Michael E. DeBakey and Denton A. Cooley (Part II)

Mike, the master assembler, and Denton, the courageous fighter: A personal overview

Unforgettable past remembrances in the 1960s

I can hardly imagine those early days of Mike DeBakey, a young 46-year-old man, in Houston in 1948, following his experience during the Second World War. I have an innermost feeling of his undoubtedly early passion to turn the base of cardiovascular surgery from theory to practice. In fact, he changed everything at Baylor College of Medicine, at the Methodist Hospital, at the Texas Medical Center.

Indeed, Michael E. DeBakey and Denton A. Cooley, two giants of cardiovascular surgery, promoted the change in the 20th Century and, without a shadow of a doubt, both had their own dreamy legend.

The Rice-Baylor Artificial Heart Program

It seems to me that Mike started thinking on the assembling strategy of Rice-Baylor Artificial Heart Program shortly after his celebrated presentation in Washington, which I mentioned in *Thesaurus 37- Michael E. DeBakey and Denton A. Cooley (Part I).*

However, to my knowledge nobody really knew Mike's steps in the preparation of that outstanding program and, finally, was a great surprise to us. In fact, we had started hearing of the project late in 1963 and of its final confirmation in early 1964.

From the very beginning, we defined the working lines and responsibilities in Rice University, establishing two groups, e.g. chemical and electronic engineers. William Akers, a chemical engineer, and his specialist partners would be responsible for the search of new biomaterials. In the other group, John H. Maness was the head of the electronic engineers directly responsible for driver development. Mike DeBakey was the director of the full Rice-Baylor program, being Domingo Liotta the co-director.

Bill Akers, a remarkably friendly person, responsible for the research of biomaterials, suffered the frequent syndrome of engineers that are occasionally fascinated by the medical aspects of the research, i.e. they remain enthralled by the medical perspective of the problem rather than be actively engaged in the collateral engineering research itself.

Bill Akers loved being in the operating room observing Mike, while performing a masterly surgery instead of being in his own laboratory helping us to progress; I don't question the noble curiosity, but to a reasonable extent, since we cannot stray away with such a freedom from what our own duties are.

From the very beginning I recognized in Bill Akers the '*enthralling engineering clinical syndrome*' and I decided to take the crucial problem of biomaterials -mainly the blood-foreign material interface- in our own hands at Baylor, e.g. the permanent risk of blood pump thromboembolism. In 1964 we published a priceless research work; the development of blood pumps lining forming a neo-endocardium.

However, Bill Akers with his extremely kind personality, worthy of all respect, was the right and indispensable person to harmonize the entire Rice team in a solid human body. I never talked about this issue with Mike, but I have the feeling that given Mike's psychological insight, he also understood Bill Akers in the same way and with the same penetration.

The difference with the noble curiosity of our dear engineer Taliani in Córdoba was remarkable; Taliani also enthralled by the research on the artificial heart was, at the same time, a master craftsman who laid his ideas into the realm of practice.

Contrarily, the group of electronic engineers participating in the Rice program was highly effective in the research of blood pump drivers; at the head of this group was engineer John H. Maness [(2)]. However, shortly after Maness quit Rice University and established his own research laboratory. Anyway, Maness always remained at our entire disposal for any consultation.

As I have said in *Michael DeBakey and Denton Cooley (Part I),* Bill Hall's contribution to create close ties of friendship with the engineers at Rice was very valuable. Besides, Bill contributed to make Rice's electronic engineers really understand hemodynamic problems that should be resolved with the design of adequate drivers.

In fact, after July 1968 Maness -with the assistance of William O'Bannon- was the engineer who, under my instructions on physiological hemodynamic guidelines, directed the construction of the advanced clinical driver for the Total Artificial Heart used on April 4, 1969. Engineer

O'Bannon, an employee of Rice University, was directly responsible for the driver's management and functioning [1page 105]. Unfortunately, he had a nervous breakdown in the afternoon of April 3, and engineer John Jurgens successfully did a master work, thus resolving the singular moment.

After almost half a century, it would be worthy to assess the usefulness of the Baylor-Rice artificial heart program created -with his unsurprising intellect- by Dr. DeBakey.

Accordingly, it is my personal belief that, in the first place, it was a good and honorable thing, a true accomplishment related to our research work coming from Mike DeBakey. On a speculative side, it intrinsically clearly penetrates in the real passion of Mike for the artificial heart research. We just have to observe his anxiety in the midst of the main struggle between himself and Denton Cooley following the clinical Total Artificial Heart in 1969, when his life was disturbed to a greater extent than necessary; subsequently, a strictly medical affair had inevitably the harshness of public affairs. Finally, the dangerous quarrelling between great personalities abated the outstanding Rice-Baylor project for ever.

Hence through years of reflection, it is difficult to estimate the true significance of the sudden and profound destruction of the artificial heart Rice-Baylor project.

It is problematic to estimate, at least for me, the true significance of those things. Highly educated professional men, in independent position, and of honest purposes, remained, for years, in a hopeless confrontation. The facts were finally frightful enough; unfortunately, they marked the standby of everything for which Mike had labored in arduous but serene action in the field of prolonged artificial circulatory research.

Research on the formation of an Autologous Interface between the ventricular prostheses and the patient's blood. The first step toward the clinical use of blood pump devices

We started this crucial research in 1964 and continued it in 1965: the formation of an autologous interface made up by fibrin and blood corpuscles from the patient that are incorporated in a permanent way into the lining of the prosthesis in contact with blood *(development of a blood-foreign material interface-an autologous cellular interface).*[3,4] To hold the fibrin and the blood corpuscles, the cardiac prostheses were lined with a special Dacron *'velour'* that I personally developed in Philadelphia with the people recommended by Mike at the *Philadelphia College of Textile.* All of our prostheses in clinical use since 1966 had this lining and the thromboembolic incidence was null. Some of the recent LVASs even on metallic surfaces have adopted this principle, the creation of an autologous interface with the patient's blood.

Dr. DeBakey played a fundamental role in this research; he put me in contact with the Director of the Philadelphia College of Textile, the same highly versed professional that had helped Mike in the early 50s, when he started the fabrication in Houston, not rarely at home, of Vascular grafts. The recorded history is universally known: Mike DeBakey changed the history of vascular surgery.

The craftwork of vascular prosthesis; well-known pictures of Mike working at home with the sewing machine of his wife Dianne Cooper; Dianne, an unforgettable lovable lady, kept a close friendship with my wife Olga during our stay in Houston, (please see: 'A photograph of an instant to remember' at the end of this Thesaurus issue) .

Our research on the neoendocardium formation in blood pumps temporarily supplemented at length the quick findings of new biomaterials at that time.

Replacement of Total Artificial Heart Function

In 1964 we published a "celebrated" paper [5], of which I am heartily glad. It was a breakthrough study. At that time we were at Baylor already thinking on the complete replacement of the heart function.

However, in 1964 we were vaguely interpreting objectives to go into real action in moribund patients. Unquestionably, veracity to facts, we were not yet prepared, even from the psychological point of view for this great step in 1964.

It is well known that members of the Department of Surgery of Baylor College of Medicine—DA Cooley, surgeon; DS Liotta, surgeon; GL Hallman, surgeon; RD Bloodwell, surgeon; A. Keats, anesthesiologist; RD Leachman, cardiologist—finally did at the Texas Heart Institute, on April 4 1969, the two-staged total heart replacement procedure in a moribund patient, in order to ´buy time´ while waiting for a donor [6].

The historical clinical implantation of the first Total Artificial Heart in 1969, has undeniably been legitimate, and may be added up to the United States lasting glory. In 2006 the Smithsonian Treasures of American History Exhibit, selected the 1969 original prototype to be displayed prominently [1, page 289]. Truly, it was the honest appeal of the unquestionable, unrestricted medical duty, assuredly, seeking at that time advancement of institutions that had to thoroughly join their efforts regarding artificial heart research. I am speaking of both the Texas Heart Institute and the Department of Surgery of Baylor College of Medicine under the chairmanship of Professor Michael E. DeBakey.

And, here I will express my unchangeable testimony –the testimony of research unity– concerning the occasion on which I had a face-to-face secret meeting with Dr. DeBakey early in the morning of April 20, 1969, just before flying to Atlantic City for our ASAIO presentation together with Dr. Cooley. Indeed, that morning, solemnly, though very strongly, Dr. DeBakey told me I should consider desisting from the idea of being in Atlantic City for the ASAIO meeting. At the end of that hard day, I had at least a majestic peace; the noble Willem J. Kolff asked the ASAIO audience for a standing ovation for Dr. Liotta, "*for the skill and persistence with which he has pursued the artificial heart*". [7, page 266].

The 1964 paper starts with the following sentences:

"*At present, we believe that in clinical application, it is preferable to use the technique of bypass of both ventricles rather than total heart replacement. We support this point for the following reasons. The durability of plastic materials for attempting a permanent substitution has not been completely explored. The intrathoracic pumps for ventricular bypass may function as long as a prosthesis for heart replacement. An external source of power is required. It leaves a reduced ventricular function with intact nervous connections for a compensatory chamber for the variable input and thus improving any possible imperfection of artificial prosthesis. Also, trauma to blood cells is minimized. With the heart in fibrillation, normal coronary arterial pressure during bypass function was demonstrated. The bypass technique is simple, not requiring the use of cardiopulmonary bypass during insertion in calves. The patient's family probably would consent more readily to this technique than the total extirpation of the heart, thus relieving the surgeon of a stressful social and ethical problem*".

The last sentence, "*thus relieving the surgeon of a stressful social and ethical problem*" was added by Bill Hall, just before submitting the paper; I remember very well the friendly moment.

For the bypass technique of the right and left Ventricles, we used, according to chest conformation, a little modified laboratory blood pump and two separated laboratory drivers.

A singular unexpected finding was demonstrated; a model for the study of bovine hearts that had fibrillated continuously for as long as 40 hours. For the first time, we showed strikingly uniform, symmetrical myocardial lesions which occupied from one-half to one-third of the ventricular wall and the interventricular septum encompassing the left ventricular cavity. The swelling and pallor of the altered inner myocardium increased in severity with increased duration of the experiment and after 24 hours a yellow-gray line separated the inner zone lesion from the apparently normal outer zone of cardiac tissue [8] .

Some years later, Bob Leachman, our recognized cardiologist, and dear friend, published a paper discussing myocardial findings associated with prolonged heart fibrillation; however, he didn't quote our seminal work. I sent Bob a note [1, page 229] .

Around 1965, an engineer, David W. Wieting, who did not belong to the Rice group showed up in Baylor. David stayed with us for a couple of years, and did a good job when studying the flow behavior in our blood pumps to detect any blood stagnant area during the cardiac cycle and, in addition, the flow characteristics of cardiac valve prostheses[9].

Thesaurus 38 is concerned with our medical students´ cultural education—the fundamental purpose of Thesauri editions; students eager to go deeper on the Baylor work on Assisted Circulation and Total Artificial Heart in the 60s may find the

complete bibliography in the Section **CV** at www: fdliotta.org

In short, I may say that the 37and 38 issues of the Thesaurus have to me an additional emotional charge, because I myself worked intensively in Houston with Mike and Denton in the 60s on the development of one of the most relevant cardiac surgical advances of the 20th Century: the development of artificial circulation in the therapy of refractory heart failure.

And fairly, Thesauri 37 and 38 are dedicated to these two outstanding personalities, in fact two giants, in my personal view, Michael E. DeBakey and Denton A. Cooley. They touched the highest problems of the 'Science of Life', with their technical skills, with their continual strong advocacy to research in the cardiovascular field. In the next Thesaurus issue (number 39) we will consider the controversies about blood pump development at Baylor in the 60s and my historical encounter with Mike in Buenos Aires in April 1996.

A photograph of an instant to remember

June 1966. A family reunion at home -4058 Falkirk St. in Houston- after the baptism of my son Carlos Augusto in St. Vincent de Paul Church.
In the center of the picture, Mrs. Dianne DeBakey is holding Carlos Augusto in her arms

To the right of Dianne, Mrs. Eloisa Villanueva and Mrs. Cady, a lovable unforgettable lady; to the left of Dianne, Olga Liotta, D. Liotta and Dr. Lee D. Cady. In the foreground, Liotta's kids and a friend of theirs.

I had the great fortune of meeting Dr. Cady in 1961, shortly after our arrival in Houston. At that time, I think he was director of Veterans Administration Hospitals in Dallas and Houston.

Colonel Lee D. Cady, MD (1896-1987) was the commanding officer of the famous United States 21st General Hospital during World War II (1939-1945), stationed in France and Algeria.

In 1963-64, Dr. Cady -a 1922 graduate of Washington University School of Medicine- translated into English my book in French "*La Duodénographie Hypotonique. Exploration élective de l'ampoulle de Vater et de la tête du pancréas*", *Masson Editeur, Paris, 1963.* The English version translated by Dr. Cady is entitled, "*The early diagnosis of the tumors of the pancreas and Ampulla of Vater*", *Charles C, Ed. Springfield, Illinois, Thomas Publishing Co. 1965.*The book summarized about 500 cases of patients with pancreatic diseases we diagnosed with the hypotonic duodenographic procedure in France at the Service of Professor Pierre Mallet-Guy. I worked on this clinical research together with Professor Pierre Mallet-Guy, surgeon-in-Chief of surgical clinic at the University of Lyon and the radiologist Dr. Paul Jacquemet, during my Residency (Assistant Étranger) at the University of Lyon (1956- 1959).

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