

UNIVERSITÀ Politecnica Delle Marche

Al-driven Electroanatomical Mapping for Ventricular Arrhythmia And Sudden Cardiac Death Prediction

Supervisor: Prof. Michela Casella

Department of Odontostomatologic and Specialized Clinical Scienceshttps://www.disco.univpm.it/





Supervisor: Prof. Michela Casella

Research Group Description: the Supervisor

Prof. Michela Casella (MD, PhD).

Associate Professor of Cardiology, DISCO, Faculty of Medicine, Marche Polytechnic University, Ancona.

More than 260 peer reviewed research articles with about 7,344 citations received, <u>https://orcid.org/0000-0002-5322-1742</u>. H-index = 45 according to Scopus. Highly qualified profile in the field of cardiology and electrophysiology.

Involved in several projects.

Funded Research Projects

2024

Staff member

<u>PNRR-MCNT3-2023-12376978</u>. SEARCH PROJECT: Statin effect on arrythmogenic cardiomyopathy disease progression.

2018

Principal Investigator

MIUR RF-2018-12367090: Cardiac Arrhythmia catheter ablation procedures guided by x-Ray imaging: N-Acetylcisteine Protection Against radiation induced Cellular damagE (CARAPACE Study).

2016

Staff Member

European Research Area Network on Cardiovascular Diseases (ERA-CVD): Joint Transnational CallCardiomyocytenon myocyte interplay as a novel platform for mechanistic insights and therapeutic approaches in arrhythmogenic cardiomyopathy heart failure

2016

Staff Member

<u>TELETHON - GGP16001</u>: Contribution of lipids and their oxidized metabolites on Arrhythmogenic Cardiomyopathy pathogenesis

2015

Staff Member

<u>PRIN 2015ZLNETW:</u> Arrhythmogenic cardiomyopathy: cross-talk among cardiomyocytes, stromal cells and sympathetic neurons in disease pathogenesis





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Research Group Description: the Group



STAFF: The group is currently formed by an Associate Professor, a post-doc researcher, a PhD student and medical residents.

RESEARCH ACTIVITY

The main research lines of the research group are: Atrial Fibrillation a. Ablative treatment and heart failure b. New technologies for ablation Ventricular Tachycardias a. Risk stratification mapping b. Endomyocardial biopsies c. Ablation and defibrillator implantation Athletic Patients and Arrhythmic Risk Assessment Pediatric Patients a. Ablation b. Paroxysmal supraventricular tachycardias **Brugada Syndrome** a. Epidemiology b. Atrial fibrillation c. Defibrillator implantation d. Arrhythmic risk assessment **Cardiomyopathies: Myocarditis and Arrhythmogenic** Cardiomyopathy a. Arrhythmic risk stratification b. Mapping c. Endomyocardial biopsies

EQUIPMENT

Electrophysiology laboratory equipped with the most advanced electroanatomical mapping systems, also featuring integration capabilities with imaging; Faculty of Engineering (UNIVPM), equipped with Al instruments.

Dept. Clinical Sciences- DISCO UNIVPM





The Department of Odontostomatologic and Specialized Clinical Sciences Director: Prof. Andrea Giovagnoni

The **Department of Odontostomatologic and Specialized Clinical Sciences** is the scientific and educational organizational structure of the UNIVPM University established in 2008, devoted to the promotion of scientific research, education and the dissemination of scientific research results in the community.

Its main objectives are to plan, organize and regularly evaluate the quality of research activity carried out in the scientific fields and disciplines under its competence; to plan, organize and manage the first-level and master's courses of the Faculty of Medicine; and, finally, provide to cultural and educational activities and contribute to training and orientation activities based on the needs of students in cooperation with the Medical Association.

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Project Idea: AI-DRIVEN ELECTROANATOMICAL MAPPING FOR VENTRICULAR ARRHYTHMIA AND SUDDEN CARDIAC DEATH PREDICTION

Backgroud: This study explores AI's role in analyzing electroanatomical mapping (EAM) data of the left ventricle to predict major arrhythmic events (MAE). AI models such as Machine Learning (ML) and Deep Learning (DL) identify substrate patterns and assess their prognostic impact.

- Ventricular arrhythmias are a leading cause of cardiovascular death.
- EAM is used to identify arrhythmogenic areas.
- Current manual EAM interpretation lacks precision and consistency.
- Artificial Intelligence (AI) can improve diagnosis and risk stratification.

Project OBJECTIVES:

- Develop AI-based models for EAM data analysis.
- Validate predictive models against clinical outcomes.
- · Identify novel metrics to enhance diagnosis and treatment.
- Implement an AI framework for clinical decision support.



Machine Learning of Prognostic Factors of Arrhythmic Cardiac Death