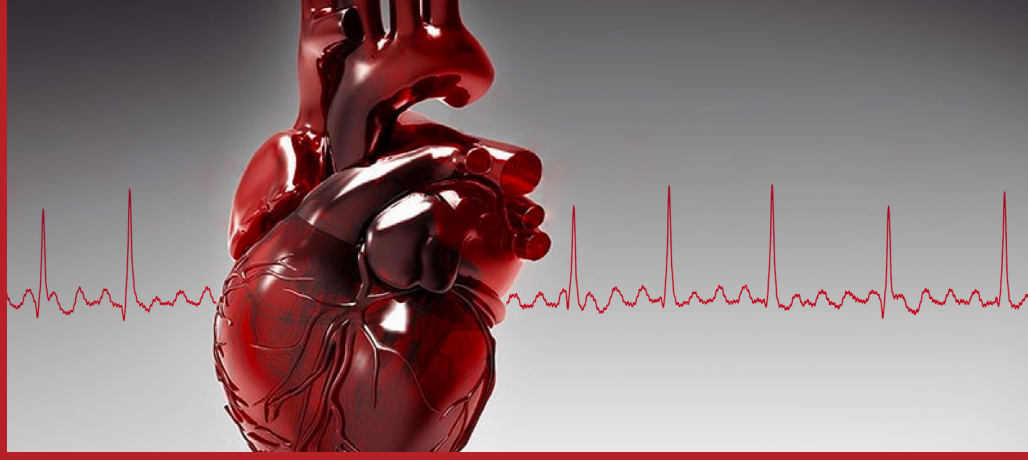
MY-ATRIA



Newsletter 01
2019

Introducing MY-ATRIA

Atrial fibrillation (AF) is a heart tachyarrhythmia characterized by a chaotic and unsuccessful contraction of the upper heart chambers, linked to an irregular and rapid heart rate. Although AF itself is not life-threatening, it is a serious medical condition that may lead to complications. In fact, it can increase the risk of stroke, heart failure, and other heart-related complications. AF is the most common arrhythmia diagnosed in clinical practice and it is estimated to affect 1.5%-2.0% of the world's population. However, despite its high incidence, the ability to treat AF has not improved, at least as assessed by age-adjusted mortality rate post-diagnosis.

The MY-ATRIA (MultidisciplinarY training network for Atrial fibRillation monItoring, treAtment and progression) project has the scientific goal to address the challenging research questions related to the understanding, monitoring and treatment of AF. The task will be achieved by using model-based integrative approaches, computational simulations and the analysis of biomedical signals and data.

A keyword of the multidisciplinary training provided by MY-ATRIA is mobility, both sectorial and geographic. In fact, the PhD training will integrate formation in academia, clinics, and industry; combining the expertise of leading European institutions from 5 different countries (Italy, Germany, Netherlands, Sweden and Spain). The aim is to shape a new generation of creative, entrepreneurial and innovative Early-Stage Researchers (ESRs), able to accelerate the transfer of advances in basic science to the market and the clinics.

In the MY-ATRIA framework, the individual research projects of 12 ESRs will provide knowledge exchange and advancement in the following **3 macro-areas**:

- **New knowledge about atrial function and AF mechanisms** by studying the electrocardiogram (ECG), and intracavity atrial electrogram (EGM) using a hybrid in-silico/in-vivo methodology.
- **AF detection, monitoring, progression and risk stratification** with a set of new tools suitable for implementation in novel device technology.
- **Assessment of effects of treatment** by developing computational models and linking them to ECG and EGM.

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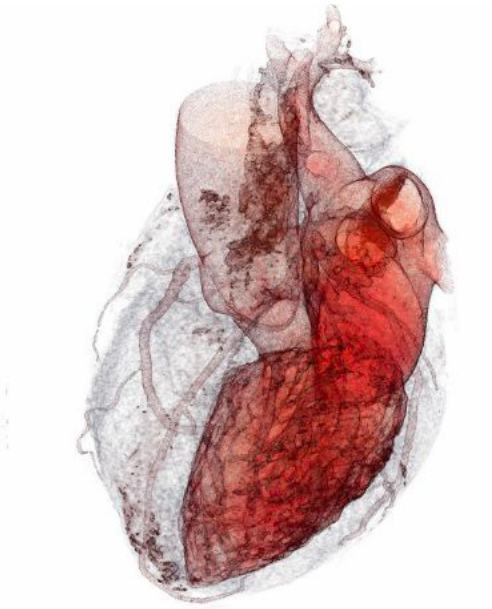
Edited and reviewed by the ESRs



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Beneficiaries and Partners

MY-ATRIA will provide the ESRs a truly multidisciplinary and multisectoral environment putting together preeminent academic and industrial European institutions, for a total of eight core Beneficiaries (6 academic, 2 industrial) and 6 Partners (4 clinical, 2 industrial) to provide scientific support and training.

Beneficiaries

Universitat Politècnica de València
(UPV)
Valencia, Spain

Politecnico di Milano
(POLIMI)
Milano, Italy

Universidad Zaragoza
(UNIZAR)
Zaragoza, Spain

Università degli Studi di Milano
(UMIL)
Milan, Italy

Medtronic Bakken Research Center
(MEDTRONIC)
Maastricht, Netherlands

Mortara Instrument Europe s.r.l.
(MORTARA)
Bologna, Italy

Lund University
(LUND)
Lund, Sweden

Karlsruhe Institute of Technology
(KIT)
Karlsruhe, Germany

Partners

Empatica
Milano, Italy

Gradiant
Vigo, Spain

Fondazione IRCCS Ca' Granda
Ospedale Maggiore Policlinico
Milano, Italy

Stadtiches Klinikum Karlsuhe
Karlsruhe, Germany

Hospital Universitario de Badajoz
Extremadura Community, Spain

Skane University Hospital
Lund, Sweden

Beneficiary Profile - Focus on the Politecnico di Milano

Politecnico di Milano is the largest technical university in Italy offering courses in engineering, architecture and design. Regarding Italian national rankings, Politecnico di Milano is considered as the best university for Engineering and the best Italian university according to the QS World University Rankings. Among its most famous students there is Giulio Natta, Nobel Prize in Chemistry in 1963.

Within the Department of Chemistry, Materials and Chemical Engineering, named after Giulio Natta, there is the Laboratory of Biological Structure Mechanics (LaBS). The latter is dedicated to research in the various fields of biomechanics, and its researchers pursue this goal through the integration of mathematical modelling and experimental testing.

The largest department of the Politecnico di Milano is the Department of Electronics, Information and Bioengineering (DEIB) and it is organized in six research areas: automatics, electronics, bioengineering, informatics, electrics and telecommunications.

Prof. Luca Mainardi

Prof. Valentina Corino

Prof. José Félix Rodríguez Matas

MY-ATRIA members in POLIMI

Within the DEIB the Biosignals-Bioimaging-Bioinformatics (BBB) group has developed a great experience in vital signals processing, system modelling and implementation of devices. Both LaBS and BBB are part of MY-ATRIA network.

Introductory Event – Milan, Italy

The **Introductory Event** took place in the Department of Chemistry, Materials and Chemical Engineering "Giulio Natta" of Politecnico di Milano, Italy, on 22 and 23 October 2018. It was attended by the recruited ESRs (who met all together for the first time), their supervisors, representatives from Beneficiaries and Partners, and researchers from the hosting university. The aim of the Introductory Event was to present MY-ATRIA in terms of its network, tasks and responsibilities, as well as to discuss preliminary technical aspects related to AF and to get to know the ESRs closely.

More in detail, during the first day, the project coordinator Prof. Luca Mainardi (*Politecnico di Milano*, Italy) gave the opening speech introducing Beneficiaries, Partners, and presenting the objectives MY-ATRIA aims to achieve. Afterwards, Prof. Federico Lombardi (*Fondazione IRCCS Ca' Granda Ospedale Maggiore Policlinico*, Milan, Italy) imparted a lecture under the title "Atrial fibrillation: from physiopathology to clinical manifestation and treatment", explaining how to classify AF and the different strategies to detect AF episodes. Prof. Lombardi also exposed the mechanisms that trigger and maintain AF, as well as the most used treatments in clinical practice.

The meeting went on with the lecture held by Prof. Pablo Laguna and Prof. Juan Pablo Martinez (*Universidad de Zaragoza*, Spain) titled "Review on surface (ECG) and intracavitary (EGM) atrial signals analysis". In particular, Prof. Laguna presented an overview of ECG signals showing derived measures to detect AF, while Prof. Martinez focused on different methodologies to characterize AF based on features of atrial EGM signals.

The activities continued in the afternoon with a lecture given by Prof. Olaf Doessel (*Karlsruhe Institute of Technology*, Germany) and by Prof. Javier Saiz (*Universidad Politécnica de Valencia*, Spain) in the topic of "Review on numerical simulation/modelling of atrial activity", in which they showed 3D models of atria for the study of atrial electrophysiology.

The last two lectures aimed to put forward the importance of conducting a responsible research and disseminating research results, as well as of commercializing a product. In particular, the former was titled "Dissemination, Communication and Responsible Research and Innovation in European Funded Projects" and was held by Alice Barbaglio (*Officina H2020*, *Università degli Studi di Milano*, Milan, Italy). She illustrated the pillars of the responsible research and innovation and asked the participants of the event: Which were the strategies of an effective communication plan?

The last lecture was titled "From idea to product", and it was given by members of the *Empatica* company (Milan, Italy). They explained how to develop and promote a commercial device based on a research idea. At the end of the meeting all participants enjoyed the Italian Happy Hour, in which MY-ATRIA members had the opportunity to get to know each other better, chatting and discussing different topics.

The second day started with the presentation of the "European Charter for Researchers" by Prof. Luca Mainardi, to explain to the researchers and their supervisors which are the ethical problems and responsibilities to face in research. Afterwards, all ESRs introduced themselves, presenting their educational background, the objectives of their current project and the skills they would like to gain, as well as the future expectations for their career. You can find more about each ESR on http://www.myatria.polimi.it/researchers/.

Researcher profiles

ESR1
Jordan Elliot
(POLIMI)

Bottom-up study on the implications of interatrial block in the mechanisms of atrial fibrillation

ESR2
Rebecca Belletti
(UPV)

Detailed 3-D computer models of human atria and torso for studying atrial fibrillation, initiation and progression

ESR3
Giorgio Luongo
(KIT)

Body Surface Potential Maps and ECG-signals of atrial fibrillation

ESR4
Muhamed Vila
(UMIL)

Atrial complex networks in endocavitary recording during atrial fibrillation

ESR5
Ricardo Salinas Martínez
(MORTARA)

Paroxysmal atrial fibrillation: Continuous tracking of arrhythmia progression

ESR6
Hesam Halvaei
(LU)

Atrial fibrillation screening using everyday sensors and data fusion

ESR7
Mostafa Abdollahpur
(LU)

Risk stratification and prediction of interventions outcome in AF using novel ECG-based markers of atrial remodelling

ESR8
Francisco Javier Saiz Vivo
(BRC)

Assessment of the atrial fibrillation triggers and their role in its progression

ESR9
Guadalupe GarcíaIsla
(POLIMI)

Evaluation of the interplay mechanism between AF and AT detected by a single lead ECG

ESR10
Luca Azzolin
(KIT)

Integrated and personalized computational model of atria with AF for an efficient ablation

ESR11
Chiara Celotto
(UNIZAR)

Assessment of atrial fibrillation therapies targeting ion channels and neural components

ESR12
Jennifer Riccio
(UNIZAR)

Characterization of atrial fibrillation dynamics for ablation guidance and prediction of its efficacy

Marie Sklodowska Curie Actions: the project inspired by Marie Curie

The Marie Sklodowska Curie Actions (MSCA) were born in 1996 as a European program to fund promising researchers from all over the world. It is named after the Polish scientist famous for her work about radioactivity to honor and spread the values she stood for.

Marie Curie was a brilliant woman who loved math and physics and was forbidden to attend the all-male University of Warsaw. Despite of the difficulties, Marie decided to move to Paris to study at Sorbonne. Whereas the current circumstances determined Marie Curie's emigration from Poland to France, the MSCA promote mobility, encouraging both scientific exchange and transnational relationships. They enable researchers to go to different countries in EU, while secondments outside Europe are also encouraged.

In Paris, Marie met and married professor Pierre Curie, and together became one of the most significant scientific teams in history, discovering two elements (Polonium and Radium) and winning together a Nobel Prize in Physics. Even when Marie Curie had already made her greatest discoveries, earned a PhD and become the first female member at the Ecole Normal Superieure, she still faced difficulties in being accepted as a scientist woman. One of the MSCA main objectives is female inclusion in science. In fact, 41% of MSCA-supported researchers are women, higher than the average percentage of female researchers across Europe (33%). Moreover, 47% of MSCA grants have female coordinators, higher than the Horizon 2020 average.

"I am one of those who think like Nobel, that humanity will draw more good than evil from new discoveries."

Marie Sklodowska Curie
1867 - 1934

After their discoveries, a new radium-based industry began developing. However, the Curies decided not to deposit the international patent for the radio isolation process, preferring to leave it free to favor progress in this scientific sector. In this sense, the MSCA give a fundamental importance to the dissemination and communication of the project outcomes. The aim is not only to promote the spread of ideas within the scientific community but also to reach the whole society, in order to demonstrate how EU funding contributes to tackling economic and societal challenges.

Marie Curie was the first woman to become professor at the University of Paris, the first woman to win a Nobel Prize and the first person and only woman to win it twice. Furthermore, she was the only person to win a Nobel Prize in two different fields: Physics and Chemistry. The MSCA encourage intersectoral and multidisciplinary exchange, giving researchers the opportunity to gain experience in different types of organizations and improving their ability for entrepreneurship.

Through the MSCA, Marie Curie continues to inspire new generations of researchers. The program aims to avoid some of the mistakes of the past, such as breaking barriers of nationality, age, gender, field and sector, and creating an international scientific community for the growth of collective benefit. Marie Curie did not experience science only as a mission, always keeping alive the genuine pleasure for discovery: "I am among those who think that science has great beauty. A scientist in his laboratory is not only a technician: he is also a child placed before natural phenomena which impress him like a fairy tale. We should not allow it to be believed that all scientific progress can be reduced to mechanisms, machines, gearings, even though such machinery also has its beauty. Neither do I believe that the spirit of adventure runs any risk of disappearing in our world. If I see anything vital around me, it is precisely that spirit of adventure, which seems indestructible and is akin to curiosity".

Sources: https://ec.europa.eu/research/mariecurieactions/; http://www.whowasbookseries.com/books/who-was-marie-curie/; https://en.wikipedia.org/wiki/Marie_Sk%C5%82o-dowska-Curie_Actions - https://en.wikipedia.org/wiki/Marie_Curie; https://www.brainpickings.org/2014/09/23/marie-curie-on-science-and-wonder/; http://ec.europa.eu/assets/eac/msca/documents/documentation/msca-factsheet_en.pdf; http://msca2017.eu/wp-content/uploads/2017/05/MSCA-2017_DG.pdf; https://ec.europa.eu/research/participants/portal/desktop/en/support/faqs/faq-933.html; http://www.ncpacademy.eu/wp-content/uploads/2016/03/20151113-Training-Slides-for-NCPs-Gender-Equality-in-H2020.pdf; marie-curie-quotes.

CONTACTS MY-ATRIA
email: myatria@polimi.it
phone: +39 02 23993347
My-Atria
MY_ATRIA