



IRCCS MultiMedica Prevention of cardiovascular diseases: physiopathology, translational research and experimental applications

Cardiovascular research at MultiMedica focuses on understanding the molecular, cellular, and clinical mechanisms underlying atherosclerosis and cardiometabolic diseases. Our work integrates basic, translational, and clinical research, with the overarching goal of improving disease prevention, risk stratification, and therapeutic management for patients across the spectrum of cardiovascular conditions.

A central area of investigation concerns lipid metabolism and the pathways regulating LDL cholesterol, with particular attention to the molecular mechanisms that influence atherosclerotic plaque formation and progression. Studies exploring the biology of key proteins, their expression in different tissues, and their systemic functions contribute to clarifying how lipid-related processes interact with vascular inflammation and endothelial dysfunction.

Diagnostic innovation represents another major component of our research program. Advanced imaging technologies—including nuclear medicine approaches such as PET and SPECT—are employed to refine the evaluation of suspected coronary artery disease and to improve the accuracy of ischemia detection. These tools support clinical decision-making and help tailor management strategies based on individual risk profiles.

Research at MultiMedica also addresses the interplay between cardiovascular health, immunity, and ageing. Particular attention is de-

voted to understanding how immune cell phenotypes change with age and frailty, and how these alterations contribute to cardiovascular vulnerability. The identification of circulating biomarkers involved in immune regulation and tissue homeostasis is a growing field of interest, with potential implications for early detection of frailty and age-associated cardiometabolic risk.

In parallel, increasing efforts are devoted to RNA-based mechanisms, including the role of microRNAs in endothelial function, inflammation, vascular remodelling, and plaque stability. These small molecules are emerging as promising candidates for diagnostic and therapeutic applications, reflecting a broader shift toward precision medicine in cardiovascular research.

Across all these areas, MultiMedica's research is characterized by strong integration between laboratory science and clinical practice. Multidisciplinary collaboration – spanning cardiology, internal medicine, molecular biology, geriatrics, diabetology, and advanced imaging – ensures a comprehensive approach to cardiovascular disease. National and international partnerships further strengthen the impact of our work and enhance the translation of scientific discoveries into improved patient outcomes.

Alberico L. Catapano

Corresponding Author

Alberico L. Catapano: alberico.catapano@unimi.it