14. Dr. Shin-ichi Nitta, President of ISAO and Immediate Past Chairman of the Board of JSAO, Professor, University of Tohoku School of Medicine, with his wife, at the ICMT Official Opening party.

FIG. 16. Dr. Paul Malchesky, President of the ICAOT and President of ISFA (left) together with Dr. Ghodrat Siami, Congress President of ISFA, Vice President of WAA, and Professor of Medicine at Vanderbilt University (middle) with an attendant at the official ICMT reception.

FIG. 17. Dr. Willem Kolff, the "Godfather of Artificial Organs" and inventor of the first clinically applicable artificial kidney in 1943, demonstrating a wearable oxygenator.

Thus, the International Faculty concept was added to the two already existing activities of the ICMT.

This Faculty will serve to educate the future generation of medical professionals as well as allied health specialists who work in the field of medical

FIG. 18. Dr. and Mrs. Laman Gray, responsible for the development of a totally implantable artificial heart (Abiocor) by ABIOMED, Inc, in 2001.

FIG. 19. Dr. William DeVries, who performed the first clinical implantation of the Utah permanent total artificial heart in 1983 and Academic Coordinator for the Cardiothoracic Surgery Service at Walter Reed Hospital, proposing the closing toast at the official Opening of the ICMT Museum.

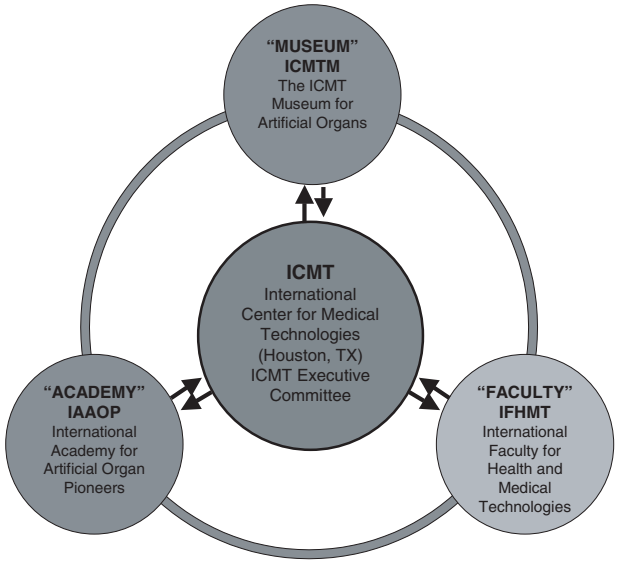

FIG. 20. ICMT structure is shown.

technologies. The Faculty will also promote global health issues. At this time, artificial organ specialties are limited and subdivided, as evidenced by the many societies representing this field. Furthermore, artificial organ expertise is contained geographically. ICMT, therefore, will strive to unify all these societies and individuals. These objectives were considered during the election process of the associate and assistant deans of the Academy.

During the symposium, artificial organ technologies for the treatment of end-stage disease patients were stressed, but it must be remembered that these technologies are also applicable for improving and maintaining the health of individuals.

Just as providing clean air and sanitary drinking water were easy to achieve through the side efforts of gas exchange and blood purification technologies, we must strive to spread each country's advanced medical technology to professionals in developing countries, thereby unifying our medical expertise to help mankind around the globe.

After the opening symposium, the need for such a third suborganization of the ICMT was discussed at the ICMT board of trustees meeting, and the International Faculty for Health and Medical Technologies (Faculty or IFHMT) was officially included as the third suborganization of the ICMT. Its bylaws were received and approved by our legal counsel, Mr. Dick Lury. The Faculty's activities fall under the ICMT's classification as a nonprofit, nontaxable Texas institution.

TABLE 5. *Officers of the ICMT Museum for Artificial Organs*

Director
Steven Phillips (U.S.A.)
Regional Directors
Akira Nishikawa (U.S.A.) Stewart Cameron (Europe) Yoshio Aoki (Japan)
Scientific Directors
Artificial Kidney Christopher Blagg Kazuo Ota
Oxygenator Viking Björk Richard DeWall
Total Artificial Heart Willem Kolff Tetsuzo Akutsu
Left Ventricular Assist Device Adrian Kantrowitz Valerij Shumakov
Administrative Staff
Administrative Director Tadashi Motomura
Associate Administrative Director Laurie Braun
Associate Director (Europe) Joerg Linneweber
Associate Director (Japan) Atsushi Hata
Associate Director (U.S.A.) Mike McGee

TABLE 6. *Officers of the International Academy for Artificial Organ Pioneers Executive Committee*

Dean	Lowell Harmison
Dean of Medical Affairs	Denton Cooley
Dean of Engineering Affairs	William J. Murphy, Jr.
Associate Deans	Steven Phillips (President, American Society for Artificial Internal Organs) Robert Bartlett (President, International Society for Artificial Organs) Raymond Vanholder (President, European Society for Artificial Organs) Kazuo Kyo (President, Japanese Society for Artificial Organs) Hikaru Matsuda (President, International Society for Rotary Blood Pumps) Paul Malchesky (President, International Society for Apheresis)
Assistant Deans	(Elected from among each category of artificial organ specialists) Reiner Körfer (Ventricular Assist) George Schriener (Renal Assist) George Noon (Oxygenator) Akira Nishikawa (Pacemakers) Yukihiko Nosé (Apheresis)

The ICMT has most of the historically relevant and currently widely used artificial organ hardware, and not only are they currently exhibited but also much other hardware is available at storage facilities near the Texas Medical Center. Additional software and personal archives of some of the Academy members are also available at the Museum. In addition, because most of the leading pioneers and experts in artificial organ technologies are available through the Academy, we should take advantage of these ICMT resources and utilize them to teach medical technologies throughout the world.

Now, the future teaching center should be "the university without walls," "the university teaching simultaneously at multiple centers," and "the university with a global network," taking advantage of worldwide available bidirectional electronic means.

Dr. Michael E. DeBakey was elected unanimously as a founding dean of the Faculty. The organization of the Faculty is just beginning and any members of the Academy or members of ISAO are welcome, for the concept of the Faculty to be successful.

TABLE 7. *Founding members of the International Faculty for Artificial Organ Pioneers*

Tetsuzo Akutsu	Reiner Körfer
Nils Alwall	Chun-Jean Lee
Yoshio Aoki	Domingo Liotta
Kazuhiko Atsumi	Paul Malchesky
Earl Bakken	Hikaru Matsuda
Werner Bandel	Johannes Müller
Robert Bartlett	William Murphy
Viking Bjork	Gordon Murray
Christopher Blagg	Tofy Mussivand
Kenneth Butler	Akira Nishikawa
Stewart Cameron	Shin-ichi Nitta
Denton Cooley	Chisato Nojiri
Jack Copeland	George Noon
Frederick Cross	Yukihiko Nosé
Michael E. DeBakey	Kazuo Ohta
Clarence Dennis	Donald Olsen
William DeVries	Steven Phillips
Richard DeWall	William Pierce
Dieter Falkenhagen	Victor Poirier
OH Frazier	Peer Portner
Emil Freireich	Hazim Safi
Eli Friedman	George Schreiner
Vincent Gott	Belding Scribner
Laman Gray	Ake Senning
Hans Gurland	Yukiyasu Sezai
Lowell Harmison	Valerij Shumakov
Lee Henderson	Richard Stewart
Donald Hill	Wadi Suki
Motokazu Hori	Kozo Suma
Kou Imachi	Akio Suzuki
Tsunamasa Inou	Mitsuru Suzuki
Peter Ivanovich	Yoshiyuki Taenaka
Robert Jarvik	Bruno Watschinger
Barry Kahan	James Willerson
Adrian Kantrowitz	Ernst Wolner
Horst Klinkmann	Isao Yada
Willem Kolff	Zenya Yamazak
Theodor Kolobow	

Mission statement and organization of the ICMT

"ICMT's mission is to preserve all available medical hardware and software as well as to recognize medical technology pioneers and contributors. Utilizing these resources, ICMT will facilitate international education, international consultation, and international project assessment and support. In cohesion with the ICMT Museum for Artificial Organs (Museum or ICMTM), the International Academy for Artificial Organ Pioneers (Academy or IAAOP), and the International Faculty for Health and Medical Technologies (Faculty or IFHMT), ICMT will promote the development of new and improved medical technologies for human health" (Fig. 20).

1. The ICMT is incorporated in the state of Texas, U.S.A., as a charitable nonprofit corporation.
2. The ICMT is exempt from sales/use tax under the terms of Chapter 20, Title 122A, Taxation-General, Revised Civil Statutes of Texas, as amended and especially as referred to in Article 20.04 (F)(5) of said statutes.
3. The ICMT has established specific areas of activities within the following organizations: the ICMT Museum for Artificial Organs, the International Academy for Artificial Organ Pioneers, and the International Faculty for Health and Medical Technologies.
4. All of these specific subsidiary organizations shall be operated within the legal framework of the nonprofit corporation status of ICMT. Thus, the board of trustees and the legal counsel of ICMT shall approve all the activities of the aforementioned organizations.
5. The specific objectives of these three organizations are described in each respective section. However, the overall objective of the ICMT is to educate professionals and the lay public in medical technologies. These three organizations complement each other in promoting the most effective objectives of ICMT. Of particular importance to ICMT is the preservation of all key information related to medical technologies, both from the past and present. ICMT will globally utilize this information for the future development of new and improved medical technologies and new and improved health related issues.

The Museum is open seven days a week, or whenever the hospital is officially open. Visitors are asked to sign the visitor's book at the Museum. The ICMT administrative office is also accessible. Visitors are asked to call the administrative office to schedule an appointment.

The ICMT administrative office can be reached by telephone: (713) 704-0964, fax: (713) 798-8439, or E-mail: jglueck@bcm.tmc.edu. We encourage all of the readers of *Artificial Organs* and members of ISAO to support ICMT activities, not only by contributing to those aspects described above but also by contributing any new activities or concepts.