This issue of the Journal of the Methodist DeBakey Heart Center *focuses on heart rhythm disorders and introduces a new initiative at the Methodist Debakey Heart Center for the treatment of heart rhythm disorders.*

HEART RHYTHM TREATMENT SERVICES (HEARTS): AN INTERDISCIPLINARY APPROACH TO THE TREATMENT OF HEART RHYTHM DISORDERS

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Several members of the HeaRTS group are pictured above. From left to right: Dr. Irakli Giorgberidze; Dr. Miguel Valderrábano; Dr. Timothy Doyle; Dr. Nadim Nasir, Jr.; Dr. Gerald Lawrie; Dr. Tapan Rami

The heart is an electrical organ. With every heart beat, millions of cells contract in unison to eject blood into the body. Such a simple pumping action would not be possible if this cellular harmony was not coordinated by the wonderfully orchestrated action of the sinus node, the atrioventricular (AV) node, and Purkinje system. We know this through the research born of cardiac electrophysiology, a clinical subspecialty that has experienced remarkable changes over the years.

Technically born with Einthoven's invention of the electrocardiogram, cardiac electrophysiology was for decades a mere diagnostic discipline of cardiologists adept at deciphering mechanisms of arrhythmia genesis by carefully scrutinizing minute details of the surface electrocardiogram.

This era of so-called "deductive reasoning" was best embodied by talents such as Pick and Langendorff, who could "see" complex cellular electrophysiological phenomena based on their subtle electrocardiographic fingerprints and translate physiology to the clinic. Thus, terms that stemmed from basic physiology research — such as concealed conduction, supernormality, dual AV node physiology, phase 3- and phase 4-block — made it into the clinical nomenclature by explaining certain rhythm disorders present in the electrocardiogram.

However, the lack of specific therapies reduced the relevance of these electrophysiological insights to little more than an intellectual curiosity and created an ongoing stigma among cardiologists that electrophysiologists speak a different language and see things others don't.

With the advent of invasive electrophysiological recordings in the 1960s, many speculations deduced from surface recordings were able to be tested and proven. Pacing maneuvers were designed to delineate the mechanisms of different tachycardias and to direct therapies, such as surgery for accessory pathways in the Wolff-Parkinson-White syndrome.

Catheters were designed to record electrical signals from the heart's different regions, and the cardiac catheterization laboratory became the true home of the electrophysiologist. But ultimately, for an effective therapy, patients underwent surgery based on information obtained in the laboratory.

Around the same time, pacemaker therapies for bradycardic disorders were developed and rapidly became part of the therapeutic arsenal, as did antiarrhythmic drugs that were developed from growing knowledge of ion channel physiology.

In the 1980s and early 1990s, newly developed catheter-based therapies allowed electrophysiologists to not only achieve an accurate mechanistic delineation of a patient's rhythm disorder but also to cure it. With the development of radiofrequency catheter ablation, our discipline became mature and indisputably established.

Most common arrhythmias such as atrioventricular nodal reentry, accessory pathway-medicated tachycardias, focal atrial tachycardias and ventricular tachycardias could be easily treated with a catheter-based procedure.

In the past decade, cardiac electrophysiology has undergone a revolutionary reshaping based on three aspects: the development of catheter-based therapies for atrial fibrillation; developments in pacemaker and defibrillator therapies; and the biomedical engineering advances in ancillary electrophysiological technologies.

As the most common sustained rhythm disorder in the general population, atrial fibrillation still continues to defy our full understanding, yet several techniques have been developed that can provide us with effective therapies for certain patients. As opposed to previous developments, catheter-based therapies for atrial fibrillation have lacked a solid mechanistic foundation.

Yet their success overshadows such an important flaw, and ablation of atrial fibrillation is rapidly occupying more of the electrophysiologist's time. The procedure, while technically challenging, has been facilitated by advances in ancillary technology such as three-dimensional mapping systems, image integration, and remote catheter navigation.

Cardiac electrophysiology has grown hand-in-hand with technical developments, something logical for a discipline that combines medicine with electricity, physics and engineering. These technical advances have lead to improvements in the feasibility and safety of the procedure and widespread performance among the most technologically advanced centers worldwide.

Since Mirowski's and Mower's invention of the defibrillator, a device that could recognize and instantaneously treat fatal tachyarrhythmias, electrophysiologists have had a tool to protect against sudden cardiac death. Devices used nowadays by electrophysiologists include pacemakers, defibrillators and cardiac resynchronization devices, providing therapies not only for brady- or tachycardiac rhythm disorders but also for heart failure. The future of these devices is likely to expand further to include hemodynamic monitoring, therapy guidance, and others.

Over the past several years, the Methodist DeBakey Heart Center has kept track of these advances, attracting a group of experienced electrophysiologists and acquiring state-of-the art equipment to provide sophisticated therapies for simple and complicated rhythm disorders. Ever mindful of progress, the center also formed the Heart Rhythm Treatment Services (HeaRTS), a specialized unit that incorporates the expertise of clinicians and researchers from several disciplines to advance the treatment of cardiac arrhythmias. In HeaRTS, Methodist-based electrophysiologists collaborate with arrhythmia experts in cardiac surgery, clinical cardiology and imaging to provide the best care for each individual patient. Our patients have access to a broad range of therapies, from complex arrhythmia ablation to cardiac resynchronization, lead extraction, and arrhythmia surgery. Our goal is to bridge the gap between disciplines and practices to achieve a uniform level of excellence.

The current issue of the JMDHC attests to this collaborative approach, with contributions on catheter ablation, device therapy for heart failure, imaging of dyssynchrony, antiarrhythmic drugs and arrhythmia surgery — covering all the relevant issues at the forefront of cardiac electrophysiology. We hope you enjoy reading this issue as much as we have enjoyed preparing it.