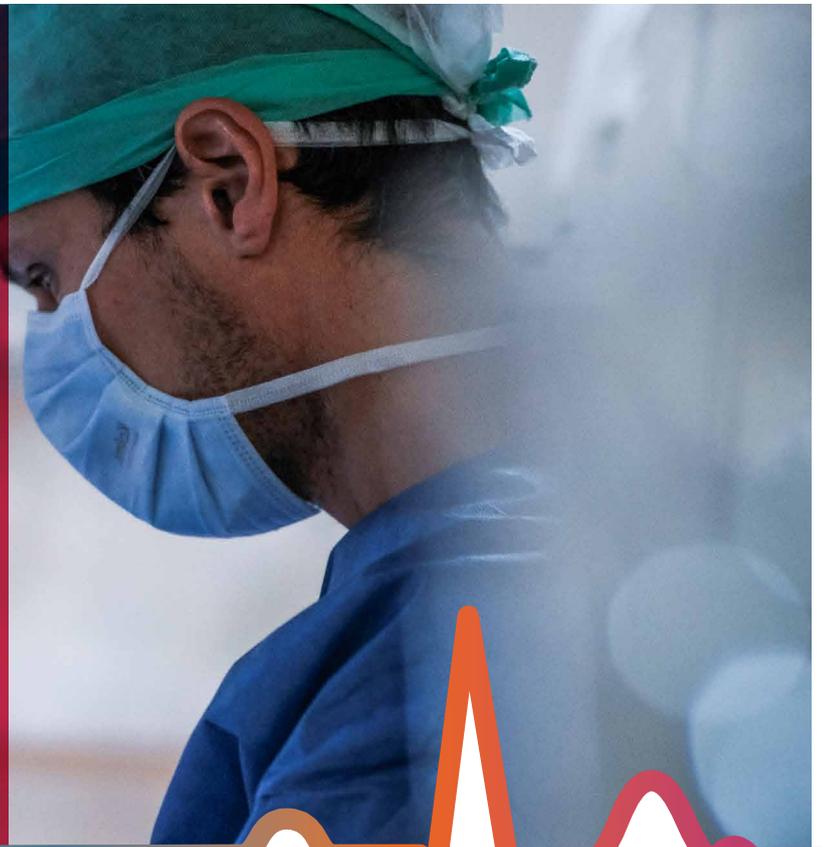




Electrophysiology and heart modeling institute

# THE LIRYC BEAT

NEWSLETTER N° 12 /// 1<sup>ST</sup> HALF 2021



EDITORIAL

## RESEARCH & INNOVATION: EXCELLENCE TO BENEFIT PATIENTS.



By **Pierre Jaïs**,  
Chief Executive Officer of LiryC

As the new Chief Executive Officer of the institute, I am pleased to lead LiryC to address the major cardiac challenges in electrophysiology while keeping in mind our initial goal : bringing major advances in medical technologies to the hospital, to improve patient care.

My concern is to pursue the strategic orientations adopted in research, innovation, care and education, focusing on the scientific excellence of our teams that are recognized worldwide.

This appointment is an opportunity to foster LiryC's multidisciplinary approach, enhancing collaborations within the institute. I feel strongly about the importance of a cross-disciplinary research for the enrichment of LiryC's ecosystem to make a real difference in patient care. This is the whole point of the European projects and international collaborations that you can read in the following pages of this newsletter. I also want to boost synergies to respond to the urgency of cardiac rhythm diseases. Moreover, these collaborations are an opportunity for researchers to obtain grants for their ambitious projects and to be published in the best scientific journals.

Innovation, both in terms of practices and approaches, will allow us to adress major medical issues. We have already defined an ambitious roadmap for the future with the artificial intelligence and modeling tools, combining the expertise of our teams, in order to accelerate research and patient care.

Finally, I wish to focus on digitalization to be more flexible and to share knowledge in the current health context, which requires us to rethink our practice every day.

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# 20 MILLION EUROS FROM EUROPE TO FOSTER CARDIAC RESEARCH

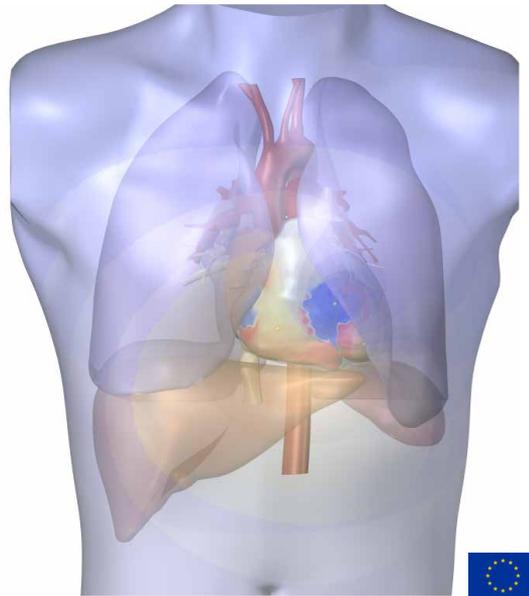
The European Commission has selected three scientific projects involving the Liryc teams as part of its Horizon 2020 program. These new grants are opening up new opportunities in terms of innovation, by supporting collaborative and interdisciplinary research to address medical challenges.

## BEAT AF : a revolutionary treatment for atrial fibrillation

The BEAT AF project coordinated by Pierre Jais, brings together 9 leading European clinical centers with the aim of demonstrating the efficacy of Pulsed Electric Field, a new ablation method, supposedly more effective and safer than radio-frequency, the reference treatment to date. It will also help to reduce recurrences, which are common. This project has received 6 million euros funding from the EU's Horizon 2020 program.

## MICROCARD : a more sophisticated cardiac modeling tool

The new European Project MICROCARD led by the IHU Liryc and coordinated by Mark Potse will develop a software able to simulate the electrical activity of an entire heart, cell by cell, on new ultra-powerful "Exascale"<sup>1</sup> supercomputers. This project, involving multidisciplinary experts from 10 partner centers received 6 million euros funding from the EU.



## SIMCARDIOTEST : 21st century in-silico<sup>2</sup> studies

This project, coordinated by Maxime Sermesant, is funded by the European Commission for 8 million euros. It will provide new insight into designing new predictive tools in cardiac pathologies. It brings together 10 international partners to develop a standardized and secure platform where in-silico clinical trials run seamlessly in order to test drugs and medical devices.

<sup>1</sup>Exascale computers perform one billion calculations per second.

<sup>2</sup>Research or a test performed using numerical calculations or computer models.



**70** is the number of human hearts studied since the CADeNCE research program based on organ donation was launched in March 2015.

6 year after the launch of this successful program, the multi-disciplinary teams met to review the results and challenges ahead during a workshop on March 26.

*The program is a great opportunity to study human cardiac pathologies with advanced mapping and high-resolution imaging tools that remain currently unavailable in the clinic.*

**Pr Olivier Bernus**, Scientific Director of the IHU LIRYC

## → HIGHLIGHTS

### Two new international experts to guide Liryc's major scientific orientations



Liryc is honoured to host two new distinguished members on its Scientific Advisory Board, joining Pr. Barbara Casadei and Katja Zeppenfeld.

**Pr Srijoy Mahapatra** will provide his expertise on new cardiac technologies. Professor of Medicine at the University of Minesota and Associate Dean for Clinical Innovation, he has held several strategic positions over the years within major international industrial groups and startups.



**Pr Dobromir Dobrev** will share his expertise on molecular mechanisms of cardiac arrhythmias. He is director of the institute for Pharmacology at the University of Duisburg-Essen in Germany.



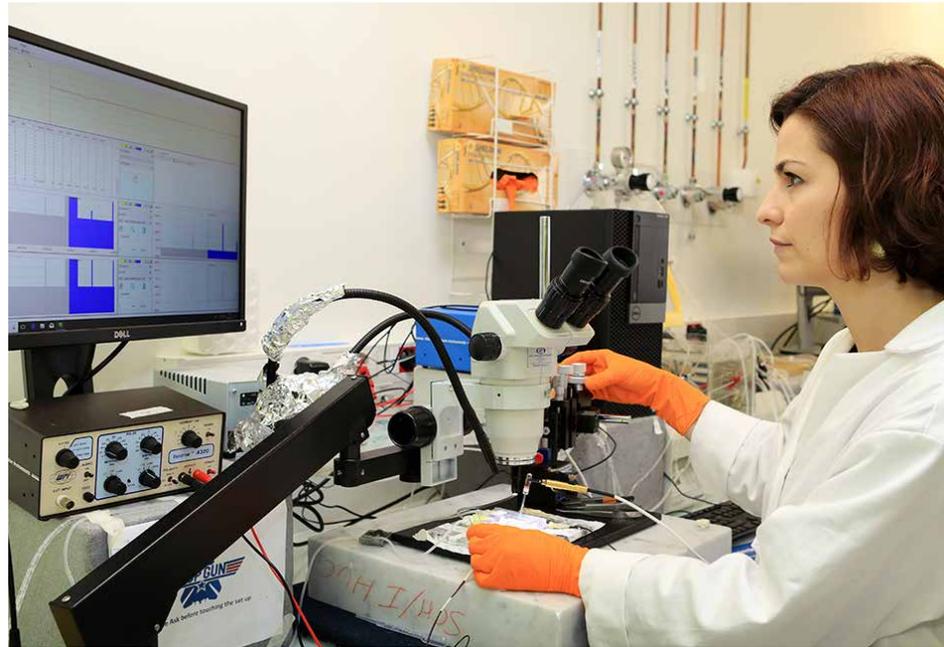


## → HIGHLIGHTS

### Optimizing the ablation procedures : from the heart to the prostate

Dr. Bruno Quesson's imaging team has demonstrated the effectiveness of temperature mapping in cardiac MRI during radiofrequency ablation procedures in predicting the size of radiofrequency catheter-induced lesions, helping in improving both the efficacy and safety of treatments. This technique, which was originally developed for the heart, may benefit other organs.

With this purpose, the Liryc teams are now working on the ThermoPro research protocol, coordinated by Dr. Clément Marcelin of the Bordeaux University Hospital. The protocol aims at evaluating this imaging method in order to develop laser ablation of localized prostate tumors under MRI guidance.



## TIC EPAC: A HOPE FOR NEW THERAPIES, FROM HEART FAILURE TO ATRIAL FIBRILLATION

**The IHU Liryc provides its expertise to support and participate in the TIC EPAC project coordinated by Dr. Frank Lezoualc'h, Research Director at INSERM Unit 1048 in Toulouse, in collaboration with INSERM Transfert and SATT Toulouse Tech Transfert. The Institute is involved in transferring the first results on heart failure into atrial fibrillation, paving the way for new therapies.**

The team led by Dr. Frank Lezoualc'h has developed a new promising molecule for the treatment of heart failure. Their work first demonstrated the involvement of the EPAC protein (Exchange Protein directly Activated by cAMP) in the disease. Toulouse researchers then identified a pharmacological inhibitor of EPAC1 called AM-001 and demonstrated its therapeutic

potential in several experimental models of heart failure. This compound is protected by a patent.

The international recognition of Liryc in preclinical models of atrial fibrillation and heart failure has aroused the interest of Dr. Lezoualc'h. This is how Dr. Fabien Brette, also interested in the EPAC protein's involvement in arrhythmias, was associated to the project. With the support of Dr Alice Récalde, the team conducts experiments to validate the inhibition of the EPAC protein with the AM-001 compound in atrial fibrillation. This project is also funded by the French National Research Agency (ANR). Another example of the importance of multidisciplinary scientific collaboration in order to develop new therapies.

## → A LOOK BACK AT

### AI : a new method to improve remote cardiac monitoring



Different sources of noises, such as artifacts due to movements, extra cardiac muscular activity or interferences due electrical devices, can modify the electrocardiogram (ECG) and affect the quality of cardiac monitoring.

The cardiac pacing team at the Bordeaux University Hospital launched a machine learning challenge to the liryc community for which 4 teams accepted to participate. The objective was to use clinical telecardiology databases to propose an artificial intelligence algorithm that could identify relevant signals and differentiate them from noise. After careful analysis, the researchers Narimane Gassa and Nejib Zemzemi presented the algorithm with the lowest error rate of under 1%. Congratulations !



# DATA MANAGEMENT: OPTIMIZING CARE AND RESEARCH

**The management of clinical data is essential for both research and care, and it requires tools to optimize data collection and manage the use of such data. In this context, clinical team of the Bordeaux University Hospital led by Dr Josselin Duchateau have set up the "DARE" project.**

Medical examination results, clinical data... every year, e-health data are increasing considerably. Now, the challenge is to collect, store and analyze all this in information coming from heterogeneous sources. The DARE project has been developed to address this challenge with a double aim.



## Optimizing patient management

Better data management will allow patients to have access to emerging medical technologies resulting from research (AI, automatic analysis), but also to improve patient follow-up (automated re-convocations, remote monitoring, practice evaluation, etc.).

## Improving the quality of scientific input

The generated cardiac data will be analyzed and registered so that Liryc researchers can access them for research projects.

The teams are working on a first phase of conversion and compilation of data to make them accessible after pseudonymization in the next 6 to 12 months. This project has a regional and national deployment objective. The availability of these data will enrich research projects and allow progress in comprehension benefiting the patient directly at the same time.

*<sup>1</sup>Data hub and REsearch network in cardiology*

### → FOCUS ON

#### **"Recovered" cardiac arrest : taking care of patients and their families**

Sudden cardiac death often affects people with no known cardiac risk factor. This reinforces the trauma and stress for patients rescued after an episode of ventricular fibrillation.

In this respect, the Reference Center for Hereditary Rhythmic Diseases and Prevention of Sudden Death is launching this spring a two-year study to investigate post-traumatic stress in these patients. The aim is to evaluate the stress of patients and one of their relatives through a semi-directive interview (one week after the episode, and then 3 months later).



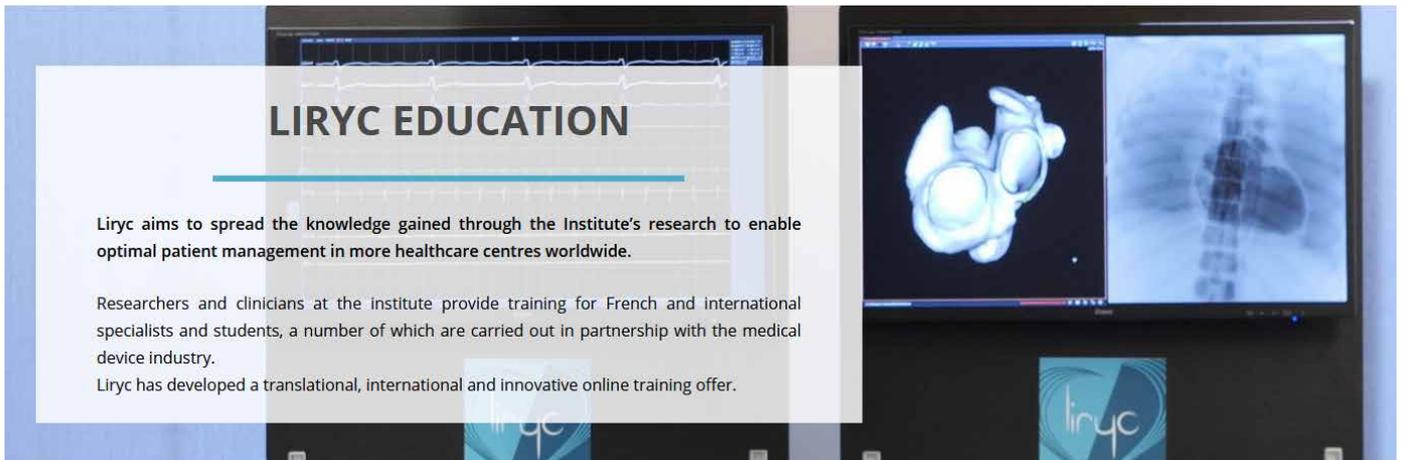
Then the teams will be able to propose adapted psychotherapeutic tools to better accompany the patients and their relatives in this traumatic situation.

This study is coordinated by Adeline Nogala who is a clinical psychologist. It has been funded by the French Cardiology Society.

### → UPDATE ON COVID-19 PROJECTS

The **ASCCOVID19** study that looks at the direct consequences of the coronavirus on the heart of high-level athletes has just completed the inclusion phase. This study has required the recruitment of more than 800 athletes who underwent clinical examination, electrocardiographic, and a cardiac MRI scan in more than 130 subjects. The results will be analyzed in detail and communicated in the near future. This will allow for a better understanding of the direct consequences of the infection on the athlete's heart, as well as the formulation of recommendations on the recovery of intense sports activity after the infection, for both professional and non-professional athletes.

The **COVID-CMR** study, which evaluates the incidence of silent myocardial scars by high-resolution MRI after COVID-19 and the associated risk of arrhythmia, is still in progress. The study has reached the halfway stage of inclusions. We can expect the study to be completed before the summer and results to be published in the fall.



## A NEW DIGITAL LIRYC-EDUCATION PLATFORM

**E-learning, remote training, personalized content accessible anywhere at any time... The COVID-19 crisis has been an opportunity for Liryc to accelerate the transition to digital tools, which are more flexible, accessible and up to date. This is why the institute has launched a new e-learning platform in April. Its mission is to facilitate and accelerate scientific and medical knowledge sharing.**

This E-learning platform will include a wide range of training contents related to electrophysiology, and more specifically to ablation and cardiac stimulation. This platform will also include all the training programs of the Institute. It takes into consideration the increasing need to provide more video content, including case studies, live interventions, transmissions of meetings or more classical teaching contents, including courses, bibliographies and publications.

### A step towards personalized training

The platform also allows for a personalized training approach, with access to profile-based contents, which are organized in modules for a step-by-step follow-up of the different courses. The modules can be self-managed

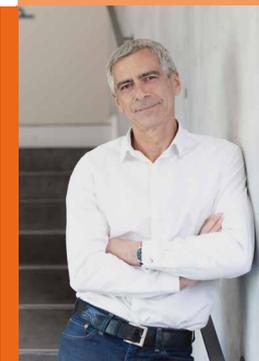
and followed via a dashboard that records the participant's progress, regardless of the type of training, whether it is continuing professional education or academic degree courses.

### An interactive tool

In a health context that has disturbed interpersonal relationships, this platform also helps to create interaction with the teaching team and other students thanks to chat modules and forums. It is a great way for the upcoming generation of researchers and clinicians in electrophysiology to multiply the opportunities for engaging with world-class experts.



### A new Training & Education Director



In February, Prof. Pierre Dos Santos succeeded Prof. Pierre Bordachar as Training & Education Director of the Institute.

Prof. Pierre Dos Santos is a cardiologist, professor of physiology and

head of the cardiology department specialized in the treatment of

heart failure at the Bordeaux University Hospital. Former vice-president of the University of Bordeaux in charge of research, he now puts his expertise at the service of Liryc by building international training programs of excellence.

He wishes to develop a teaching program designed enhancing Liryc's scientific excellence and interdisciplinary approach to train future cardiac electrophysiology experts. A first challenge will be to involve the whole Liryc community as well as the industrial partners in this training project.



*With the support of a dedicated teaching team, I want to develop an international training program of excellence, in which interdisciplinarity is the cornerstone of a strong scientific culture. My personal challenge would be to see that within five years, any student or professional who wants to learn about electrophysiology knows that this is happening at Liryc.*

**Pr Pierre Dos Santos**  
Training & Education Director of the IHU LIRYC .





## → HIGHLIGHTS - LIRYC'S TEAMS'S INITIATIVES



Each month, an Artificial Intelligence (AI) working group meets virtually, led by the Multimodal Data Science researcher Dr Marta Nunez Garcia.

AI at Liryc is a transversal and important theme that involves several research and clinical teams. The purpose of this group is to discuss ideas and tools to improve practices and facilitate the cooperation for future projects.

## A NEW CEO FOR LIRYC

Professor Pierre Jaïs has been appointed Chief Executive Director of the IHU Liryc by the Administrative Board on February 1st 2021, after an international recruitment procedure.



As Chief Executive Director of the IHU Liryc for a 4-year term, he will lead the institute in its strategic objectives and challenges, both in terms of the scientific and clinical aspects of cardiac electrophysiology as well as the business plan of the institute.

Driven by his passion for technological innovation and cardiac electrophysiology, Prof. Pierre Jaïs is an internationally recognized expert. He wishes to strengthen the multidisciplinary and translational aspect of the Institute.

**He succeeds Professor Michel Haïssaguerre, who founded the institute and will continue to be involved in the scientific life of Liryc, and more generally as Honorary Chairman of the institute.**

## → FUNDRAISING

### Two important virtual meetings for Liryc's fundraising's activities

On March 10, Liryc hosted a plenary session of the **ETI Club of Nouvelle-Aquitaine**. This was an opportunity to introduce the institute and its projects to an audience of 90 regional business leaders. It paves the way to future collaboration and fundraising opportunities. Welcoming the Club at Liryc illustrates the Institute's desire to engage with regional companies.

Liryc's fundraising campaign is also running internationally. On March 18, in a remote session, the institute gave a **virtual visit** tour of its laboratories and platforms to 50 Americans gathered around Mark and Laura Bailey, donors of the institute. The event was an opportunity to raise awareness about heart rhythm disorders and about Liryc's ambition to develop new diagnostic and therapeutic solutions. Many participants became donors of Liryc after this initiative.

*I am very proud to be part of the dynamic initiative initiated by the ETI Club and to become a sponsor of Liryc.*

Jean-Paul Calès,  
CEO of Cap Ingelec

*Opening the institute, sharing our projects, and meeting the public is essential to us. On its own scale, this event allowed us to achieve those goals.*

Dr Méléze Hocini,  
Deputy Director of Liryc



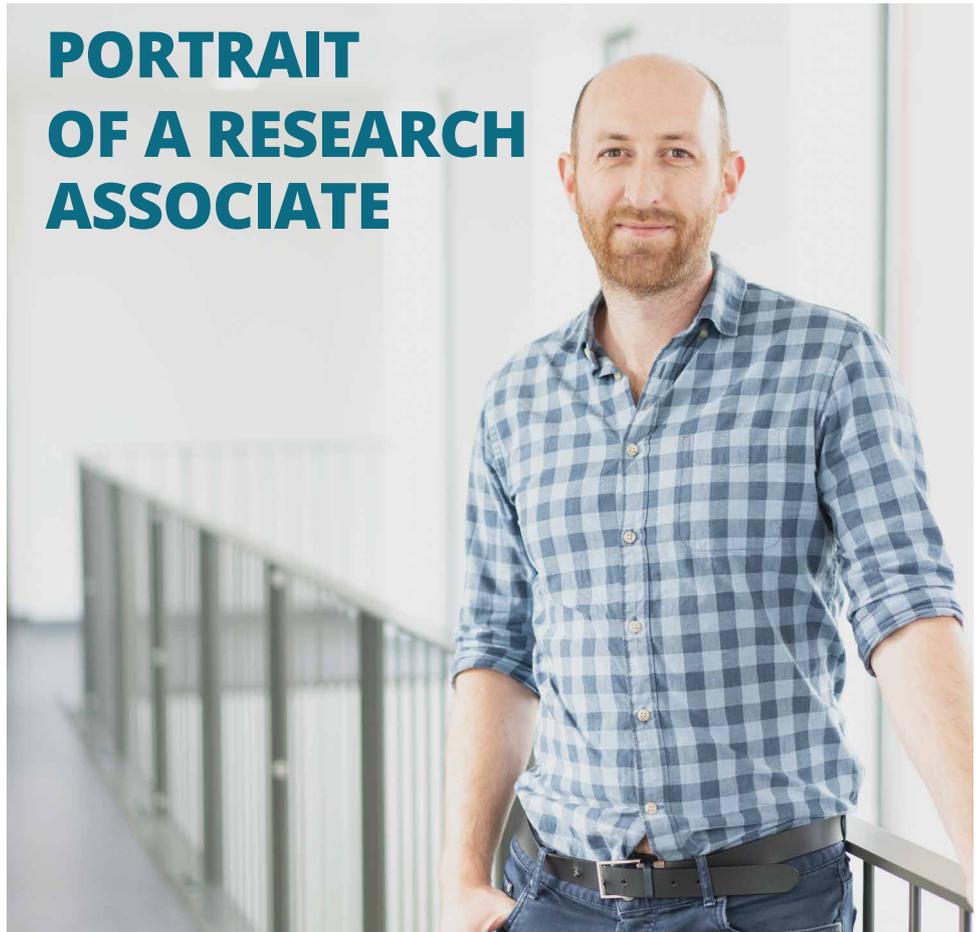


## CONGRATULATIONS !

- **Aurélien Bustin** and **Kanchan Kulkarni** received a grant from the Lefoulon Delalande Foundation for their research projects.
- **Maxime Sermesant** has received a European Horizon 2020 grant for his AI project, Digital Twin & Clinical Trial for a Disruption in Catheter Ablation.
- **Aurélien Bustin** is the winner of an ISMRM Junior Fellow award 2021, recognizing the outstanding work of young researchers.
- **Matthias Stuber** received a gold medal at the Society for Cardiovascular Magnetic Resonance 2021 conference, the highest distinction in the profession.



## PORTRAIT OF A RESEARCH ASSOCIATE



### Meeting with Richard Walton, associate researcher in the tissue electrophysiology team, at Liryc.

#### **Richard, what is your position at Liryc ?**

I am a research associate, specializing in cardiac physiology.

#### **When did you join the institute ?**

I joined Liryc at the end of 2011, coming from the UK where I was already working with Prof Olivier Bernus, now Scientific Director at Liryc.

#### **What does it mean to be a research associate at Liryc ?**

I work mainly in the experimental laboratory, but I am also involved in the coordination of different research projects, from obtaining funding for these projects to the daily management of the experimental work in the lab. On the scientific side, I am interested in the mechanisms of sudden cardiac death, and more particularly in the development of new tools to map ventricular activity. I observe the behavior of cardiac cells and tissues with different imaging tools and try to understand the mechanism

of the heart and the impact of electrical and structural alterations in pathological hearts.

#### **What is your greatest pride ?**

My greatest pride is to coordinate a collaborative project "MultiFib" with two European teams. We are developing an innovative catheter to image microscopic details of the cardiac tissue. The goal is to characterize electrical activity with an optical approach, to better identify and localize electrical substrates that predispose to ventricular fibrillation. We should have a working prototype by 2022.

#### **To conclude, do you prefer to work in the UK or in France ?**

Today, my family is in France and I am also very happy to work in a great international professional environment, with huge research opportunities, right here in Bordeaux !



# A LOOK BACK AT THE KEY EVENTS

## → JANUARY 29, 2021

Second session of remote learning for the 20 students of the University Diploma in remote monitoring of implantable cardiac devices.

## → JANUARY 29-31, 2021

The teams participated to the 26th AFsymposium virtual edition on the latest advances in atrial fibrillation management.

**26<sup>TH</sup> ANNUAL INTERNATIONAL AF SYMPOSIUM**  
A complimentary CME activity – January 29-31, 2021  
This highly focused three-day virtual symposium will be streamed live.

**COMPLIMENTARY REGISTRATION**  
More than 100 Expert Faculty  
Mini-Symposia / Panel Discussions  
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## → FEBRUARY 2021

Participation of the institute's reference center in charge of hereditary rhythmic diseases in the digital awareness campaign for rare diseases and their prevention, to remind the importance of diagnosis and family screening to improve access to treatments.

## → MARCH 4, 2021

Temporary installation of Intuitive Surgical robots for medical training in robotic surgery.



**WE CAN SUPPORT LIRYC TOGETHER  
TO PREVENT AND CURE HEART RHYTHM DISEASES**

Make a donation on : [www.ihu-liryx.fr](http://www.ihu-liryx.fr)

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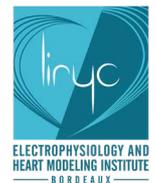
## → APRIL 6, 2021

Dr Mèlèze Hocini has taken part in the first ANCRE medical program broadcast, a patron of the institute and Allianz, to discuss research & COVID-19 with other experts.



## → MARCH 25, 2021

The world's first commercially approved use of pulsed field ablation technology to treat patients with atrial fibrillation on March 23rd by the IHU Liryx and Bordeaux University Hospital, led by Prof. Pierre Jaïs using technology from Farapulse.



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## NEWSLETTER N° 12 /// APRIL 2021

Directors of the publication : the board of directors with P. Jaïs, M. Hocini, P. Jaïs, R. Marthan, P. Bordachar, O. Bernus, J. Boussuge-Rozé, R. Dubois, V. Bitker, H. Normand, M. Haissaguerre. • **Model and graphics** : F. Garcia, E. Gaillacq • **Photo Credits** : Liryx - Richard Noury - Gautier Dufau - Production du désert - Marie Astrid Jamois - Grilled Cheese - Maitexu Etchevarria.

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