

A Multi-omics Approach to Cardiovascular Disease



Manuel MAYR, MD, PhD

British Heart Foundation

**Professor of Cardiovascular
Proteomics**

**King's British Heart Foundation
Centre of Research Excellence**

King's College London, London, UK

Cardiovascular disease (CVD) results from a complex interplay of genes and environmental factors. A clear picture of how these different factors impact on individuals is yet to emerge. Lipid abnormalities account for over 60% of the population attributable risk for myocardial infarction and are the most important single target for prevention, along with blood pressure lowering and smoking cessation. Traditionally, research focused predominantly on lipid classes, such as cholesterol and triglycerides, while ignoring their inherent complexity of lipid speciation and differential associations with CVD. Likewise, lipoproteins were mostly defined in terms of their separation by physical properties which does not always correspond to their function. Among apolipoproteins, the main focus has been on apoB-100 and apo-A1. There are likely targets beyond these measurements that can inform on CVD risk. My group uses mass spectrometry-based proteomics to integrate biological information in disease-specific networks for CVD. Using mass spectrometry, we recently demonstrated that resolving

the complexity of apolipoproteins improves CVD risk prediction. Notably, plasma data are integrated with proteomics findings from human atherosclerotic plaques to advance our understanding how circulating biomarkers relate to lipid retention and vascular inflammation in CVD. By linking cutting-edge technologies to tissue biobanks and prospective, community-based studies, our aim is to demonstrate how a multi-omics approach can be used to advance our understanding of the pathophysiological mechanisms of CVD.

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SHORT BIOGRAPHY

Manuel Mayr qualified in Medicine from the University of Innsbruck (Austria) in 1999. He then moved to London to undertake a PhD on combining proteomics and metabolomics. Upon completion of his PhD, he achieved promotion to Professor at King's College London in 2011. In 2017, he has been awarded a British Heart Foundation Personal Chair for Cardiovascular Proteomics. His academic achievements have been recognised by the inaugural Michael Davies Early Career Award of the British Cardiovascular Society (2007), the inaugural Bernard and Joan Marshall Research Excellence Prize of the British Society for Cardiovascular Research (2010), and the Outstanding Achievement Award by the European Society of Cardiology Council for Basic Cardiovascular Science (2013). In 2017, he was awarded a British Heart Foundation Personal Chair.