



Electrophysiology
and heart modeling institute



“THE LIRYC BEAT”

NEWSLETTER N° 9 /// 2ND HALF 2019

EDITORIAL

RESEARCH, INNOVATION, CARE AND TRAINING: ENRICHED PROGRAMS!



By **Olivier Bernus**,
Scientific Director
of Liryc

At the dawn of a new strategic stage for 2020 to 2025, Liryc’s research, innovation, care and training programs are further being consolidated.

In terms of research, the success of the transatlantic Rhythm research network, together with the start of the Chair on Ventricular Fibrillation, represent important advances in our program, which will undoubtedly contribute to a better understanding of sudden cardiac death.

In terms of innovation and care, there is an ongoing drive for improvement of diagnostic and therapeutic tools, along with pioneering partnerships in the field of tele monitoring, to ensure better patient care.

Finally, the training program capitalizes on the success of the first International Summer School to develop its academic and professional training activities.

These last 6 months have thus been extremely productive, also in terms of fundraising activities, and rich in collaborations involving our multidisciplinary teams at the interface between fundamental and clinical research.

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THE RHYTHM TRANSATLANTIC NETWORK RENEWED FOR ANOTHER 2 YEARS!



Experts from the transatlantic Rhythm Network met on May 7th in San Francisco for its mid-term evaluation.

The RHYTHM network, supported by the Leducq Foundation for a period of 5 years, brings together international experts from 6 research teams. It is carrying out the first comprehensive study on abnormalities in repolarization*, and the mechanisms of sudden cardiac death.

Working simultaneously from the molecule to the patient, the network aims to create new tools to characterize abnormal repolarization, the mechanisms of which are still poorly understood today.

The main advances of the network have been already published in more than 50 scientific articles. They highlight the heterogeneous mechanisms of sudden cardiac death, requiring a personalized diagnostic and therapeutic approach. The next challenge will

be to be able to identify individuals at risk of sudden cardiac death, through the development of innovative tools (including non-invasive electrocardiography, modeling, and imaging).

The evaluation confirmed the commitment of the Leducq Foundation to the second part of the program, pointing out that "advances in research will be a lasting contribution to the field of electrophysiology". The foundation is pleased to have contributed, through this network, by building scientific collaborations that transcend national borders and training young researchers in an international environment.

* Repolarization denotes the return to the electrical rest phase of the cells at the end of the cardiac cycle.

HRS* 2019 CONFERENCE



67 SCIENTIFIC COMMUNICATIONS (ABSTRACTS)

7 INVITED ORAL PRESENTATIONS

51 POSTERS PRESENTED

Mélèze Hocini, Deputy Director of Liryc was also a member of the scientific committee of the conference.

* Heart Rhythm Society : Largest US Conference of Cardiac Electrophysiology

→ FOCUS ON

RESEARCH MANAGEMENT

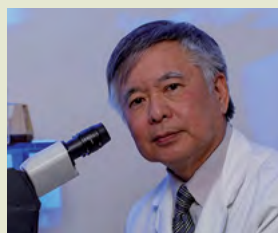


Liryc's research teams have been restructured into **four major areas** for further clarity: Modeling, Pathophysiology, Healthcare Technology and Clinic.

→ HIGHLIGHTS



LIRYC WELCOMES PROFESSOR PENG-SHENG CHEN from the Krannert Institute of Cardiology in the United States to lead a new Research Chair in Ventricular Fibrillation.





A NEW PARTNERSHIP TO IMPROVE TELEMONITORING FOR HEART FAILURE PATIENTS

Liryc signed last July a partnership agreement with Careline Solutions. The goal is to develop an algorithm to predict cardiac decompensation* from patient's home telemonitoring data.

Bordeaux-based Careline Solutions is developing and marketing a global telemonitoring platform for healthcare professionals treating chronic diseases, such as heart failure. This platform allows remote monitoring of heart rate, blood pressure and quality of life through the use of home-connected objects. It also enables the automated import of biological assessment reports, and soon the integration of data collected by pacemakers and implantable defibrillators.

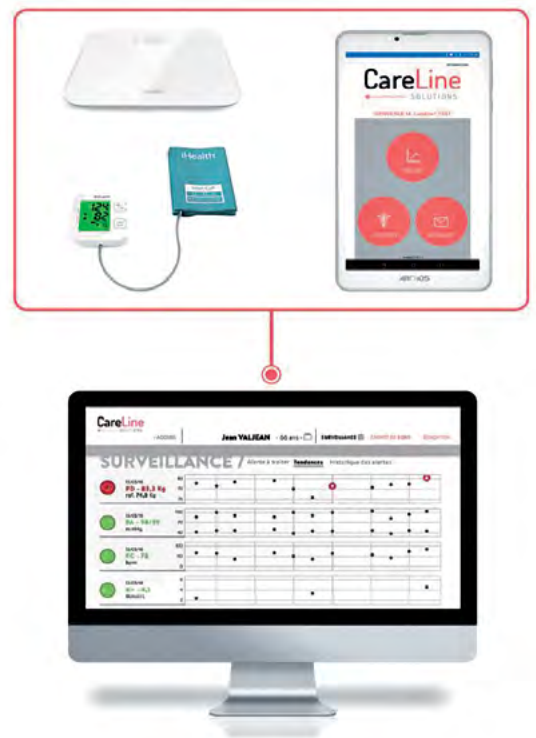
The data collected on a same platform allow health professionals to detect earlier destabilization of the patient's condition, and intervene to avoid or reduce the length of hospitalization, except in the case of cardiac decompensations, which are life-

threatening and require urgent treatment.

The challenge of the research partnership between Liryc and Careline Solutions is to identify markers, predictor scenarios of cardiac decompensation on the basis of telemonitoring data.

This partnership is also an opportunity for Liryc to complete its research program on the management of heart failure through an epidemiological approach with big data.

* **Cardiac decompensation:** rupture of a balance between the capacities of a weakened heart and the needs of the organism, leading to a generalized dysfunction of the organs (resulting into a fatigue, a breathlessness, a retention of water and sometimes leading to death).



→ CONGRATULATIONS!



The CERTIS THERAPEUTICS start-up project led by Stéphane Chemouny and Bruno Quesson, head of Liryc's imaging team, received the I-lab 2019 Grand Prix.

The start-up develops pioneering solutions for thermotherapy.

→ FOCUS ON

The drug developed by OP2 Drugs, spin-off and partner of Liryc, has successfully completed its phase 1 trial!

Their experimental drug, OP2113, will now enter an innovative phase 2 clinical in silico trial to demonstrate its efficacy in myocardial infarction.

This is a world first in collaboration with the FDA (Food and Drug Administration), allowing OP2 to start a phase 3 by 2020, the last necessary step before a market launch in the United States in 2023.





→ NEWS

About clinical research

New therapeutic approaches to treat atrial fibrillation are being implemented by Liryç's physicians to improve the outcome and safety of atrial fibrillation surgery.



Pulsed Electric Field ablation, a non-thermal energy, is among the most promising approaches.

It is a catheter endocardial ablation technique that uses high voltage electrical micro-shocks to open pores at the nanoscale in cell membranes. Pulsed Electric Fields ablation creates specific lesions in the myocardial tissue, which is particularly sensitive to this energy, without risk of lesion in neighboring organs.

Two multicenter clinical studies are evaluating and validating this technique in atrial fibrillation.

M3C - REFERENCE CENTER FOR COMPLEX CONGENITAL HEART DISORDERS



Congenital heart defects affect one in 100 newborns, but their great diversity and complexity make them rare diseases. Certified in 2017, the M3C Reference Center - Complex Congenital Cardiac Malformations - coordinates the medical and surgical management of these diseases in France.

The Congenital Cardiovascular Diseases Department of Prof. Jean-Benoît Thambo provides governance for the network, along with the coordinating health care facility Necker in Paris and two other constituent hospitals (HEGP-Paris and HML-Le Plessis Robinson). In total, there are 21 centers playing a role of multidisciplinary expertise, from prenatal to adult diagnosis, based on a state-of-the-art technical platform to enable the best management of patients.

The Bordeaux center is working on several key missions:
- Training, both initial and continuous

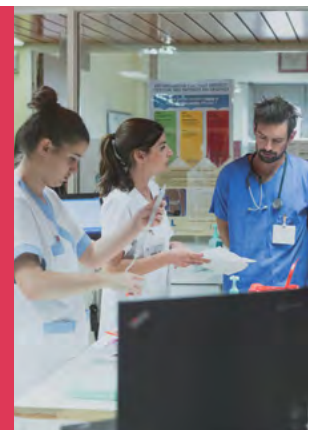
education, for health professionals but also patients and families, in collaboration with patient associations to improve care and conditions of hospitalization.
- Fundamental and clinical research to better understand and identify the mechanisms behind these pathologies.
- Improving patient care by developing access to the network's expertise with the establishment of international collaboration.

The network is currently the largest medical and surgical center for congenital and pediatric cardiology in the European community.

→ CONGRATULATIONS!

The cardiac electrophysiology teams of Liryç and of the Bordeaux University Hospital are at the top of "Le Point" ranking with a score of 19.77 / 20!

This ranking includes the 350 hospitals in France that manage heart rhythm disorders by pacemaker, defibrillator or ablation. This reward recognizes their commitment to ensure better patient care, covering everything from prevention to the most innovative therapies.





→ NEWS



AS PART OF THE COLLABORATION BETWEEN LIRYC AND THE MAYO CLINIC (ROCHESTER, MINNESOTA),

clinicians of the institute took part of the Complex Ablation and Device tracing Summit in Atlanta from September 25th to 28th, 2019.

This conference was an opportunity to strengthen Liryc's education programs and to develop projects for international expertise transfer, including a possible edition in Bordeaux in the coming years.



A SUCCESSFULL 1ST SUMMER SCHOOL

Liryc organized from July 8th to 12th the first edition of its Summer School on Cardiac Electrophysiology, in partnership with the University of Bordeaux.

This ongoing training is based both on unique research platforms and on the multidisciplinary expertise of the scientific teams (from cell to organ, from imaging to modeling).

“*The Summer School is a great opportunity to learn more about research advances to gain a better understanding of my work as a clinician.*”

42 international students, doctors and researchers, were involved in this program at Liryc. During these 5 days of training, they attended intensive courses combining theoretical and practical session and live cases provided by the leading international experts in cardiac electrophysiology.

The Summer School is a unique opportunity to bridge the gap between the preclinical and the clinical approach.

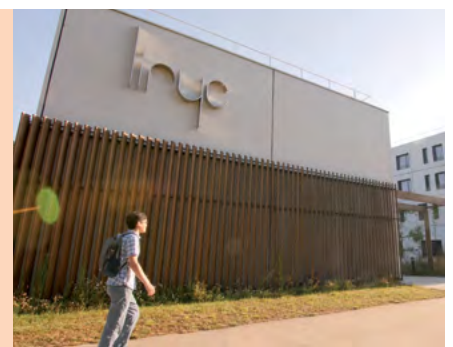
Being the first stage of the institute's education activity, the Summer School is part of a broader agenda of university, academic and professional training. It will now be an annual event.

Adam Dennis,
Summer School Student, Internal Cardiology, London

→ RENDEZ-VOUS

THE UNIVERSITY DEGREE FOR IMPLANTABLE CARDIAC DEVICES STARTS ON OCTOBER 7TH AT LIRYC.

This training is dedicated to teaching the practical and theoretical bases of the operation of implantable devices and the telemonitoring of these devices. It is intended for health professionals.





→ NEWS



Michel Vounatsos, global CEO of Biogen, was elected Chairman of the Liryc Management Board on May 3rd for a 3-year term.

Alumni of the University of Bordeaux, he has worked for 25 years as a corporate executive in the largest pharmaceutical and biotech companies, in mature and emerging markets.

« Passionate about innovation, I find within Liryc the same determination to advance scientific and medical research.»

→ EVENT

Liryc organized in June the 1st edition of its Charity month.

This month, dedicated to increase public awareness about heart rhythm diseases, raised more than €10,000. Thank you all for your donations!

FUNDRAISING: “ADVANCING SCIENCE FOR LIFE”



[From left to right- top to bottom] In the presence of J. Belcastro, Bordeaux University Hospital, M. Tunon de Lara, University of Bordeaux, A. Rousset, Nouvelle-Aquitaine Council, P. Jaïs, Liryc, E. Thépaut et A. De Rosa, Boston Scientific, C. Quercia, Fondation of Bordeaux University.

On September 3rd, Liryc signed a fundraising agreement with the Global Medical Technologies Group Boston Scientific, for a support of 1 million euros over 5 years.

Boston Scientific and the Liryc Institute share a common commitment to develop innovative medical solutions to improve the health of patients with heart rhythm diseases worldwide.

This partnership, led by Professor Pierre Jaïs, Deputy Director of Liryc, is part of the continuity of scientific and industrial collaborations with the company. It also demonstrates the institute's desire to lead public-private partnerships to the

benefit of scientific excellence and medical innovation.

The partnership provides a one million euros commitment for a period of 5 years.

This donation will be invested to support both research and training activities in the field of cardiac arrhythmias. It will contribute in particular to the financing of Liryc's international scientific Chairs of excellence for atrial fibrillation and cardiac imaging or to the financing of innovative actions for medical training such as the development of simulators or academic programs.

“ At Boston Scientific we are committed to advancing science for life and by partnering with the Liryc Institute, our aim is to support research and development of vital importance and contribute to ongoing studies into the electrical problems of the heart to ultimately save people's lives. ”

Angelo De Rosa,
Vice President
Rhythm
Management, Boston
Scientific

→ FOCUS ON

Liryc welcomed the international jury of the National Agency for Research on June 24th as part of the evaluation of the Program of Future Investment PIA1, which had led to the creation of the institute.

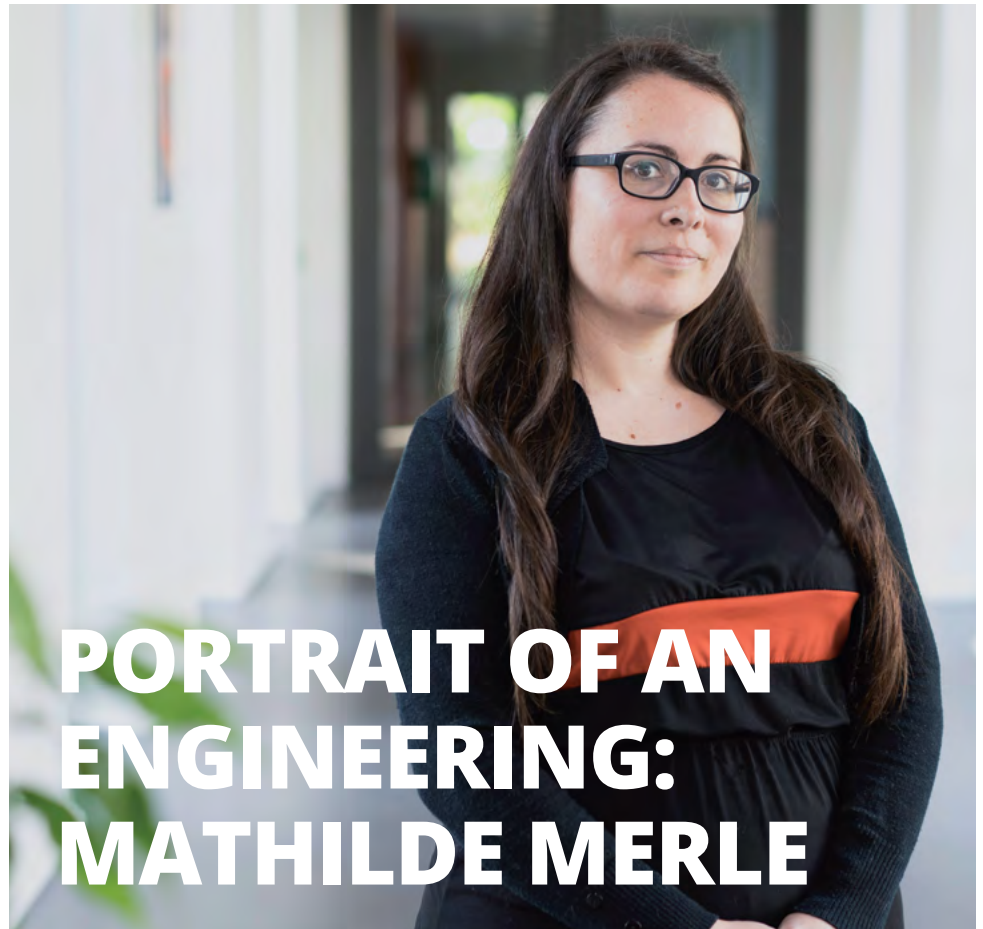




CONGRATULATIONS!

- **Michel Haïssaguerre** received the Luigi Luciani Electrophysiology Award in Ascoli, Italy on June 22nd to reward his scientific merits.
- **Pierre Jais** was awarded the Eli S. Gang Most Innovative Abstract Award at the Heart Rhythm Society International Conference in San Francisco on May 11th.
- **Jason Bayer** and **Zakaria Jalal** received an award from the Rotary District West Bordeaux on June 13th.
- **Pierre Bour** received an award from the Interventional MR study group at the 27th Annual ISMRM Conference in Montreal.
- **Yingjing Feng** received the Rosanna Degani Young Investigator Award at the Computing in Cardiology 2019 conference in Singapore.

Congratulations to all the researchers who also received a grant for their research projects.



PORTRAIT OF AN ENGINEERING: MATHILDE MERLE

Interview with Mathilde Merle, engineer in the MUSIC team - at Liryc.

Mathilde, what is your job at Liryc?

I am a computer engineer specializing in medical imaging.

When did you join the institute?

I joined the team in 2011, before the creation of the institute, at the very beginning of the Liryc project. Recruited by Bruno Quesson, imaging team leader, I was the first engineer at Liryc.

What does it mean to be a computer engineer at Liryc?

I am working on a research project in the field of "Multimodal Data Science" which is developing a suite of image processing software, called MUSIC.

We combine images from various sources (MRI, CT, ECG), algorithms and visualization tools to improve the knowledge of the structural substrate causing arrhythmias.

The results can be used for diagnosis and treatment of heart rhythm diseases or also for basic research. On the treatment side, we work with a consortium of hospitals that provides real-time anonymized patient data. These data are software processed and sent back then to surgeons in those hospitals with indications to adapt appropriately the treatment to their patients.

What is your biggest pride?

A few years ago, a clinician we worked with sent an e-mail to thank our team. He pointed out that the tools we developed are saving lives on a daily basis. Being focused on computer coding every day, we do not realize this at all. I was very moved by this recognition of our work.

On a completely different topic, as an engineer of the MUSIC project, do you prefer classical music or metal?

Well, both!



A LOOK BACK AT THE KEY EVENTS

→ MARCH 9TH

Reference Center for Hereditary Rhythmic Diseases **Patient Day** at Liryc.



→ FEBRUARY 13TH & 14TH

2nd edition at Liryc of the live case conference Alliance, in partnership with Boston Scientific, with a hundred participants from Europe.

→ JUNE 6TH & 7TH

FIMH Conference - Functional Imaging and Modeling of the Heart - in Bordeaux.



→ JULY 3RD

Liryc Symposium with the world's leading experts to present recent research results and the development of innovative techniques.

→ JUNE 21ST

Participation in the **1st edition of Stimuprat Cardiology MasterClass** at the Palais des Congrès in Bordeaux.

→ JULY 8TH TO 12TH

1st édition of the Summer School on Cardiac Electrophysiology which welcomed 42 international students.



AGENDA



- **September 27th**
Researchers European Night, in Cap Sciences, Bordeaux
- **September 28th**
Open House "Research in cardiac electrophysiology: let's talk about sport!>
- **October 7th**
Launch of the University Degree in Telemonitoring of Cardiac Implantable Devices
- **October 14th & 15th**
Atrial Signals Conference at La cité mondiale in Bordeaux
- **December 2nd**
Innovation and Awareness Day with the Pessac Business Club at Liryc



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