

Innovative Training Networks (ITN)  
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**Multidisciplinary training network for Atrial fibRillation  
monitoring, treAtment and progression**

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| 2.0      | 30.04.2023    | All                         | Final version               |

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# 1 Summary

The aim of this deliverable is to list the scientific papers (Green or Gold Open access) which have been published during the MY-ATRIA project. The list of publications is accompanied by a few metrics used to quantify the MY-ATRIA scientific production.

## 2 List of publication

The list of publications produced as a result of the MY-ATRIA research activities and accepted before the end of the project are reported in the following table:

| No. | Conference/Journal   | Authors   | Title   |
|-----|--|---|---|
| 1   | 2020 Computing in Cardiology Conference (CinC)   | Mostafa Abdollahpur, Fredrik Holmqvist, Pyotr Platonov, Frida Sandberg  | Respiratory Modulation in Permanent Atrial Fibrillation   |
| 2   | 2020 Computing in Cardiology Conference (CinC)   | Ricardo Salinas-Martínez, Johan De Bie, Nicoletta Marzocchi, Frida Sandberg   | Automatic Detection of Atrial Fibrillation Using Electrocardiomatrix and Convolutional Neural Network   |
| 3   | 2020 Computing in Cardiology Conference (CinC)   | Hesam Halvaei, Emma Svennberg, Leif Sornmo, Martin Stridh   | False Alarm Reduction in Atrial Fibrillation Screening  |
| 4   | 2020 42nd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC) | G. Luongo, L. Azzolin, M. W. Rivolta, R. Sassi, J. P. Martinez, P. Laguna, O. Dossel, A. Loewe  | Non-Invasive Identification of Atrial Fibrillation Driver Location Using the 12-lead ECG: Pulmonary Vein Rotors vs. other Locations           |
| 5   | 2020 Computing in Cardiology Conference (CinC)   | Luca Azzolin, Giorgio Luongo, Sara Rocher, Javier Saiz, Olaf Doessel, Axel Loewe  | Influence of Gradient and Smoothness of Atrial Wall Thickness on Initiation and Maintenance of Atrial Fibrillation                            |
| 6   | 2020 Computing in Cardiology Conference (CinC)   | Giorgio Luongo, Luca Azzolin, Massimo W Rivolta, Tiago Paggi de Almeida, Juan Pablo Martínez, Diogo Coutinho Soriano, Olaf Doessel, Roberto Sassi, Pablo Laguna, Axel Loewe | Machine Learning to Find Areas of Rotors Sustaining Atrial Fibrillation From the ECG  |
| 7   | 2020 Computing in Cardiology Conference (CinC)   | Giorgio Luongo, Steffen Schuler, Massimo W Rivolta, Olaf Doessel, Roberto Sassi, Axel Loewe   | Automatic ECG-based Discrimination of 20 Atrial Flutter Mechanisms: Influence of Atrial and Torso Geometries                                  |
| 8   | 2019 Computing in Cardiology Conference (CinC)   | Jennifer Riccio, Alejandro Alcaine, Natasja de Groot, Richard Houben, Pablo Laguna, Juan Pablo Martínez   | Characterization of Propagation Patterns With Omnipolar EGM in Epicardial Multi-Electrode Arrays  |
| 9   | 2020 Computing in Cardiology Conference (CinC)   | Jennifer Riccio, Sara Rocher, Laura Martinez, Alejandro Alcaine, Javier Saiz, Juan Pablo Martínez, Pablo Laguna   | Unipolar Electrogram Eigenvalue Distribution Analysis for the Identification of Atrial Fibrosis   |
| 10  | 2020 28th European Signal Processing Conference (EUSIPCO)  | Jennifer Riccio, Alejandro Alcaine, Sara Rocher, Pablo Laguna, Javier Saiz, Juan Pablo Martinez   | Omnipolar EGM Voltage Mapping for Atrial Fibrosis Identification Evaluated with an Electrophysiological Model                                 |
| 11  | 2020 Computing in Cardiology Conference (CinC)   | Chiara Celotto, Carlos Sánchez, Konstantinos Mountris, Mostafa Abdollahpur, Frida Sandberg, Pablo Laguna, Esther Pueyo  | Relationship between Atrial Oscillatory Acetylcholine Release Pattern and f-wave Frequency Modulation: a Computational and Experimental Study |
| 12  | 2020 42nd Annual International   | Chiara Celotto, Carlos Sanchez,   | SK Channel Block and Adrenergic   |

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|----|---|---|---|
|    | Conference of the IEEE Engineering in Medicine & Biology Society (EMBC) | Konstantinos A. Mountris, Pablo Laguna, Esther Pueyo  | Stimulation Counteract Acetylcholine-Induced Arrhythmogenic Effects in Human Atria  |
| 13 | IEEE Transactions on Biomedical Engineering                             | Giorgio Luongo, Steffen Schuler, Armin Luik, Tiago P. Almeida, Diogo C. Soriano, Olaf Dossel, Axel Loewe  | Non-Invasive Characterization of Atrial Flutter Mechanisms Using Recurrence Quantification Analysis on the ECG: A Computational Study           |
| 14 | European Heart Journal  | Jorge Corral-Acero, Francesca Margara, Maciej Marciniak, Cristobal Rodero, Filip Loncaric, Yingjing Feng, Andrew Gilbert, Joao F Fernandes, Hassaan A Bukhari, Ali Wajdan, Manuel Villegas Martinez, Mariana Sousa Santos, Mehrdad Shamohammdi, Hongxing Luo, Philip Westphal, Paul Leeson, Paolo DiAchille, Viatcheslav Gurev, Manuel Mayr, Liesbet Geris, Pras Pathmanathan, Tina Morrison, Richard Cornelussen, Frits Prinzen, Tammo Delhaas, Ada Doltra, Marta Sitges, Edward J Vigmond, Ernesto Zacur, Vicente Grau, Blanca Rodriguez, Espen W Remme, Steven Niederer, Peter Mortier, Kristin McLeod, Mark Potse, Esther Pueyo, Alfonso Bueno-Orovio, Pablo Lamata | The 'Digital Twin' to enable the vision of precision cardiology   |
| 15 | Frontiers in Physiology   | Jennifer Riccio, Alejandro Alcaine, Sara Rocher, Laura Martinez-Mateu, Sergio Laranjo, Javier Saiz, Pablo Laguna, Juan Pablo Martínez   | Characterization of Atrial Propagation Patterns and Fibrotic Substrate With a Modified Omnipolar Electrogram Strategy in Multi-Electrode Arrays |
| 16 | Frontiers in Physiology   | Chiara Celotto, Carlos Sánchez, Konstantinos A. Mountris, Pablo Laguna, Esther Pueyo  | Location of Parasympathetic Innervation Regions From Electrograms to Guide Atrial Fibrillation Ablation Therapy: An in silico Modeling Study    |
| 17 | Hearts  | Claudia Nagel; Axel Loewe; Olaf Doessel; Giorgio Luongo   | Computer Modeling of the Heart for ECG Interpretation—A Review  |
| 18 | EP Europace   | Luongo, G.; Schuler, S.; Rivolta, M. W.; Doessel, O.; Sassi, R.; Loewe, A.  | Automatic classification of 20 different types of atrial tachycardia using 12-lead ECG signals  |
| 19 | Frontiers in Physiology   | Jorge Sánchez; Jorge Sánchez; Giorgio Luongo; Mark Nothstein; Laura A. Unger; Javier Saiz; Beatriz Trenor; Armin Luik; Olaf Dössel; Axel Loewe  | Using Machine Learning to Characterize Atrial Fibrotic Substrate From Intracardiac Signals With a Hybrid in silico and in vivo Dataset          |
| 20 | Frontiers in Physiology   | Azzolin L; Steffen Schuler; Olaf Doessel; Axel Loewe  | A Reproducible Protocol to Assess Arrhythmia Vulnerability  |



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|----|--|---|--|
|    |  |   | in Silico: Pacing at the End of the Effective Refractory Period  |
| 21 | Journal of Clinical Medicine   | Nagel, Claudia and Luongo, Giorgio and Azzolin, Luca and Schuler, Steffen and Dössel, Olaf and Loewe, Axel  | Non-Invasive and Quantitative Estimation of Left Atrial Fibrosis Based on P Waves of the 12-Lead ECG—A Large-Scale Computational Study Covering Anatomical Variability |
| 22 | Frontiers in Physiology  | Muhamed Vila; Massimo Walter Rivolta; Giorgio Luongo; Laura Anna Unger; Armin Luik; Lorenzo Gigli; Federico Lombardi; Axel Loewe; Roberto Sassi   | Atrial Flutter Mechanism Detection Using Directed Network Mapping  |
| 23 | Cardiovascular Digital Health Journal  | Luongo, Giorgio; Azzolin, Luca; Schuler, Steffen; Rivolta, Massimo W.; Almeida, Tiago P.; Martínez, Juan P.; Soriano, Diogo C.; Luik, Armin; Müller-Edenborn, Björn; Jadidi, Amir; Dössel, Olaf; Sassi, Roberto; Laguna, Pablo; Loewe, Axel | Machine learning enables noninvasive prediction of atrial fibrillation driver location and acute pulmonary vein ablation success using the 12-lead ECG                 |
| 24 | Frontiers in Physiology  | Mostafa Abdollahpur; Fredrik Holmqvist; Pyotr G. Platonov; Frida Sandberg   | Respiratory Induced Modulation in f-Wave Characteristics During Atrial Fibrillation.   |
| 25 | 2021 43rd Annual International Conference of the IEEE Engineering in Medicine & Biology Society (EMBC) | Muhamed Vila, Sara Rocher, Massimo W Rivolta, Javier Saiz, Roberto Sassi  | Directed Network Mapping Approach to Rotor Localization in Atrial Fibrillation Simulation  |
| 26 | Frontiers in Physiology  | Ricardo Salinas Martinez, Johannes de Bie, Nicoletta Marzocchi, Frida Sandberg  | Detection of Brief Episodes of Atrial Fibrillation Based on Electrocardiomatrix and Convolutional Neural Network   |
| 27 | 2021 Computing in Cardiology Conference (CinC)   | Javier Saiz-Vivo, Mostafa Abdollahpur, Luca T. Mainardi, Valentina D.A. Corino, Mirko De Melis, Frida Sandberg  | Atrial Fibrillatory Rate Characterization Extracted from Implanted Cardiac Monitor Data  |
| 28 | Sensors  | Hesam Halvaei; Leif Sörnmo; Martin Stridh   | Signal Quality Assessment of a Novel ECG Electrode for Motion Artifact Reduction   |
| 29 | Frontiers in Physiology  | Hesam Halvaei, Emma Svennberg, Leif Sörnmo, Martin Stridh   | Identification of Transient Noise to Reduce False Detections in Screening for Atrial Fibrillation  |
| 30 | 2020 Computing in Cardiology Conference (CinC)   | Elliott J; Dossel O; Loewe A; Mainardi L; Corino V; Rodriguez Matas JF  | An In-Silico Study Into the Impact of Electrophysiological Variability at the Cellular Level on the Re-entry Patterns in Atrial Fibrillation                           |
| 31 | 2021 Computing in Cardiology Conference (CinC)   | Elliott J; Belen MK; Mainardi L; Corino V; Rodriguez Matas JF   | Impacts of Cellular Electrophysiological Variability on Conduction Velocity Within Isolated Tissue and Depolarization and Repolarization Across the Whole Atrial Model |

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|----|--|--|---|
| 32 | 2019 Computing in Cardiology Conference (CinC)   | Elliot J, Dössel O, Lowe A, Mainardi L, Corino V, Rodriguez Matas JF   | An In-Silico Study of the Effects of Conductance Variation on the Regionally Based Action Potential Morphology                      |
| 33 | Mathematics  | Elliot J, Belen MK, Mainardi L, Rodriguez Matas JF   | A Comparison of Regional Classification Strategies Implemented for the Population Based Approach to Modelling Atrial Fibrillation   |
| 34 | 2020 Computing in Cardiology Conference (CinC)   | Rebecca Belletti; Laura Martinez Mateu; Lucia Romero Perez; Javier Saiz  | Simulation Study of the Arrhythmogenic Effects of Two Missense Mutations in Human Atrial Fibrillation                               |
| 35 | Frontiers in Physiology  | Rebecca Belletti; Lucia Romero; Laura Martinez-Mateu; Elizabeth M. Cherry; Flavio H. Fenton; Javier Saiz           | Arrhythmogenic Effects of Genetic Mutations Affecting Potassium Channels in Human Atrial Fibrillation: A Simulation Study           |
| 36 | CASEIB 2020. Libro de Actas. XXXVIII Congreso Anual de la Sociedad Española de Ingeniería Biomédica. | Belletti, R.; Martínez Mateu, L.; Romero Pérez, Lucia; Cherry, E.; Fenton, F. H.; Saiz Rodríguez, Francisco Javier | Arrhythmogenicity quantification of two genetic defects affecting IKr channel in AF patients  |
| 37 | CASEIB 2019. Libro de Actas. XXXVII Congreso Anual de la Sociedad Española de Ingeniería Biomédica.  | Belletti, R.; Martínez-Mateu, L.; Romero-Pérez, L.; Saiz, J.   | Computational simulations of the effects of the V17M missense mutation on atrial electrical activity                                |
| 38 | 2020 Computing in Cardiology Conference (CinC)   | Guadalupe García-Isla, Rita Laureanti, Valentina D. Corino, Luca T. Mainardi                                       | ECG Morphological Decomposition for Automatic Rhythm Identification   |
| 39 | 2021 Computing in Cardiology Conference (CinC)   | Guadalupe Garcia-Isla, Luca Mainardi, Valentina DA Corino  | A Poincaré Image-Based Detector of ECG Segments Containing Atrial and Ventricular Beats   |
| 40 | 2021 Computing in Cardiology Conference (CinC)   | Stefano Magni, Andrea Sansonetti, Chiara Salvi, Tiziana Tabiaddon, Guadalupe Garcia-Isla                           | Combining ResNet Model with Handcrafted Temporal Features for ECG Classification with Varying Number of Leads                       |
| 41 | 2019 Computing in Cardiology Conference (CinC)   | Guadalupe Garcia-Isla, Valentina Corino, Luca Mainardi   | Cardiac Tachyarrhythmia Detection by Poincaré Plot-Based Image Analysis   |
| 42 | Frontiers in Physiology  | Guadalupe García-Isla, Luca Mainardi and Valentina D. A. Corino  | A Detector for Premature Atrial and Ventricular Complexes   |
| 43 | Frontiers in Physiology  | Saiz-Vivo, Javier; Corino, Valentina; Hatala, R; De, Melis; Mainardi, Luca   | Heart Rate Variability and Clinical Features as Predictors of Atrial Fibrillation Recurrence After Catheter Ablation: A Pilot Study |
| 44 | IEEE Journal of Biomedical and Health Informatics  | Guadalupe Garcia-Isla, Valentina D.A. Corino, Luca Mainardi  | Poincaré Plot Image and Rhythm-Specific Atlas for Atrial Bigeminy and Atrial Fibrillation Detection                                 |

### 3 Publication analytics

#### 3.1 Quality and distribution of publications

The overall production consists of 20 journal papers, 22 articles in international conference proceeding and 2 articles in national conference proceedings. A fairly balance ratio between journal and conference contributions is observed (45% journals, 55% conferences) and shows that dissemination activities was differentiated to reach a larger audience and to maximize potential impacts.

Ten different journals were targeted for article publications: 4 journals are in Q1 rank, 3 in Q2 (source: Scimago - <https://www.scimagojr.com/>) and the remaining three are open-access journal recently started (thus they have no rank yet).

Concerning conference publications, the audience varied from hundreds of attendees (Computing in Cardiology or European Signal Processing Conference) to thousands of attendees (as for the annual IEEE-EMB Conference).

#### 3.2 Distribution among ESR and WPs

All the ESR contributed with at least 2 publications during the project. The distribution of the papers with respect to the ESRs is shown in the following table:

| ESR   | 1 | 2 | 3  | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|-------|---|---|----|---|---|---|---|---|---|----|----|----|
| #Pubs | 4 | 4 | 11 | 2 | 2 | 3 | 4 | 2 | 6 | 7  | 3  | 4  |

With respect to WPs the distribution of the publications is the following:

| WP    | WP2 | WP3 | WP4 |
|-------|-----|-----|-----|
| #Pubs | 20  | 10  | 20  |

On average, the production rate was 4.3 publications/ESR, ranging from 2 to 11 publications/ESR. This score is in-line with the number (>2) declared in the DoA.

A relationship emerges between the enrollment date and the number of publication per ESR: a larger production is observed in the three ESRs (ESR3, ESR9 and ESR10) that were enrolled before the others. In fact, not all ESRs already finished the Ph.D. at the conclusion of the MY-ATRIA project and more publications are envisioned for them in the next months.

Interestingly, the networks activities performed during the MY-ATRIA project have stimulated the production of joint-publications among ESR's. Nine publications (*i.e.*, 20% of the overall production) were authored by at least 2 ESRs.

With respect to the research activities spanning between different WPs, they are reported in 7 papers which involves ESRs from different WPs.