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Spotlight: Thierry Gillebert, MD, PhD, FESC

Involved in Promoting the Concept That Heart Function Is Governed by the Interplay of 3 Factors: Load, Myocardial Activation/Inactivation, and Degree of Synchrony

Thierry Gillebert, professor of medicine and cardiology, Ghent University, Ghent, Belgium, talks to Jennifer Taylor, BSc, MSc, MPhil.

In terms of his research career, the most important period for Thierry Gillebert, MD, PhD, FESC, professor of medicine and cardiology, Ghent University, Ghent, Belgium, came when he began to coach PhD students, and the most significant of their PhD theses have led to continuing research interactions.

"When You Come Off Pump and the Heart Is Not Working as It Should, You Have to Wait 10 to 15 Minutes Before Giving Drugs to Stimulate the Heart"

Professor Gillebert's first PhD student was Stefan G. De Hert, MD, who, this year, became professor of anaesthesiology at Ghent University after several years at the University of Amsterdam, Amsterdam, the Netherlands. The heart is empty during surgery and then refills again after surgery; they observed that, in the first 10 to 15 minutes after refilling, the return of strength is related to length-dependent regulation of both systole and diastole.[1] This had previously been shown in isolated cardiac muscle. Professor Gillebert says, "The consequence is that when you come off pump and the heart is not working as it should, you have to wait 10 to 15 minutes before giving drugs to stimulate the heart."

In a subsequent article, they systematically analysed the effect of load alterations (leg lifting) in >200 patients undergoing coronary artery bypass grafting in whom they elevated the legs, and showed a combined response of both systole and diastole and accordingly, contraction and relaxation.[2] Contraction and relaxation were impaired in patients who responded less well to leg elevation, and led to heart failure. This confirmed the close coupling of contraction and relaxation in the intact heart and was subsequently related in these patients to a failing Frank-Starling response.

"If Your Contractility Is No Good, Even 10 mm Hg Is Too Much Additional Blood Pressure, and Your Heart Will Fail"

Professor Gillebert's second PhD student was Adelino F. Leite-Moreira, MD, who is now a cardiac surgeon and professor of medicine and physiology at the University of Porto, Porto, Portugal. Leite-Moreira arrived in Belgium at the age of 25 years after receiving the top mark in Portugal's national examination after medical school. The top 2 students received a grant to spend 2 years abroad, and Leite-Moreira's boss asked Professor Gillebert to mentor him. Their first article together was published in *Circulation* in 1994,[3] and it described their conceptual framework on how load and load alterations may alter diastolic function. "It was a systematic study giving a complex answer to a simple problem," says Professor Gillebert. "If you increase blood pressure with 10 mm Hg, what is the response of your diastolic function? The answer is, it depends. It depends on your contractility. If your contractility is good, you will have no problems with diastolic function,

On other pages...

Spotlight: The Asklepios Project
Thierry Gillebert, MD, PhD, FESC, professor of medicine and cardiology at Ghent University, Ghent, Belgium, talks about the Asklepios Project, which was set up with his support by Ernst Rietzschel, MD, PhD, in 2002. It has become one of the main epidemiological projects on preclinical heart disease worldwide, and has spawned >50 articles, and will lead to more major articles over the next 20 years.
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Professor Gillebert with Professor Leite-Moreira, "the closest scientific collaborator I have abroad." They developed a conceptual framework on the effects of load alterations on diastolic function. They are presently extending their animal work to the clinical situation during cardiac surgery. Photograph courtesy of Mrs Maria Leite-Moreira.

but if your contractility is no good, even 10 mm Hg is too much, and your heart will fail." In a 1997 review article in *Circulation,* they used all the data available to show that diastolic function cannot be considered in isolation; understanding it requires looking carefully at systolic function as well because the two are interrelated.[4]

At that time, leaders in the field were saying that changes in myocardial relaxation were not important; it was the effect of filling pressures that mattered. That led Professors Gillebert and Leite-Moreira to investigate the effect of loads on the filling pressures. The study was conducted in rabbits in the very old physiology lab (at that time) at the University of Porto, and they showed that there was a logical reason behind each ventricle's response to increased pressure.[5] In each heart there was a given level of pressure that the heart could sustain without slowing of relaxation and without diastolic dysfunction (afterload reserve, afterload tolerance). They have recently expanded the work to human experiments. "I think we are done with the left ventricle. We have shown what we intended to show and what we started with 20 years ago," says Professor Gillebert. "The future will be in investigating the right ventricle, the famous unknown ventricle." He adds that the most enjoyable aspect of research is that all partners must become close because they work hard together to get the most out of the research. "Research partners became friends for life," he says.

"Dirk Brutsaert Had Quite Original Ideas on Cardiac Function Research, and I Loved Working There"

Professor Gillebert came to research relatively late in his career, at the age of 35, when he was married with 3 children. Born in 1950, he studied medicine at the University of Leuven, Leuven, Belgium, and received his MD in 1975. His father, who quit MD studies during World War II and went underground in the armed resistance, was particularly pleased with his career choice. Professor Gillebert went on to gain board certifications in renal disease (internal medicine) in 1980 and cardiology in 1983. He says, "I became interested in medical research when attending a Boerhaave postgraduate course on glomerulonephritis. Younger scientists presented their experimental work, and I was fascinated by the achievements and interactive discussions."

Professor Gillebert was especially interested in noninvasive imaging techniques, in particular echocardiography and cardiac Doppler. He had "the privilege to be trained in Doppler" by Professor Liv Hatle, MD, who was the main pioneer of this approach in the 1970s and the 1980s. She taught him how to perform cardiac Doppler with a "rigorous, scientific spirit."

A challenge throughout Professor Gillebert's career has been to make choices, because he has always had many interests. He enjoyed specialising in both renal disease and cardiology, but comments, "Why did I decide to switch to cardiology? Because it is more based on evidence, and you perform very precise measurements."

In 1983, he left Leuven to lead the echocardiographic lab at the University of Antwerp, Antwerp, Belgium, and there he was able to carry out research for the first time. A senior investigator's grant from the National Foundation of Scientific Research in Flanders, Belgium, from 1991 to 1994 enabled him to spend 50% of his time on research activities. His research has since been consistently funded by the foundation.

Starting with abnormal load occurring in patients with valvular heart diseases, Professor Gillebert became interested in the effects of load on both systolic and diastolic function, and his work on isolated papillary muscle led to a PhD thesis. The chief of physiology in Antwerp, Professor Dirk Brutsaert, MD, had a world reputation in cardiac mechanics, and was one of the first scientists to study diastole. His lab was a melting pot of influences from around the world, and it hosted scientists from the United States, Canada, and the United Kingdom. Professor Gillebert says, "Professor Brutsaert had quite original ideas on cardiac function research, and I loved working there. It was not easy, because it is never easy to work in scientific surroundings, but it was very stimulating."

Professor Gillebert analysed how load and load changes influence the process of myocardial relaxation,[6] and they developed the concept that the heart, in both systole and diastole, is governed by the interplay between 3 factors: load, myocardial activation/inactivation, and degree of synchrony.[7] "It was in that lab that for the first time people were interested in the coordination of contraction and relaxation of the heart," says Professor Gillebert.

Professor Gillebert is a member of the European Society of Cardiology's Global Scientific Activities Committee, which is chaired by European Society of Cardiology president Michel Komajda, MD. The Committee has organised educational meetings in which members have presented recent European Society of Cardiology guidelines and provided case report-based teaching to members of national cardiology societies in India in 2009 (left-hand photo, from left to right: Wolfram Doehner, MD, PhD; Professor Gillebert; Diana Katanec, MD, PhD; Alan Fraser, FRCP), in China in 2010 (right-hand photo, from left to right: a Chinese interpreter, Professor Gillebert, Professor Komajda, David Wood, MRCP), and in Saudi Arabia, Malaysia, Argentina, Brazil, and Mexico. Photographs courtesy of Professor Gillebert.

"This Is the Tough Way Science Progresses, and That Is What I Mainly Learned in Jim Covell's Lab"

Professor Brutsaert encouraged his fellows to generate contacts with people from other universities and other countries, and he urged them to spend some time abroad. As a result of his influence, Professor Gillebert secured a postgraduate research fellowship from the American Heart Association. Thus, in 1986, Professor Gillebert moved to California with his family to spend 1 year carrying out intact animal experiments in the lab of Professor Jim Covell, MD in the Cardiovascular Division at the University of California San Diego, La Jolla, CA. He says, "This was initially tough. What is a physician, husband, and father of 3 young children doing in an animal lab 7000 miles from home? But it proved to be an extraordinary experience for all of us." He adds, "From the moment you see what you are doing, what data you are gathering, and the potential impact of this work for clinical decision making and clinical insight, you become more and more enthusiastic about it."

Professor Gillebert worked closely with Professor Wilbur Lew, MD, now professor of medicine at the University of California San Diego. Professor Covell, the boss in the lab, "was a man who did not speak a lot, but when he talked, you listened," says Professor Gillebert. "He had a visionary perspective on cardiac mechanics, and most of the important evolutions of the past 30 years were already seeded in that physiology lab: for example, finite strain analysis, torsion, 3-dimensional deformation of cardiac muscle, and the importance of fibrosis."

Again Professor Gillebert found himself in stimulating surroundings, which produced "an amazing experience." The people in La Jolla were very strict scientists. They started with an experimental hypothesis, assessed the tools needed to answer it, performed the experiments, and then analysed the results to see whether the hypothesis was confirmed. Professor Gillebert says, "This is the tough way science progresses, and that is what I mainly learned in Jim Covell's lab."

In Professor Covell's lab, Professor Gillebert extended the work he had done on cat papillary muscle to the intact heart of a dog and translated his findings in isolated cardiac muscle to the intact circulation.[8] He also published a proof of concept article to show that inducing dysynchrony has a direct impact on diastolic function.[9]

"Now I Know Better How to Handle Hundreds of Students at a Time"

Professor Gillebert led the echocardiographic lab at the University of Antwerp from 1983 to 2001, and taught pathophysiology. With his background in segment length tracings in animals, strain and strain rate imaging in normal and diseased hearts have been familiar to him for >3 decades. He was appointed professor of medicine and cardiology at the University of Ghent in 2001, and that same year he became chief of cardiology at Ghent University Hospital, a post he held until 2008.

Teaching and training have always been an important focus in his career, and this part of the profession has given him the most satisfaction. As chief of cardiology in Ghent, he was in charge of training in cardiology, and currently he is responsible for the graduate teaching of cardiovascular diseases at the University of Ghent.

Although it is rewarding, teaching is neverending, to be started again for every new cohort of students or fellows. Professor Gillebert says, "I am surprised that this is as enjoyable now as in the first years, maybe even more, because teaching and training are tasks with a long learning curve.

*Professor Gillebert has enjoyed a diverse career, which has allowed him to interact with numerous people from different backgrounds, nationalities, and ethnicities. An academic and scientific career is often demanding and requires long working days and short weekends. He says, "To be proficient in this job, you have to make sure that you have the continuous support of your wife and family. He was raised with the adagium, "*Mens sana in corpore sano*" ("A healthy mind in a healthy body"), and he has always cared for a healthy lifestyle. He bikes to and from the university on working days, works in the garden, and enjoys biking in the hills on weekend days. The summer holidays are mostly spent hiking in the Swiss Alps. Photographs courtesy of Frederic Gillebert.*

With more experience, you become a better teacher. When I started giving classes I must have been very clumsy. Now, I know better how to handle hundreds of students at a time, what works, what doesn't work, and how to keep their attention for up to 90 minutes. You have to be very well prepared every time, and it is always fun to do it."

"In This System Where You Have to Work to Get All These Certifications, the Innovation and Research Potential Are Lost"

Since 2009, Professor Gillebert has become more active in the European Society of Cardiology. As a member of the Committee for Education in Cardiology, chaired by Professor Otto Smiseth, MD, he is leading a task force responsible for the Update Programme, which addresses postgraduate education in Europe, and for the Implementation of Practice Guidelines. Direct sponsorship of physicians by pharmaceutical or device companies for attending meetings and congresses is expected to decrease in the next few years, so the profession needs to organise its own postgraduate teaching.

In February 2011, he was asked to chair a task force to prepare a new version of the "Core Curriculum of the Cardiologist." He says, "My personal view is that it should not be an exhaustive summary of what could be learned or a summation of skills and certifications mandatory to obtain, but rather a flexible framework allowing for individual interpretation and the combination of research and clinical training in a reasonable time frame." Professor Gillebert believes that today's trend for cardiologists to gain certification in different specialties, including echocardiography, interventional procedures, and electrophysiology, will not necessarily improve the quality of training. He prefers a flexible system in which cardiologists can decide to interrupt their training to learn more on a certain topic. He explains, "In this system where you have to work to get all these certifications, the innovation and research potential are lost. This is a threat."

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